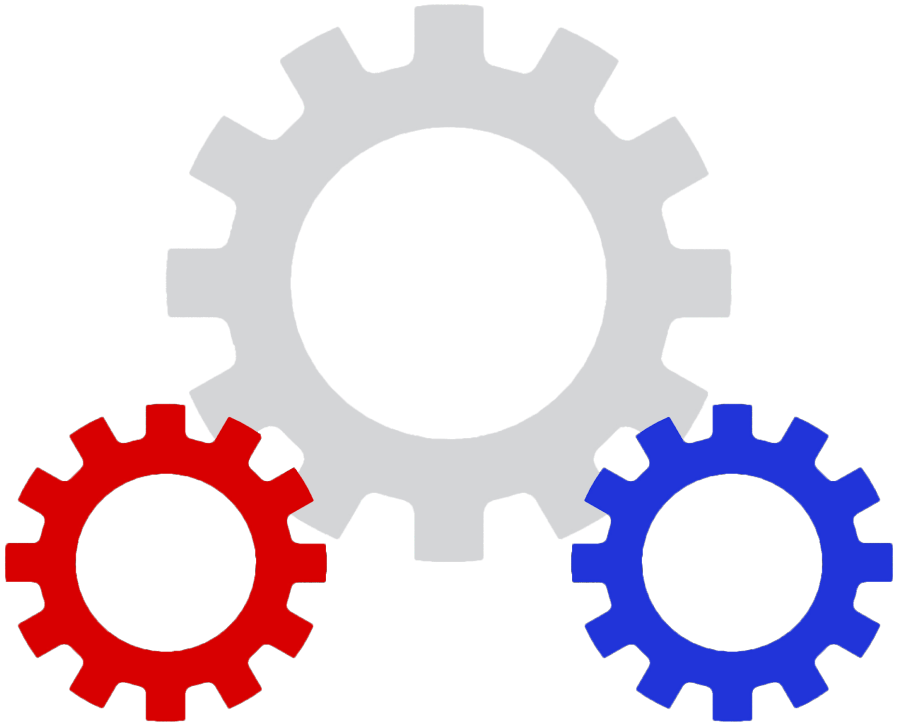
The WorBots 4145

2022 - 2023 Impact Award



Cultivating a Culture of STEM in Worthington, Ohio

ENGAGE, INSPIRE, IMPACT

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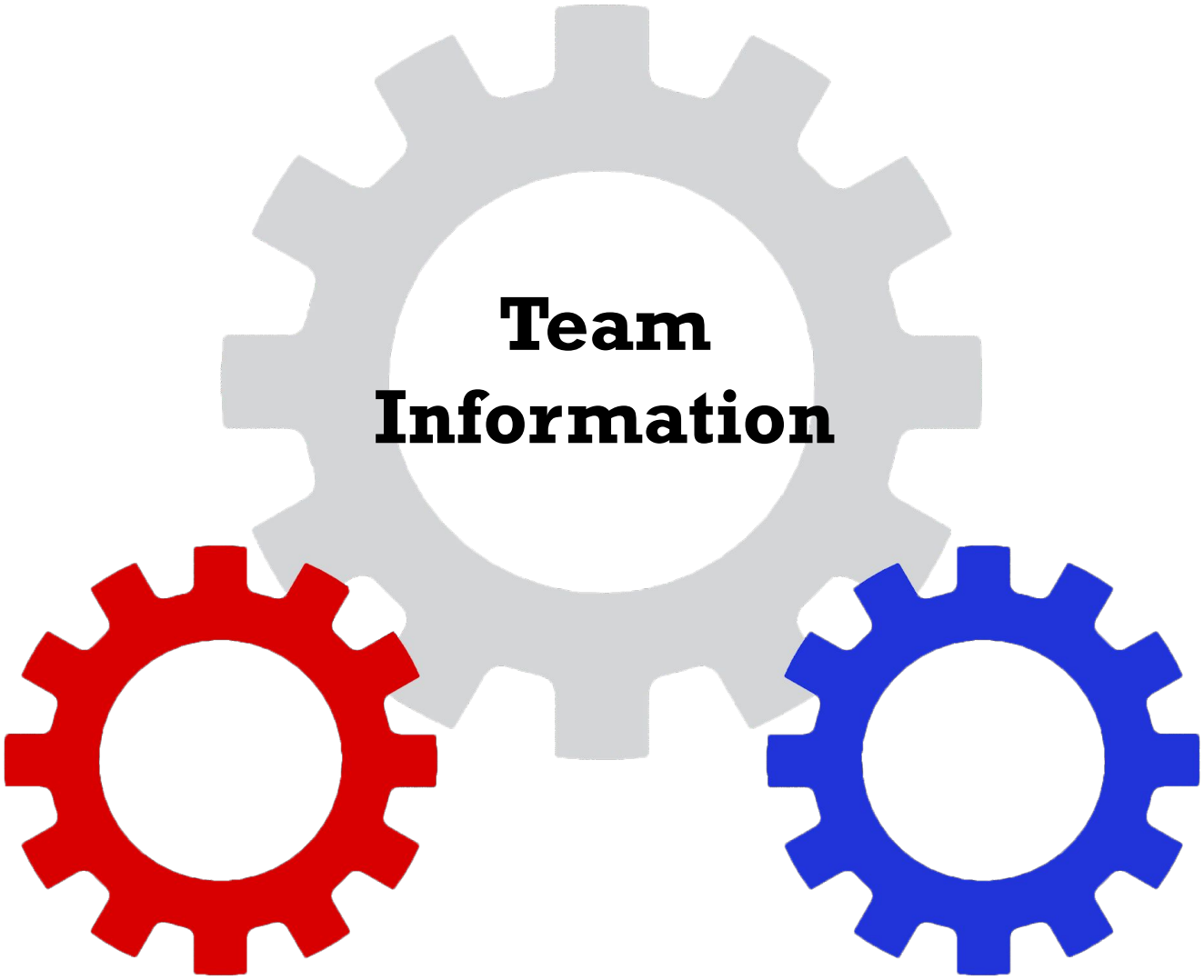
Team Information



Started in 2012, the WorBots 4145 (The Worthington Robotics Team), are dedicated to cultivating a culture of STEM in Worthington, Ohio by engaging, inspiring, and impacting our community.

> ***To engage*** is to get our community involved, regardless of their prior affiliation with STEM, and ensure that STEM is reaching a diverse audience in and beyond Worthington.
> ***To inspire*** is to get students of all ages involved with the *FIRST* pathway and encourage them to stay involved throughout their academic and professional careers.
> ***To impact*** is to go beyond reaching our community — to increase STEM opportunities and access, develop educational resources, and improve Worthington through giveback activities.

We bring together students from both Worthington City Schools high schools, Worthington Kilbourne and Thomas Worthington. Despite being "rival schools" athletically, we consider ourselves partners in STEM education and inspiration. We are from a fairly small, land-locked community and have been central in the effort to expand opportunities for students in Worthington to develop STEM knowledge.

In eleven years, Worthington *FIRST* has grown from a single team of approximately twenty students to a pathway of eighty students on teams FLL 44451, FLL 44452, FLL 57154, FTC 16284, and FRC 4145.

FLL Shop Tour 2023 (Picturing WorBots' Team Leads and FLL 57154)

WorBots 4145: Program History

Cultivating a Culture of STEM in Worthington, Ohio

Team Timeline

2012 — In 2012, the WorBots was founded — officially becoming the first *FIRST* team in Worthington, Ohio. For our first competing season, we joined less than twenty students. As the first Worthington *FIRST* team, we effectively dedicated ourselves to cultivating a culture of STEM in Worthington, Ohio.

2016 — At the Queen City Regional, we competed in the finals alongside 3324 and 4028.

2018 — At the Greater Pittsburgh Regional, we were Regional Finalists. At Buckeye Regional, we became Regional Winners. At the Miami Valley Regional, we were the recipients of the Creativity Award.

We developed three feeder teams: FLL 44451, FLL 44452, and FTC 16284.

2019 — Alongside 48 and 4028, we won the Buckeye Regional and qualified for the *FIRST* World Championship

We won the Innovation in Control Award.

2020 — We expanded our team beyond a STEM focus — developing a business subteam. At the only competition we could compete at prior to the outbreak of the Covid-19 Pandemic, we received the Entrepreneurship Award.

2022 — At the Greater Pittsburgh Regional, we were the recipients of the Team Spirit Award.

At the Midwest Regional, we won the Innovation in Control Award.

We started FLL team 57154

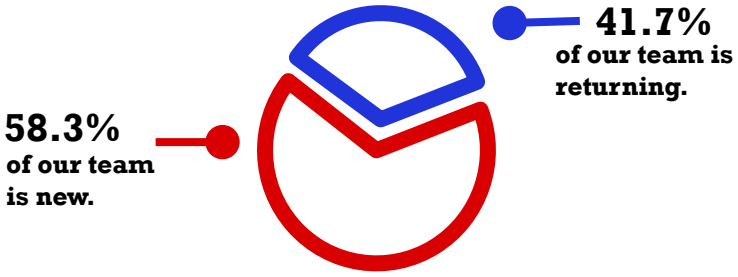
Outreach and Giveback Summary

- Hosted the 2018 CORI Invitational
- Hosted the 2019 CORI Invitational
- Presented to primary and secondary school administrators and to expand Worthington FIRST.
- Ran a booth at the Worthington Kilbourne Activities Fair
- Ran a station at the Worthington Hills STEM Night
- Volunteered and ran a booth at a local STEM fair
- Ran informational booths and interactive activities for a Middle School STEM Night
- Volunteered to help run the Kilbourne Middle School STEM Night
- Ran a booth at the 2019 Worthington District Science Day
- Ran a booth at the Bluffsview Elementary School Science Night
- Participated in STEM nights at the Olde Worthington Library
- Presented to district officials to gain support for Worthington FIRST LEGO League and protect the FRC program.
- Developed an informal robotics club at Wilson Hill Elementary School.
- Published business and recruiting resources
- Presented to IED classes.
- Presented to POE classes.
- Presented to CAD classes
- Ran shop tours for FLL team students.
- Demonstrated our robot to our FLL teams.
- Ran shop tours for middle school students
- Volunteered at a mini battle bots event.
- Ran a shop tour for ATS Automation
- Presented *FIRST* to local businesses
- Volunteered at a Gateway to Technology summer camp
- Ran a robotics competition for Worthington middle school students
- Provided robot demonstrations to students at freshman orientation
- Developed safety kits for other *FIRST* teams
- Presented to Destination Imagination students from Worthington Elementary Schools
- Provided an interactive shop tour for Worthingway Middle School
- Provided an interactive shop tour for Kilbourne Middle School
- Ran an interactive tour for students at McCord Middle School
- Participated in Habitat for Humanity
- Participated in Turn for Troops
- 3D-Printed face shields to address a lack of PPE in Delaware County
- Ran a LEGO Toy Drive for Nationwide Children's Hospital with our FLL teams.
- Fixed toys for community members before the holidays
- Ran multiple food drives
- Hosted the 2023 CORI Invitational
- Demonstrated robotics at the Bluffsview Care After School (CAS) program.
- Participated in student news segments for TWHS and WKHS
- Presented alongside FC Bank at Worthington Market Day
- Ran shop tours for elementary school students
- Ran a shop tour for Lake Shore Cryotronics

WorBots 4145: Team Statistics

Cultivating a Culture of STEM in Worthington, Ohio

Team Structure



- 64% of students are from an underrepresented STEM minority.
- 73% of our fabrication team is female.
- 42% of our team is female.
- 33% of our team is from an ethnically diverse background.

39% of team members were on a feeder team prior to joining.

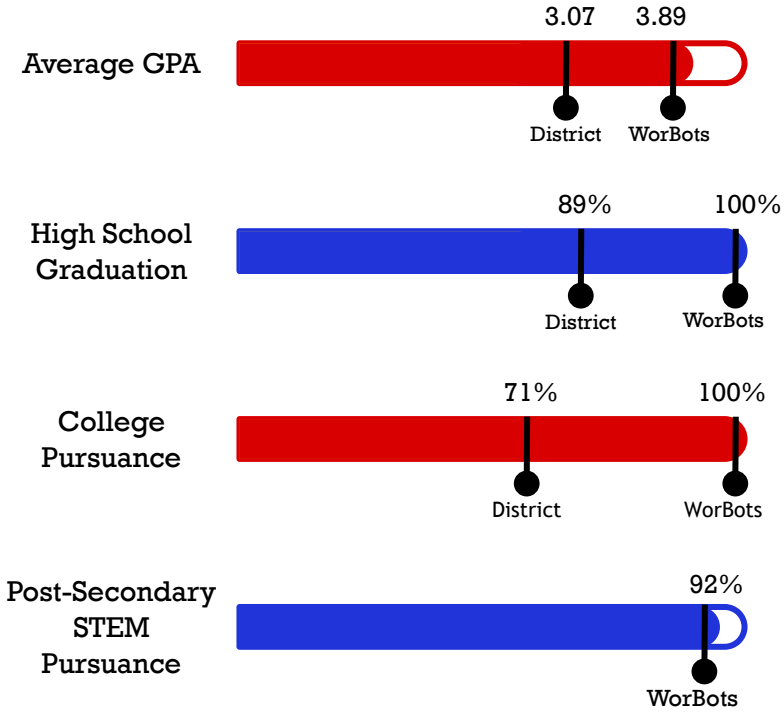
78% of team members attended an outreach event prior to joining.

70% of our team leadership is female.

97% of current team members intend to pursue STEM.

82% of returning WorBots cite *FIRST* as a reason they intend to pursue STEM.

Academics



- 69% of WorBots are in the PLTW program.
- 56% of WorBots play a sport.
  - The district average is 47%.
- 39% of WorBots are art students.
- 61% of WorBots are taking a music course.
- 50% of our students are from TWHS and 50% are from WKHS.
- The average student on our team is involved in three additional extracurricular activities.

WorBots 4145: Season Summary

Cultivating a Culture of STEM in Worthington, Ohio

4 Shop tours for middle and elementary school students to learn more about *FIRST*.

1 Invitational hosted, including twenty teams from around Central Ohio.

4 Advocacy projects to preserve Worthington STEM as our schools are remodeled.

5 *FIRST* teams mentored (3 FLL, 1 FTC, 1 FRC), one of which we started this season.

CLIPSE

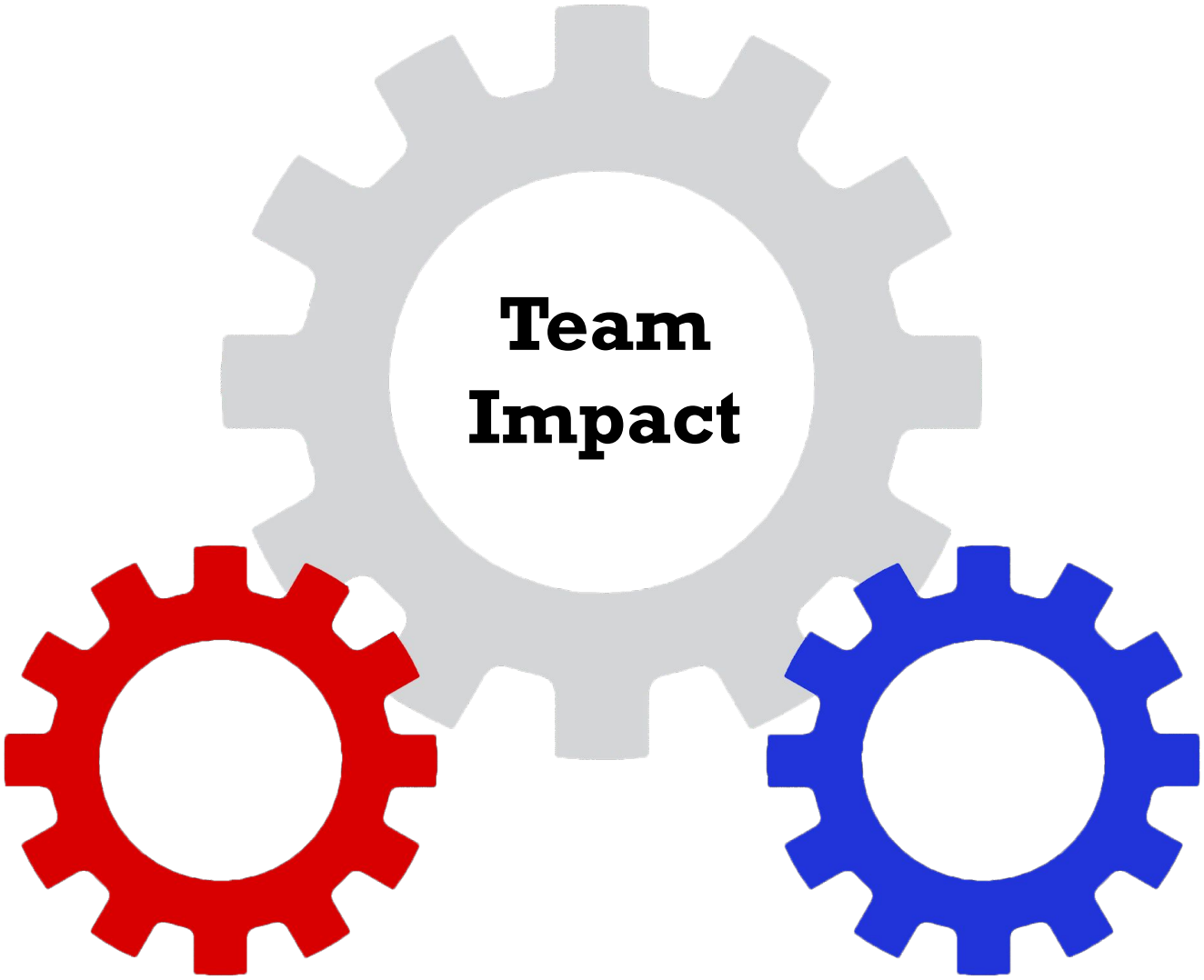
400% Social Media Growth

42 Outreach Events

360% Reach Increase

Key Season Events

- Worthington STEM advocacy
- Worthington Market Day
- Hosting CORI
- Shop tour series
- PLTW presentation series
- Summer camp demonstrations


Team
Impact

WorBots 4145: Impact Overview

Cultivating a Culture of STEM in Worthington, Ohio

92% of team alumni inspired to pursue STEM.

89% of members cite *FIRST* as a reason they want to pursue STEM

78% of team members attended an outreach event prior to joining

67% of 2021-2022 alumni still in *FIRST* through mentoring or volunteering

64% of team members from an underrepresented STEM minority

26,000 community members reached.

80 students in Worthington City Schools on *FIRST* teams

5 *FIRST* teams mentored in the past three years.

2 schools advocated for STEM education spaces in

7 long-term goal indicators of success 75-100% reached

Engage

Inspire

Impact

Kid Responses to Business Questions

Questions:

1. What is business?
2. What do you business does in robotics?
3. Do you think business can be fun?
4. What do you think business includes?
5. How would you explain business to a friend?

Student 1 (Third Grade)

**Name/school not included for student privacy; spelling edited for correctness but content unedited*

1. "Making money and being a boss"
2. "Getting money so they can build a good robot"
3. "When you get the money and can keep going"
4. "Getting money and getting stuff done for the team to get stuff done"
5. "Kind of getting a lot of money so you can build a lot of stuff"

Student 2 (Fifth Grade)

**Name/school not included for student privacy; spelling edited for correctness but content unedited*

1. "Getting money, writing a lot, and keeping track of things"
2. "Making money so everyone else can make robots"
3. "Probably because people do it"
4. "Same as 1"
5. "Running everything so it works"

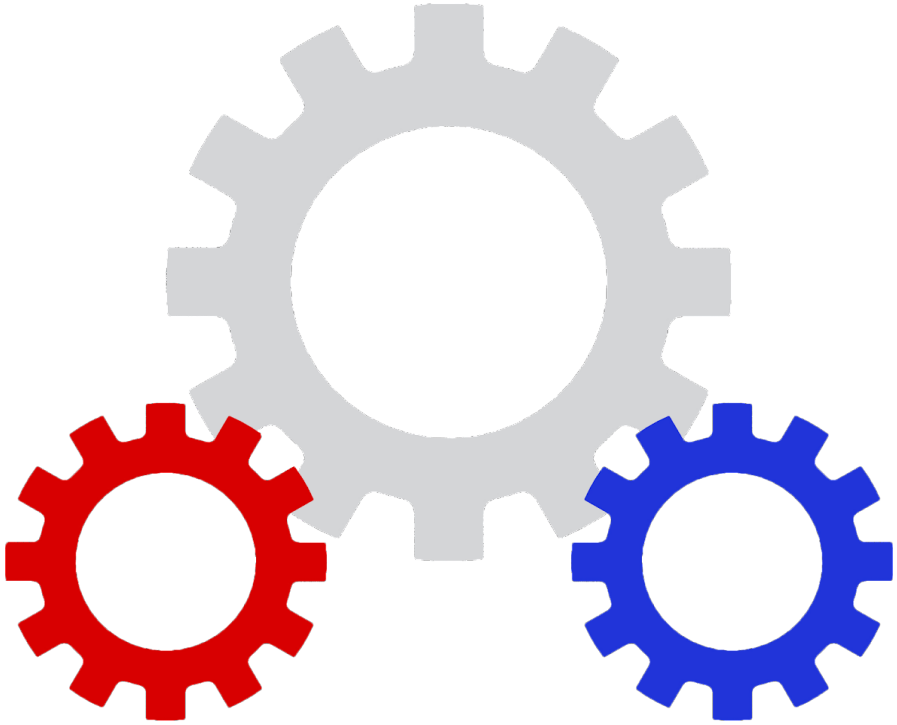
Student 3 (Seventh Grade)

**Name/school not included for student privacy; spelling edited for correctness but content unedited*

1. "Running everything from the back, like fundraising and marketing, so everything else can go smoothly"
2. "Make money for the team and keep track of everything"
3. "Yeah"
4. "Pictures, money, shirts, team member lists, and events like this"
5. "Essentially, making sure that every other part of the team works"

The WorBots 4145

2022 - 2023 Impact Analysis



Cultivating a Culture of STEM in Worthington, Ohio

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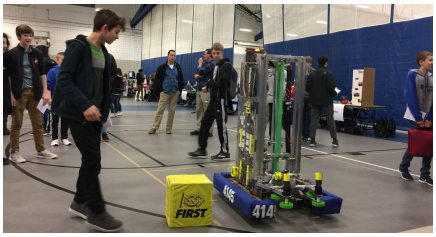
WorBots Long-Term Goals

The WorBots develop long-term goals and work to meet and exceed indicators of success and work to analyze events after they occur to determine their impact on goal accomplishment. This allows us to revise our efforts to maximize community impact.

Goal	Time	Indicators of Success
Develop a high retention of students from elementary school to high school robotics programs.	Five years	☼ At least 80% of elementary school robotics program students join FRC teams. ☼ All feeder team students have the opportunity to connect to WorBots annually
Expand the presence of *FIRST* within Worthington and Worthington Schools.	Two years	☼ Every school has an FLL/FTC team. ☼ Run or participate in at least 3 whole-community events seasonally. ☼ Run or participate in events at all schools — regardless of feeder team status.
Develop a training system that improves team succession and consistently gain new members.	Three years	☼ Returning students feel prepared to enter each season. ☼ 90% rookie retention. ☼ At least three students per subteam obtained and retained.
Mature our relationship with the SWE Next group within both schools.	Two years	☼ 10 members join from that program. ☼ 2 or more events with them annually.
Develop cohesive team social media and website branding and management.	Two years	☼ 500% increase in social media engagement. ☼ Communication is consistent on all social media. ☼ Have consistent graphics in all media and publications.
Develop a resource library for incoming team members to prevent information loss.	Yearly effort	☼ Have all produced resources available through the website. ☼ Document all technical changes to ensure sustainability.
Sustain and grow the rainy day fund to ensure team sustainability.	Two years	☼ $35,000 rainy day fund available consistently at the end of each season.
Mature partnerships with businesses, schools, and educational institutions.	Four years	☼ Retain machine shop and sponsor relationships ☼ Have 5 members of the Worthington City School Board in our shop annually. ☼ Reach groups beyond our small community and maintain means of doing so.
Maintain long-term development data and statistics.	Yearly effort	☼ Have all statistics available in the Master Folder. ☼ Have statistics for each season.
Strengthen partnership at TWHS to retain members from both schools.	Five years	☼ 5 consecutive seasons of equal membership between schools.
Serve our community through giveback activities.	Three years	☼ 4,145 hours of active community outreach work.

Event Descriptions

8th Grade Night
At our eighth-grade night event, we invited students from Worthingway Middle School to join us and learn more about *FIRST* and robotics within high school. We had thirty student attendees who had the opportunity to ask questions and hear from WorBots.



Worthington Kilbourne Activities Fair
At the Worthington Kilbourne Activities Fair, we annually have freshmen coming from five Worthington middle schools — a total of approximately four hundred students — hear from current WorBots and see the previous season's robot in action.

Worthington Hills STEM Night
At Worthington Hills STEM Night, we demonstrated our robot and provided interactive activities for over two hundred elementary-aged students and their families. We showed CAD designs and discussed opportunities for them to get involved in robotics before high school.

Destination Imagination Presentation
Destination Imagination is a STEAM-based tournament available to elementary-aged students in Worthington. We invited these groups into our workspace to see additional ways to get involved with STEM and learn a little about robotics and engineering.

Worthington School Board Presentation
If we qualify for Worlds, we visit a school board meeting to present our program and robot. Here, the district learns about the status of Worthington *FIRST* and offers recognition for students on 4145.

CORI Invitational
We seasonally host the CORI Invitational in conjunction with the PAST Foundation and Center for Robotics Innovation. This event brings together over thirty teams and one thousand people from around Ohio, and it provides an opportunity for community leaders such as our superintendent as well as Worthington students to see STEM in action.

Worthington District Science Day
The Worthington District Science Day brings together STEM-interested students to present their science fair projects, showcase innovation challenges, and enjoy fun activities. Here, we demonstrate our robot and discuss STEM with five hundred community members.

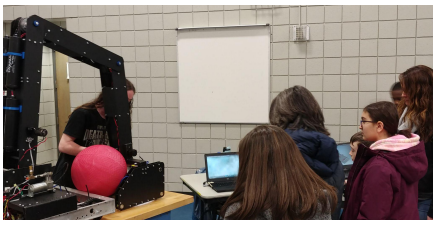
Kilbourne Middle School Shop Tour
At our Kilbourne Middle School Shop Tour, twenty students from KMS learned more about robotics as they heard from leaders of each subgroup. These students went on to move from an informal robotics club at their school to FTC Team 16284, the 8-Bit Bandits.

Bluffsview Elementary Science Night
At Bluffsview Elementary Science Night, we presented robotics to interested families and provided interactive activities for those attending. This outreach event engaged approximately two hundred people.

Worthingway Middle School STEM Night
At Worthingway Middle School STEM Night, we brought together students from one of our schools with an FLL team to learn more about STEM and robotics while seeing where *FIRST* can take them if they stay involved through high school.

Middle School Robotics Competition
At Kilbourne Middle School, we ran an informal robotics competition where students from multiple middle schools ran sumo and maze robots. This provided an opportunity for schools with developing *FIRST* programs to get involved with robotics.

Worthington STEM Fair
At Worthington STEM fairs and events, the WorBots offer interactive activities to community members, engaging Worthington locals of all ages and giving them an opportunity to hear about STEM in Worthington.



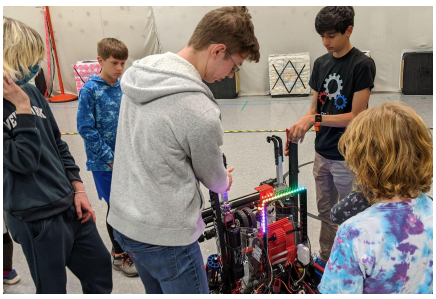
Worthington Kilbourne Freshman Orientation
At freshmen orientation in the school we are based out of, we annually bring our competition robot and game elements along with team members to engage students and recruit new team members. We annually reach four hundred incoming students through this event.

FLL Robot Demonstration
We bring a robot to visit our FLL teams to inspire students to remain involved in *FIRST* throughout their academic careers, engaging thirty students annually.

Columbus Dispatch *ThisWeekWorthington* Article
We were featured in the Worthington subsection of the Columbus Dispatch, where over six thousand people locally had the chance to read about what *FIRST* is and *FIRST* within Worthington, Ohio.

Meeting with School District for *FIRST* Support
We ran an event in which our school district officials came into our workspace to hear our students talk about STEM and the critical role of *FIRST* in STEM education in and beyond Worthington. Here, we advocated for coach stipends, support for new teams, and partnerships in identifying potential elementary coaches.

Wilson Hill LEGO Robotics Club
At an elementary school in our district, we started and mentored an informal robotics club in 2021 to engage students as we worked out the logistics of an FLL team there. This impacted twenty students.



Bluffsview CAS Robot Demonstration
At Bluffsview Elementary, we visited an after-school program and demonstrated our robot in fun ways — such as demonstrating the shooting mechanisms by having the robot shoot into basketball hoops, climb, and drive in front of the crowd of thirty students, many of whom expressed that they now wanted to build robots.

Worthington Kilbourne Student News Segment
On the Worthington Kilbourne news, our team was featured at competitions — with both our Chairman's video and footage from our matches. This is shown to all students in the school on Fridays (about one thousand).

Thomas Worthington Student News Segment
On the Thomas Worthington news, Flock Talk, our team was featured at competitions — with both our Chairman's video and footage from our matches. This is shown to all students on Fridays (over one thousand).

Elementary School Shop Tours
In the summer of 2022, we ran tours inviting elementary school students and their families to see our shop space and learn more about how they can get involved with STEM through *FIRST*. This reached approximately thirty people.

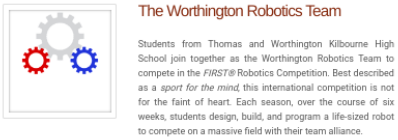
Olentangy Caverns Robot Demonstrations
At a geology camp in a nearby cave, we demonstrated our robot and talked to the students (aged six through eleven) about robotics. Many of these ninety students were not from Worthington, so they are students we don't see at our more local events. We helped ten of these kids connect with teams in their districts.

Worthington Libraries LEGO Battle Bots
At a library a few miles away from our shop, we helped run a free workshop where kids could come and modify robots to compete in a battle-bots-style competition. This engaged thirty children and their families.

School Board Meeting STEM Advocacy
At a regular school board meeting during the planning phase for school remodels, the team attended and had a representative speak to the school board about STEM education. This led to a discussion with district officials about how STEM spaces can be preserved.

Thomas Worthington Freshman Activities Fair
At the TWHS freshmen activities fair, we bring a robot, competition videos, photos, information, and game elements along with team members to engage students and recruit new team members. We annually reach four hundred incoming students through this event.

Freshman PLTW Class Presentations
In freshmen STEM classes, we discussed how they could apply what they were learning in their classes to build robots on the team and discussed the benefits of *FIRST* beyond high school.



Thomas Worthington High School Newsletter
In the TWHS newsletter, over one thousand families received information about our team, its mission, competitions, and how they could get involved.

Thomas Worthington Student News Interview
At the start of the 2022 school year, our team presidents spoke with our student news anchors to educate students in the school about *FIRST*, detail the impact it has, and share information about upcoming meetings.

Thomas Worthington Involvement Fair
The TWHS involvement fair demonstrates every club and team, but our booth was one of the most attended with a robot swerving around in front of it. All of the students in the school had the opportunity to hear about the team and see videos of us in competition, with many students citing the event as their reason for joining.

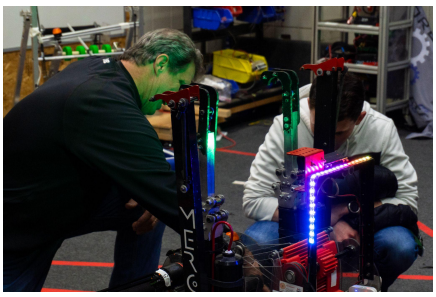
Principles of Engineering PLTW Class Presentations
In sophomore STEM classes, we discussed how they could apply what they were learning in their classes to build robots on the team and discussed the benefits of *FIRST* beyond high school.

CAD Presentation
In CAD classes, we discussed how they could apply what they were learning in their classes to build robots on the team and discussed the benefits of *FIRST* beyond high school.

Worthington Market Day
Worthington Market Day is the largest single-day event in Worthington. FC Bank invited us to present our team at one of their booths and demonstrate our robot in front of that allowing community leaders, alumni, families, and Worthington residents to learn about our team and *FIRST*.

Worthington Middle School Shop Tour
We invited STEM-interested middle school families and students into our shop to hear about *FIRST* and how they can get involved in and before high school from team members and alumni who mentor. Many of these students were on a feeder team and intended to move to one of the middle school teams.

Lake Shore Shop Tour
Before the start of the 2023 season, we invited one of our sponsors, Lake Shore, into our shop space to see our 2022 robot in action and hear from our teammates. Some of our teammates also had the opportunity to talk about their career plans for the future and hear about internship opportunities.



ATS Shop Tour
We invited ATS, a team sponsor, into our shop to see our 2022 robot before the start of the season and hear about our competition experiences. They also shared their industry experience with students and discussed their new facility.

FLL Shop Tour
We invited FLL students and families into our shop to hear from some of our students who moved from FLL to FRC, talk about all of the different subteams, meet some more WorBots (other than those they know as student mentors), and drive a robot. Many of them indicated that they were eager to remain involved with robotics.

Turn for Troops
We annually participate in Turn for Troops, an event at a local store called Woodcraft, to turn pens on lathes and write handwritten letters for veterans going on Honor Flights.

Habitat for Humanity
We use our large team size to improve our broader Central Community through participating in Habitat for Humanity events. Here, team members help to work on homes.

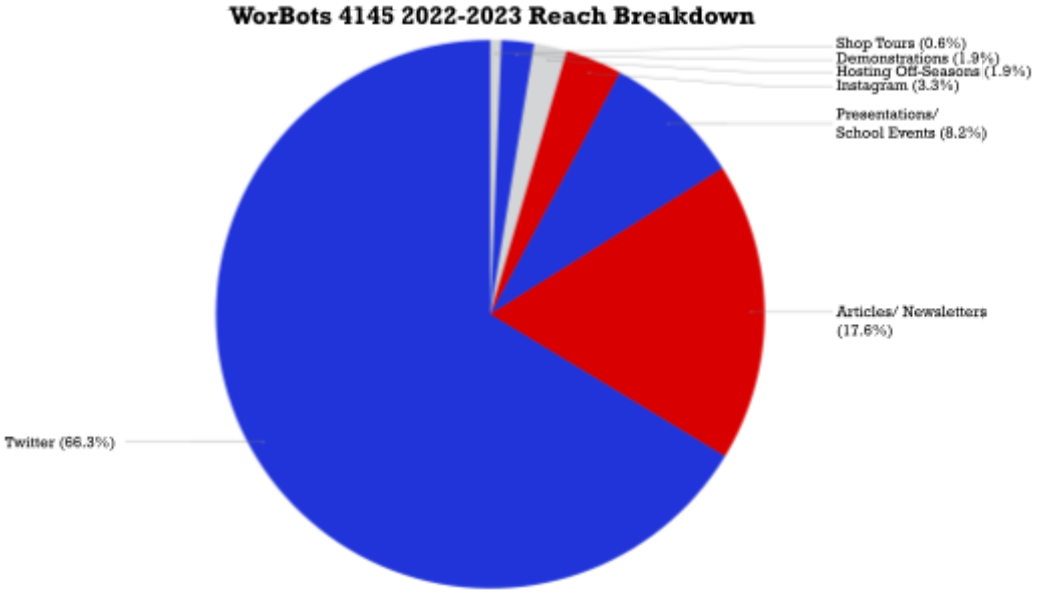
Drives
For the 2023 season, we partnered with two of our FLL teams to run a LEGO drive for children at Nationwide Children's Hospital and the Ronald McDonald house. We collected thirty-two LEGO sets. We also use our presence in both schools to benefit our community through running seasonal food and resource drives for the Worthington Food and Resource Pantry. This season, we partnered with our FTC team to run this drive in the middle school as well.

Outreach Event Analysis

Event	Goal Worked Toward	Indicator(s) of Success Worked Toward	Direct results
8th Grade Night	Develop a training system that improves team succession and consistently gain new members.	At least three students per subteam obtained and retained.	30 students reached 6 students joined to the WorBots
Worthington Kilbourne Activities Fair	Develop a training system that improves team succession and consistently gain new members.	At least three students per subteam obtained and retained.	500 students reached 26 interested students joined
Worthington Hills STEM Night	Expand the presence of *FIRST* within Worthington and Worthington Schools.	Run or participate in events at all schools — regardless of feeder team status.	200 students and parents reached 2 students joined
Destination Imagination Presentation	Expand the presence of *FIRST* within Worthington and Worthington Schools.	Run or participate in events at all schools — regardless of feeder team status.	20 students reached
Worthington School Board Presentation	Mature partnerships with businesses, schools, and educational institutions.	Have 5 members of the Worthington City School Board in our shop annually.	30 school officials reached 3 follow-up meetings
CORI Invitational	Expand the presence of *FIRST* within Worthington and Worthington Schools.	Run or participate in at least 3 whole-community events seasonally.	3,000 community members reached. 23 teams reached annually.
Worthington District Science Day	Expand the presence of *FIRST* within Worthington and Worthington Schools.	Run or participate in events at all schools — regardless of feeder team status.	1,000 community members reached. 4 students joined.
Kilbourne Middle School Shop Tour	Expand the presence of *FIRST* within Worthington and Worthington Schools.	Run or participate in events at all schools — regardless of feeder team status.	1 FTC team started 20 students reached 4 students joined
Bluffsview Elementary Science Night	Expand the presence of *FIRST* within Worthington and Worthington Schools.	Run or participate in events at all schools — regardless of feeder team status.	200 students and families reached 1 student joined
Worthingway Middle School STEM Night	Expand the presence of *FIRST* within Worthington and Worthington Schools.	Run or participate in events at all schools — regardless of feeder team status.	30 students reached
Middle School Robotics Competition	Expand the presence of *FIRST* within Worthington and Worthington Schools.	Run or participate in events at all schools — regardless of feeder team status.	75 students and parents reached 4 students joined.
Worthington STEM Fair	Expand the presence of *FIRST* within Worthington and Worthington Schools.	Run or participate in events at all schools — regardless of feeder team status.	300 students and parents reached
Worthington Kilbourne Freshman Orientation	Develop a training system that improves team succession and consistently gain new members.	At least three students per subteam obtained and retained.	500 students reached 15 students joined Adequate subteam membership
FLL Robot Demonstration	Develop a high retention of students from elementary school to high school robotics programs.	All feeder team students have the opportunity to connect to WorBots annually	20 students reached 100% retention of students on the team

Columbus Dispatch *ThisWeekWorthington* Article	Expand the presence of *FIRST* within Worthington and Worthington Schools.	Run or participate in at least 3 whole-community events seasonally.	6,000 people reached
Meeting with School District for *FIRST* Support	Mature partnerships with businesses, schools, and educational institutions.	Have 5 members of the Worthington City School Board in our shop annually.	Preserved shop space Grew TWHS STEM space
Wilson Hill LEGO Robotics Club	Develop a high retention of students from elementary school to high school robotics programs.	All feeder team students have the opportunity to connect to WorBots annually	20 students reached. All students progressed to FLL.
Bluffsview CAS Robot Demonstration	Expand the presence of *FIRST* within Worthington and Worthington Schools.	Run or participate in events at all schools — regardless of feeder team status.	46 students reached
Worthington Kilbourne Student News Segment	Expand the presence of *FIRST* within Worthington and Worthington Schools.	Run or participate in events at all schools — regardless of feeder team status.	1,250 students reached
Thomas Worthington Student News Segment	Expand the presence of *FIRST* within Worthington and Worthington Schools.	Run or participate in events at all schools — regardless of feeder team status.	1,810 students reached
Elementary School Shop Tours	Expand the presence of *FIRST* within Worthington and Worthington Schools.	Run or participate in events at all schools — regardless of feeder team status.	90 students reached 97 parents reached
Olentangy Caverns Robot Demonstrations	Mature partnerships with businesses, schools, and educational institutions.	Reach groups beyond our small community and maintain means of doing so.	68 students reached 3 students connected to *FIRST* in their district.
Worthington Libraries LEGO Battle Bots	Expand the presence of *FIRST* within Worthington and Worthington Schools.	Run or participate in at least 3 whole-community events seasonally.	47 students reached
School Board Meeting STEM Advocacy	Mature partnerships with businesses, schools, and educational institutions.	Have 5 members of the Worthington City School Board in our shop annually.	30 district employees reached Shop space preserved STEM space preserved
Thomas Worthington Freshman Activities Fair	Strengthen partnership at TWHS to retain members from both schools.	5 consecutive seasons of equal membership between schools.	500 students reached 8 students joined
Freshman PLTW Class Presentations	Strengthen partnership at TWHS to retain members from both schools.	5 consecutive seasons of equal membership between schools.	120 students reached 4 students joined
Thomas Worthington High School Newsletter	Strengthen partnership at TWHS to retain members from both schools.	5 consecutive seasons of equal membership between schools.	1,810 students reached
Thomas Worthington Student News Interview	Strengthen partnership at TWHS to retain members from both schools.	5 consecutive seasons of equal membership between schools.	1,810 families reached
Thomas Worthington Involvement Fair	Develop a training system that improves team succession and consistently gain new members.	At least three students per subteam obtained and retained.	500 students reached 3 students joined
Principles of Engineering PLTW Class Presentations	Strengthen partnership at TWHS to retain members from both schools.	5 consecutive seasons of equal membership between schools.	90 students reached 1 student joined

CAD Presentation	Strengthen partnership at TWHS to retain members from both schools.	5 consecutive seasons of equal membership between schools.	20 students reached
Worthington Market Day	Expand the presence of *FIRST* within Worthington and Worthington Schools.	Run or participate in at least 3 whole-community events seasonally.	1 mentor acquired 800 people reached
Worthington Middle School Shop Tour	Expand the presence of *FIRST* within Worthington and Worthington Schools.	Run or participate in at least 3 whole-community events seasonally.	30 students reached
Lake Shore Shop Tour	Mature partnerships with businesses, schools, and educational institutions.	Retain machine shop and sponsor relationships	7 representatives of sponsors engaged 2 students offered internships
ATS Shop Tour	Mature partnerships with businesses, schools, and educational institutions.	Retain machine shop and sponsor relationships	5 representatives of sponsors engaged
FLL Shop Tour	Develop a high retention of students from elementary school to high school robotics programs.	All feeder team students have the opportunity to connect to WorBots annually	30 families reached
Turn for Troops	Serve our community through giveback activities.	4,145 hours of active community outreach work.	94 pens turned 94 letters written
Habitat for Humanity	Serve our community through giveback activities.	4,145 hours of active community outreach work.	1 home worked on
Resource Drives	Serve our community through giveback activities.	4,145 hours of active community outreach work.	50 items collected for the resource pantry
LEGO Toy Drive	Serve our community through giveback activities.	4,145 hours of active community outreach work.	32 LEGO kits collected and donated to Nationwide Children's Hospital.
Social Media	Develop cohesive team social media and website branding and management.	500% increase in social media engagement.	36,000 people reached



Impact Maximization

In the past season, we have seen significant progress toward our goals as outlined above. With the aforementioned efforts being relatively new, one of our current focuses is sustaining and expanding. these efforts to ensure that we can maximize our community reach and impact. As such, we have developed the following plan to ensure necessary means for event repetition and growth. The goal of our work is not focused solely on reach numbers; we are focusing on the spread of STEM to students and community members who lacked those knowledge or opportunities prior to learning about or getting involved with our program.

The timeline for all procedural and structural changes is by January 6th, 2024 with an expected implementation start date of June 4th, 2024 for all changes that are not to a specific event. All changes are to be documented in the Master Folder including corresponding dates, images, and changes made to the following plans. This will ensure that the approach can be repeated and future alterations to events consider the impact of these changes. No changes not outlined in this document shall be made without approval from team officers and all involved leads; no officer or lead should disapprove of any suggestions fitting our goal unless it is detrimental to team operations.

WorBots should consistently work to involve themselves and the team in the community with the mindset of impact over reach. Being one of the three pillars of our focus — engage, inspire, impact — it is important that we are going beyond numbers and generating a positive impact on STEM, the lives of those in Worthington, and our students.

Methodology and Implementation

Shop tours are to be fully standardized (*Appendix I*), including smaller group sizes and longer time spent in each station, allowing more connection between WorBots and those attending. For shop tours involving younger students, we will have one period of time that is longer and more specialized, allowing students to choose which subteam they desire to engage the most with. The aim of this is to engage attendees and demonstrate their STEM capabilities to inspire them to get involved at their corresponding levels.

Documentation of events with younger students to track effectiveness is to be implemented through creating a feeder team interest form similar to the model created for the WorBots . Supplementary to this, we will maintain both projected and actual rosters of all team events, allowing us to cross-reference them for future statistics and program analysis. The goal of this modification is to better track and modify outreach in accordance with its success, making it more engaging for those reached and increasing individual event impact.

Demonstrations of our program and robot will include more interactive components to support the initial introduction to the robot and its functions. Our current interactive components are a design challenge, which we can expand upon through connecting it to selling their idea to a company and applying it to small prototypes. The aim of this modification is to engage more students and inspire them to get involved with *FIRST* through a sense of empowerment from a product of their work at our events.

School events' reach is maximized numerically; however, we want to increase the number of events we participate in at each school, as we average approximately three whole-school events and two audience-specific events annually. To do so, we have added a school calendar review to our summer agenda, at which time we will go through school events for the coming school year and contact school staff to get involved with them when possible. The objective of this event is to increase student awareness of *FIRST*; increasing involvement in STEM classes and interest in STEM careers, even if team membership is directly impacted.

Instagram reach will be increased through consistent posting of informational materials. Within the mindset of increasing awareness and involvement in STEM as opposed to numbers, we will also include statistics pertaining to awareness of social media pages prior to joining through our interest survey and a survey at our parent meeting. This will presumably show the effectiveness of our social media, as it will give us a stronger idea of our audience and provide information about our program to our following.

Documentation of impact on alumni will be further tracked through communication via our team Discord. Here, we will ask alumni to inform current members of their involvement with other teams or *FIRST* events as well as why they chose to get involved. We will then increase our focus on replicating the source of their interest in remaining involved on our team, converting the 100% of upperclassmen who currently have interest in participating after high school into actively-participating alumni. The aim of this effort is to increase involvement in *FIRST* beyond high school, thus promoting a culture of STEM in Worthington, Ohio.

Resource Drive impact will be maximized by creating a robotics-themed incentive for the class that donates the most to the drive as well as partnering with our FTC team to connect this effort to middle school students. This allows us to increase donations and share our values with our younger students. Furthermore, we will contact groups such as the student council to ensure drives do not overlap and begin promoting the drives sooner. The aim of this is to better support families in our community.

Team branding and graphics will be modified to follow a team branding inventory (*Appendix II*). This will be available in our Master Folder, ensuring that it is sustained beyond our current team membership. This branding will also be expanded upon in a branding document, outlining the meaning of each guideline and detailing appropriate steps for approaching a scenario not covered in the provided branding information. The goal of this modification is to ensure that our team is recognizable across platforms, at competition, and in-person so we are more memorable and, therefore, can be repeatedly identified.

Graphic standardization will be approached by recruiting new graphic design members. To do so, we will partner with our communications technology classes, which include students interested in graphic design. We will also intertwine graphic design with our business program, which will encourage more students to learn and adhere to branding guidelines. The goal of this is to ensure a sustainable graphic design program and ensure that all team publications are consistent and timely.

Training will be modified so that the team information and history portion involves all students — not just students in the business program. Furthermore, new students will be interviewed by returning business students with the suggested awards questions publicized by *FIRST* to better simulate the competition environment and ensure retention of information about their subteam and the whole team. The goal of this modification is to prevent team information loss or reliance on our lead mentor to serve as our source of information predating current members.

Presentations will be modified so new business students are more involved with classroom presentations. Business rookies currently participate in a sustainability presentation, which is a presentation we do for Merrill Lynch and FC Bank detailing the components of the business plan; however, returning members tend to lead all other community presentations. The aim of this modification is to allow new business students to develop presentation skills in a low-stress environment.

Growth from 2021-2022 Season

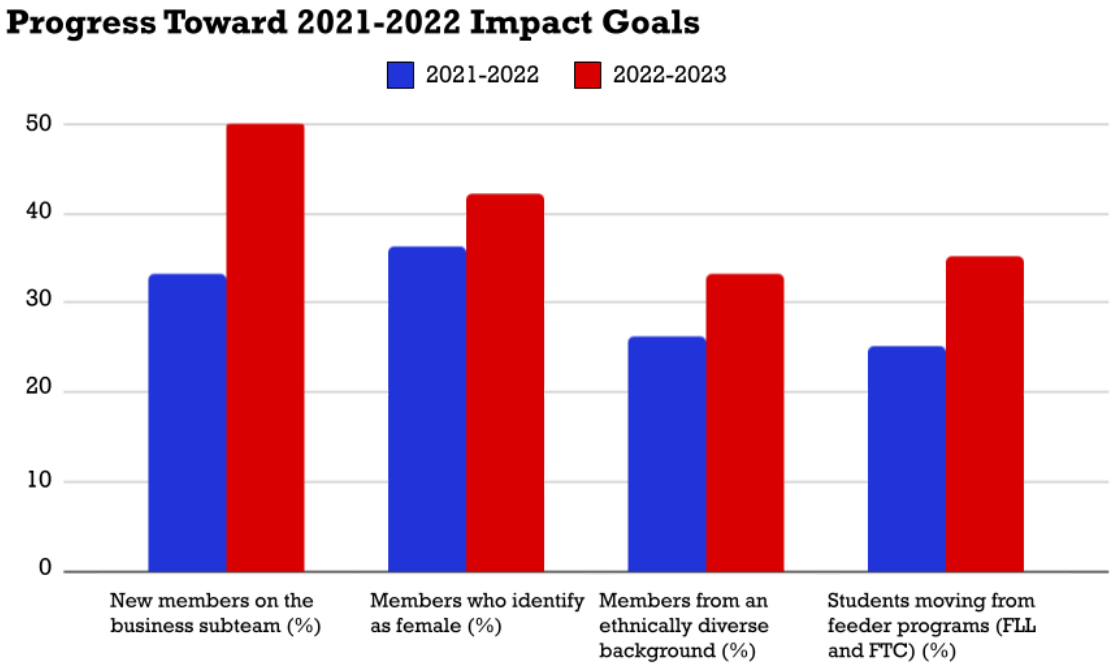
Our focus for implementation impact were as follows: grow the business and design sectors of the team, increase team diversity, maintain the Worthington *FIRST* Pathway, and expand the Worthington *FIRST* pathway. All of the following were successfully achieved during the off-season, during which time we expanded upon on-season efforts. Between 2022 and 2023, we reached approximately eighteen thousand community members (*Appendix III*).

To grow the business sector of the team, we contacted the Entrepreneurship Business Academy (EBA) and acquired two new members of our business program, both of whom are completing their first season on the team. We focused on this goal beyond a recruitment perspective with a new training program. This covered all sectors of the business team — awards, treasury, and fundraising. Participants wrote a letter for catering donations, served as "judges" for our Impact Award materials, and practiced cold calling.

To grow the design sector of our team, we presented in a CAD class at one of our schools. This effort brought in students; however, we needed to increase our retention, causing us to modify our training program. The program allows students working on the robot design to complete a design challenge created by our design lead, which is then applied to the fabrication rookies who take this design and turn it into a prototype. This method allows us to best simulate the competition environment. We struggled to find graphic design members, but we mitigated this by teaching business rookies graphic design. We also appointed a social media lead, which encouraged more students to participate in graphic design. This also significantly increased our community and broader reach.

To increase team diversity, we reached out to the SWENext directors who promoted our program to their students. We also maintained our decreased team fee and sustained sponsor relationships to ensure that our scholarship program could continue.

To maintain the Worthington *FIRST* Pathway, we worked with our school district at our robot reveal event. We followed this with meets to discuss Worthington STEM, gaining district support for these teams. We also continued to supply funding and mentors to our teams, as well as continuing our FTC team's operation under our 501(c)(3). To grow it further, we started an informal team at one of the schools without a feeder team, resulting in FLL 57154.



Appendix I: Revised Shop Tour Agenda

For the purpose of this outline, it is to be assumed that the shop tour begins at 4:00 p.m. and ends at 6:00 p.m.

Agenda for Youth Tours
Pre-4:00 p.m.: Run game video and have team members talk to students in the common room

4:00 p.m. to 4:10 p.m.: Team leads introduce themselves and provide brief summaries of their subteams. Business leads introduce the "More than Robots" concept; fabrication leads discuss shop safety.

4:10 p.m. to 4:15 p.m.: Students are broken into groups and assigned to stations A-E.
- Station A: Fabrication
- Station B: Design
- Station C: Programming
- Station D: Business/Marketing
- Station E: Electrical/Pneumatics

4:15 p.m. to 4:25 p.m.: Students participate in their first station's activities, then move to the next letter.

Station Transition

4:30 p.m. to 4:40 p.m.: Students participate in their second station's activities, then move to the next letter.

Station Transition

4:45 p.m. to 4:55 p.m.: Students participate in their third station's activities, then move to the next letter.

Station Transition

5:00 p.m. to 5:10 p.m.: Students participate in their fourth station's activities, then move to the next letter.

Station Transition

5:15 p.m. to 5:25 p.m.: Students participate in their fifth station's activities, then move to the next letter.

Select Station to Learn More About and Transition

5:30 p.m. to 6:00 p.m.: Students hear more about and engage with the subteam that interested them the most throughout the tour.

Agenda for Non-Youth Tours

Pre-4:00 p.m.: Run game video and have team members talk to attendees in the common room

4:00 p.m. to 4:15 p.m.: Team leads introduce themselves and provide brief summaries of their subteams. Business leads introduce the "More than Robots" concept; fabrication leads discuss shop safety.

4:15 p.m. to 4:35 p.m.: Attendees hear from fabrication and design team members about the functionality of the robot, see a demonstration of it in action, and have the opportunity to drive it.

4:35 p.m. to 4:55 p.m.: Attendees hear from programming members about the controls of the robot and the overall program.

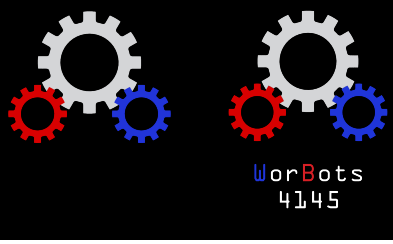
4:55 p.m. to 5:25 p.m.: Attendees hear from electrical and pneumatics members, who detail their respective systems on the off-season and competition robots.

5:25 p.m. to 5:45 p.m.: Attendees hear from the business team members, who discuss the impact of *FIRST*, Worthington STEM, and program operations holistically.

5:45 p.m. to 6:00 p.m.: The business team summarizes the tour and recognizes any contributions from the attending group.

Appendix II: Branding Inventory

Semicolons are used to separate appropriate variations on capitalization and wording.

Team Name	Formal, non-*FIRST* Communication: The Worthington Robotics Team Informal and *FIRST* Communication: WorBots; WorBots 4145; the WorBots.
Team Mission	Banners/Posters/Shirts/Graphics: To cultivate a culture of STEM in Worthington, Ohio; To cultivate a culture of STEM in Worthington, Ohio through engaging, inspiring, and impacting our community. Full Documents: Our mission is to cultivate a culture of STEM in Worthington, Ohio through: **Engaging** the community through our STEM and non-STEM outreach. **Inspiring** future generations of lifelong STEM learners through our constantly improving cohesive K-12 pathway while increasing retention and diversity in STEM fields. **Impacting** our community through giveback activities and contributing to the workforce with our growing internship programs.
Slogan	Engage, Inspire, Impact; ENGAGE, INSPIRE, IMPACT
Team Colors (HEX)	Red: #d80001 Blue: #2134d9 Grey: #d4d5d7
Logos *Black background solely to show text*	
Team Shirts	Friday: Game shirt, which should include the logo, sponsors on the back, the slogan (when possible), a game-specific design, and be black Saturday: Team shirt, black with the team logo and name
Fonts	Rockwell for team publications Bullet points must be gears for graphics RPG for game shirts

Appendix III: Reach Data

Event	Reach*
Worthington Schools Newsletter	5,000
8th Grade Night	30
Worthington Kilbourne Activities Fair - Worthington, Ohio	500
Hills STEM Night - Worthington, Ohio	200
Published Accident Report Form - Website	20
Published Safety Rules Poster - Website	20
Published Safety Certification Reminders - Website	20
Published Pit Safety Poster - Website	20
Published Safety Checklist - Website	20
Published Safety Seminar - Website	20
Destination Imagination Presentation - Worthington, Ohio	20
Developed and Distributed Safety Kits	60
Worthington School Board Presentation	30
CORI Invitational - Worthington, Ohio	1,000
District Science Day - Worthington, Ohio	500
Kilbourne Shop Tour - Worthington, Ohio	20
Bluffsview Elementary Science Night - Worthington, Ohio	200
WKHS Football Game	300
CORI Invitational - Worthington, Ohio	1,000
Worthingway Middle School STEM Night - Worthington, Ohio	30
FIRST LEGO League Team 44451	10
FIRST LEGO League Team 44452	10
FIRST Tech Challenge Team 16284	20
FIRST LEGO League Team 44451	10
FIRST LEGO League Team 44452	10
FIRST Tech Challenge Team 16284	20
Middle School Robotics Competition - Worthington, Ohio	75
STEM Fair - Worthington, Ohio	300
Science Day - Worthington, Ohio	100
FIRST LEGO League Team 44451	10
FIRST LEGO League Team 44452	10
FIRST Tech Challenge Team 16284	20

FIRST LEGO League Team 44451	10
FIRST LEGO League Team 44452	10
FIRST Tech Challenge Team 16284	20
Freshman Orientation Robot Demonstration - Worthington Kilbourne High School	500
Columbus Dispatch Article	6,000
Meeting with School District Officials for *FIRST* Support - Worthington, Ohio	20
Meeting with Principals and the Directors of Primary and Secondary Education for Worthington *FIRST* Support - Worthington, Ohio	15
Wilson Hill LEGO Robotics Club - Worthington, Ohio	20
Wilson Hill LEGO Robotics Club - Worthington, Ohio	20
Worthington Kilbourne Activities Fair - Worthington, Ohio	500
Bluffsview CAS Robot Demonstration - Worthington, Ohio	46
Published Business Resources	240
Published Recruiting Resources	240
Worthington Kilbourne Student News Segment	1,250
Thomas Worthington Student News Segment	1,810
May 5th, 2022 Elementary School Shop Tour - Worthington Ohio	60
May 10th, 2022 Elementary School Shop Tour - Worthington Ohio	60
May 12th, 2022 Elementary School Shop Tour - Worthington Ohio	60
Olentangy Caverns Robot Demonstration Week 1 - Worthington, Ohio	33
Olentangy Caverns Robot Demonstration Week 2 - Worthington, Ohio	35
Worthington Libraries LEGO Battle Bots - Worthington, Ohio	47
School Board Meeting STEM Advocacy - Worthington, Ohio	30
Thomas Worthington Freshman Activities Fair - Worthington, Ohio	500
Worthington Kilbourne Freshmen First Day - Worthington, Ohio	500
Demonstration for Freshmen PLTW Class 1 - Worthington, Ohio	30
Demonstration for Freshmen PLTW Class 2 - Worthington, Ohio	30
Thomas Worthington High School Newsletter	1,810
Thomas Worthington Student News Interview	1,810

Thomas Worthington Involvement Fair - Worthington, Ohio	500
POE Presentation 1 - Worthington, Ohio	30
POE Presentation 2 - Worthington, Ohio	30
POE Presentation 3 - Worthington, Ohio	30
CAD Presentation	30
Worthington Market Day	800
FIRST LEGO League Team 57154	15
FIRST Tech Challenge Team 16284	15
FIRST LEGO League Team 44451	15
FIRST LEGO League Team 44452	15
FIRST LEGO League Team 57154	15
Worthington Middle School Shop Tour - Worthington, Ohio	30
CORI Invitational - Worthington, Ohio	1,000
FLL Shop Tour	30
Lake Shore Shop Tour	20
ATS Shop Tour	20
FLL Shop Tour	50
Curriculum Night Presentation	200
FC Bank Presentation	20
Merrill Lynch Presentation	20
Chipotle Presentation	20
Impower.ai Presentation	20
Worthington School Board Presentation / Robot Reveal	20
Reach Summary	**28,256**
1-Season Reach	**18,651**

*All reach is adjusted for definite overlap in the one-season and composite reach summaries; there may be some unintended overlap.

*When reach must be estimated, we use the lower end of our potential reach as suggested by the Impact Award definitions.

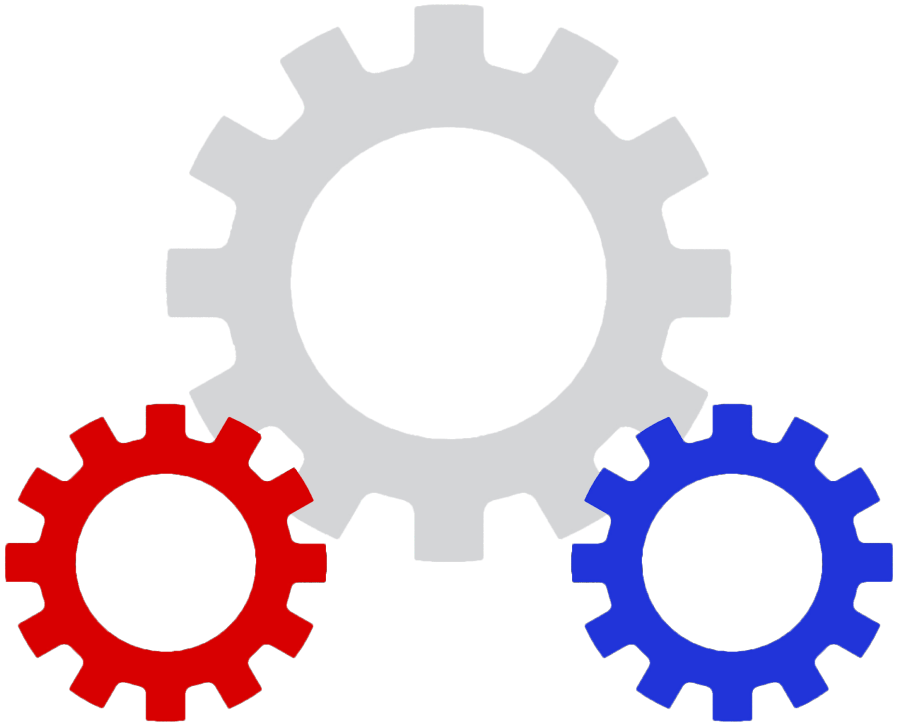
Appendix IV: All Team Statistics

- We have 36 team members and 11 mentors.
    - 5 (45%) of our mentors are alumni.
- 137 out of 149 (92%) team alumni chose to pursue STEM education after high school.
- 149 out of 149 (100%) team alumni graduated high school and went on to college.
- 7 (70%) of our team leads are female.
- 21 (58.3%) of our team members are new.
- 12 (33.6%) of our team members are from an ethnically diverse background.
- 15 (41.7%) of our team members identify as female.
- 23 (63.9%) of our team members are from an underrepresented minority in STEM.
- 18 (50%) of our team members are from Thomas Worthington High School; 50% of our team members are from Worthington Kilbourne High School.
- 7 (19.4%) of our team members have siblings who are or were on the WorBots.
- Our average unweighted GPA is 3.89
- Our average weighted GPA is 4.11
- 25 (69.4%) of our team members are in the PLTW program.
- 3 (8.3%) of our team members are taking business courses.
- 14 (38.9%) of our team members are taking art courses.
- 22 (61.1%) of our team members are taking music courses.
- 20 (55.6%) of our team members play a sport outside of robotics.
- 11 (30.6%) of our team members hold leadership positions in their other sports or clubs.
- 35 (97.2%) of our team members intend to pursue careers in STEM.
- 14 (82.4%) of our 17 upperclassmen members cite *FIRST* as their reason for wanting to pursue STEM.
- 28 (77.8%) of our team members attended an event we were at prior to joining the team.
- 14 (38.9%) of our team members were on a feeder team prior to joining.
- 16 (44.4%) of team members cite outreach events or feeder teams as their reason for joining.
- 5 (13.9%) of team members cite announcements as their reason for joining.
- 6 (16.7% of team members cite PLTW teachers as their reason for joining.
- 17 (100%) of 17 upperclassmen have an interest in remaining involved in *FIRST* beyond high school.
- 6 (16.7%) of team members joined with an interest in business.
- 14 (38.9%) of team members joined with an interest in graphic design.
- 16 (44.4%) of team members joined with an interest in programming.
- 11 (30.6%) of team members joined with an interest in fabrication.
- 15 (41.7%) of our team members joined with an interest in CAD.
- 26 students joined from the WKHS Activities Fair.
- 6 students joined from 8th Grade Night.
- 2 students joined from Worthington Hills STEM Night.
- 4 students joined from Worthington District Science Day.
- 1 student joined from Bluffsview Science Night.
- 4 students joined from our Kilbourne Middle School Shop Tour.
- 4 students joined from our Middle School Robotics Competition.
- 5 students joined from the Thomas Worthington High School Freshmen Activities Fair.
- 4 students joined from our Freshmen Class PLTW Presentations.
- 3 students joined from the Thomas Worthington High School Involvement Fair.
- 1 student joined from our Principles of Engineering Class Presentation.
- 13 (61.9%) of our new team members followed at least one of our social media pages prior to attending their first team meeting.

Team
Sustainability

The WorBots 4145

2022 - 2023 Recruitment Plan



Cultivating a Culture of STEM in Worthington, Ohio

ENGAGE, INSPIRE, IMPACT

Membership Needs Assessment

Subteam Name	Minimum Members Needed	Minimum Number of Members to Recruit
Fabrication	10	5
Design	5	3-4
Programming	5	1-2
Electrical/Pneumatics	3	2
Drive	2	0
Vision	1	1
Safety	1	1
Graphic Design	2	1
Business	5	2-3
Scouting	20	N/A
Finance	2	1
Marketing	3	2

*This reflects recruitment need — not number of members retained after the recruiting process

To ensure effective recruitment and sustainable operations, the previous chart serves to outline the absolute need — the goal is to exceed each number. All students acquired will be expected to attend a preliminary meeting, where they hear about opportunities within each subteam. They will then progress to our pre-established training program. All students interested in the program should have access to the team calendars and contact information for their respective leads — ensuring retention by demonstrating necessary commitment from the beginning of the season.

All students interested in overlapping subteams, as defined by the inability to participate meaningfully in both, will be given the opportunity to choose one subteam of the two and encouraged to participate in both areas of training to determine which they are most passionate about. Students will not be sent to a subteam specifically; however, leads may encourage students to get involved in a non-overlapping subteam in the event that membership requirements are not met.

Recruiting Methodology

Method	Audience	Location	Deadline
Freshman Orientation	Student Body	WKHS	August 17th
Involvement Day	Student Body	TWHS	September 19th
Activities Fair	Student Body	TWHS	August 17th
Department Emails	Dependant on Department	WKHS & TWHS	September 5th
Flyers (with emails)	Student Body	WKHS & TWHS	September 5th
Newsletters	Student Body	WKHS & TWHS	September 5th
Announcements	Student Body	WKHS & TWHS	August 29th
Student News	Student Body	WKHS & TWHS	August 29th
Posters	Student Body	WKHS & TWHS	August 29th
Freshmen PLTW Presentations	Technical-Side Students	TWHS	September 25th
CAD Presentation	Student Body	TWHS	September 25th
Sophomore PLTW Presentations	Technical-Side Students	TWHS	September 25th
Student Emails	Business	WKHS & TWHS	October 5th
Individual Recruitment	Dependent on Member	WKHS & TWHS	N/A

The focus of all recruiting events is to ensure team sustainability for the coming seasons. We have found that outreach events and PLTW presentations are our strongest means of recruitment alongside feeder programs. Many events this year are targeted toward Thomas Worthington High School (TWHS) because we have historically struggled to engage students there due to our operations taking place in Worthington Kilbourne High School (WKHS).

In terms of reaching the whole student body, we provide broad information about all of our subteams and allow participants to guide the conversation toward subteams they feel interested in. We find that this effectively balances general information with specific information, making the events more effective for student engagement.

Math Department: We reach out to the heads of both schools' math departments to engage students for scouting, finance, business, programming, and fabrication.

Science Department: We reach out to the heads of both schools' science departments primarily to recruit for fabrication and programming.

STEM Department: We reach out to the heads of both schools' science departments primarily to recruit for fabrication, design, and programming.

English Department: We reach out to the heads of both schools' English departments primarily to recruit for business and marketing.

Business Department: We reach out to the heads of both schools' business departments primarily to recruit for business, finance, and marketing.

Art Department: We reach out to the heads of both schools' art departments primarily to recruit for graphic design.

Theater Department: We reach out to the heads of both schools' theater departments primarily to recruit for business and marketing.

Library: We reach out to the heads of both schools' library departments primarily to recruit for business and marketing.

Society of Women Engineers (SWENext): We reach out to the heads of both schools' SWENext programs to ensure that engineering-focused women in our schools know about *FIRST*.

Preseason Important Recruiting Dates

August 17th - WKHS and TWHS Freshman Orientation and Activities Fair
August 29th - Student news and posters deadlines
September 5th - Department emails, flyers, and newsletters deadlines
September 19th - TWHS Involvement Day
September 25th - PLTW presentations and CAD presentation last day
October 5th - Student email deadline
October 16th - Middle school shop tour
October 23rd - CORI Invitational
October 26th - Rookie training starts
December 17th - Saturday build day
January 7th - Kickoff

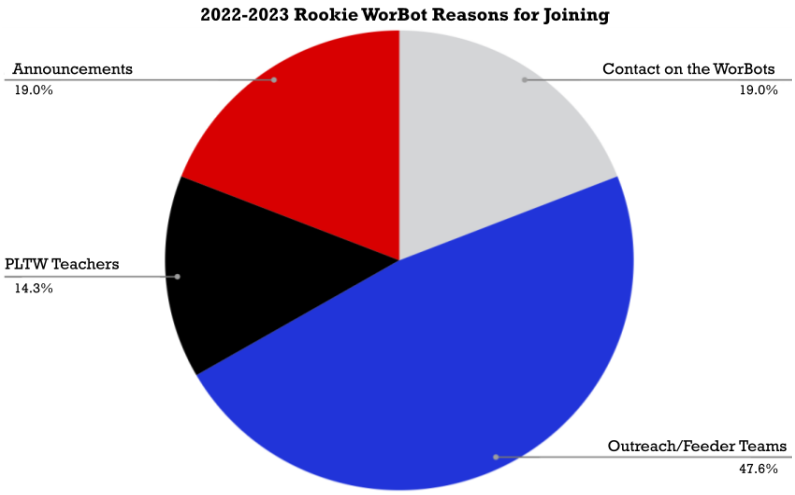
2022-2023 Recruiting Results (01/08/2023 Revision)

The following documented results were not a part of the initial plan but are included in this document to guide future recruiting efforts and highlight effective methods of acquiring team members.

Subteam Name	Minimum Number of Members to Recruit	Members Gained
Fabrication	5	5
Design	3-4	7
Programming	1-2	7
Electrical/Pneumatics	2	2
Drive	0	0
Vision	1	2
Safety	1	1
Graphic Design	1	1
Business	2-3	2
Scouting	N/A	1
Finance	1	2
Marketing	2	2

*This is greater than the number of new students we have, as many students participate in multiple subteams.

At the beginning of the season, new team members fill out a form citing their reasons for joining the team. This season, outreach, feeder teams, and our PLTW presentations were reportedly our most effective efforts.



Necessary Modifications (01/08/2023 Revision)

Students did not directly cite teachers who may have learned about our program from department emails, posters, student news, or flyers as their reasons for joining. While this may be the result of many events and modes of communication during the recruiting season, modifying these efforts may mitigate this lack of impact.

To improve the effectiveness of department emails, we may want to provide team contact points and offer a presentation for both the department and their students, which may allow more teachers and students to learn more about how classroom education is built upon in *FIRST* — regardless of student subteam. We can also consolidate this information into an information-dense handout and Google Slides presentation, which will mitigate concerns regarding time needed for presentations if departments find this to be a barrier.

To improve the effectiveness of posters, we can make them more information dense as opposed to focusing on one graphic and spread more of them throughout the schools. We also may need to use a larger QR code and potentially include copies of team informational materials in it to interest students more and convey what our program is about prior to the first meeting. Additionally, we can make our name and logo more prominent on each, as they are recognizable within both schools.

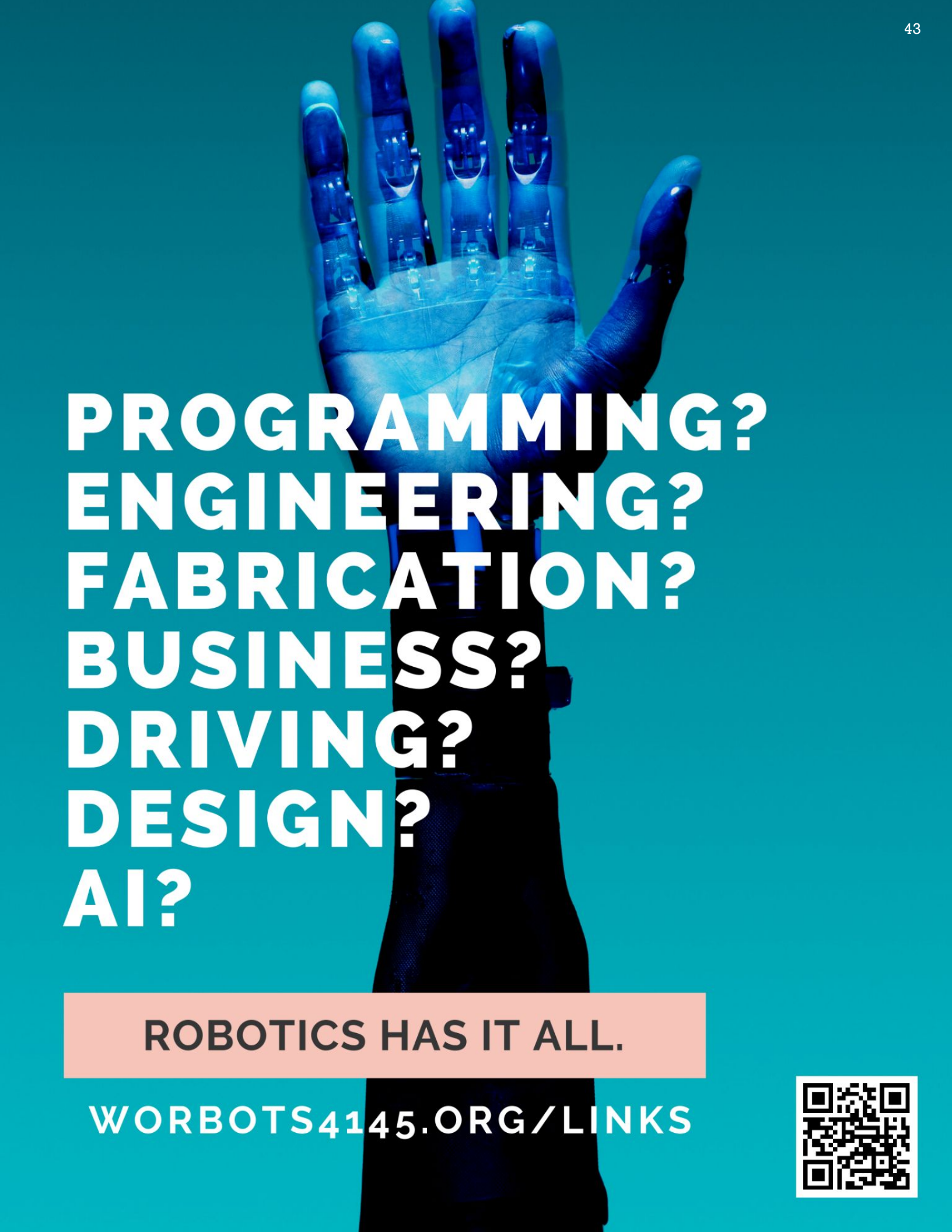
To improve the effectiveness of flyers, we can get them into more classrooms and make them more focused on specific content so they are less information-dense, then include a QR code with resources describing the roles of our different subteams, schedule, and how to contact the team if you see the flyers after the informational meeting. Furthermore, we can add them to our social media links and create digital, downloadable versions for students.

To improve the effectiveness of student news interviews, we will include all of our team leads as opposed to our two presidents, allowing students to get baseline information about each subteam, and provide places students can learn more so those students who are interested know where to look for more information than we had time to cover.

DISCOVER STEM *HANDS-ON.*

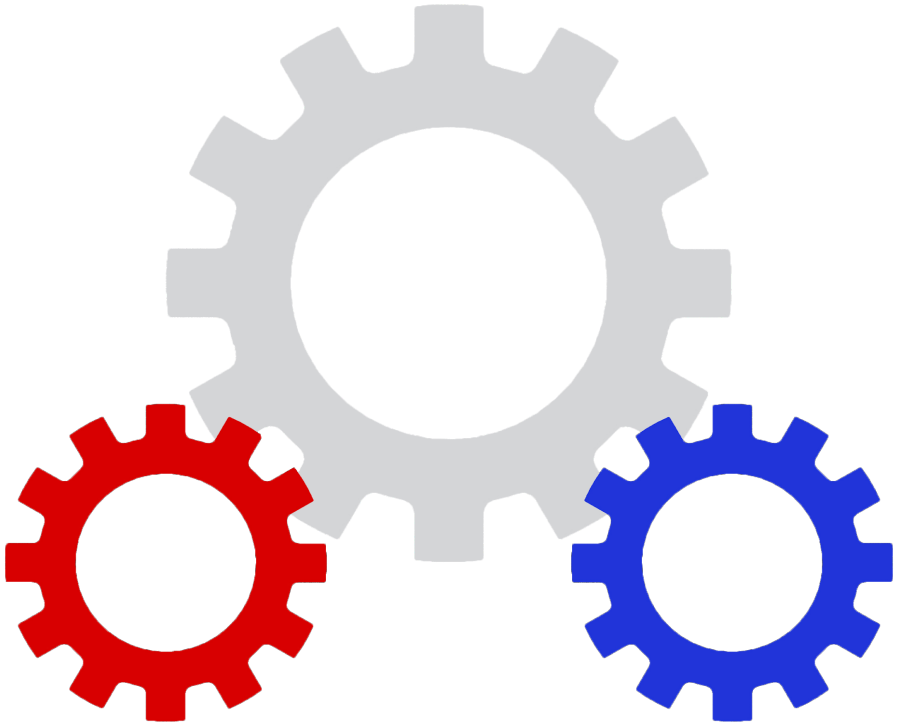
(NO TEXTBOOKS, WE PROMISE)

LEARN MORE ABOUT ROBOTICS AT WORBOTS4145.ORG/LINKS


PROGRAMMING?
ENGINEERING?
FABRICATION?
BUSINESS?
DRIVING?
DESIGN?
AI?
ROBOTICS HAS IT ALL.
WORBOTS4145.ORG/LINKS

The WorBots 4145

2022 - 2023 Business Plan



Cultivating a Culture of STEM in Worthington, Ohio

ENGAGE, INSPIRE, IMPACT

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Executive Summary

Mission Statement

Our mission is to cultivate a culture of STEM in Worthington, Ohio through:

- **Engaging** the community through our STEM and non-STEM outreach
- **Inspiring** future generations of lifelong STEM learners through our constantly improving cohesive K-12 pathway while increasing retention and diversity in STEM fields
- **Impacting** our community through giveback activities and contributing to the workforce with our growing internship programs

WorBots Core Values

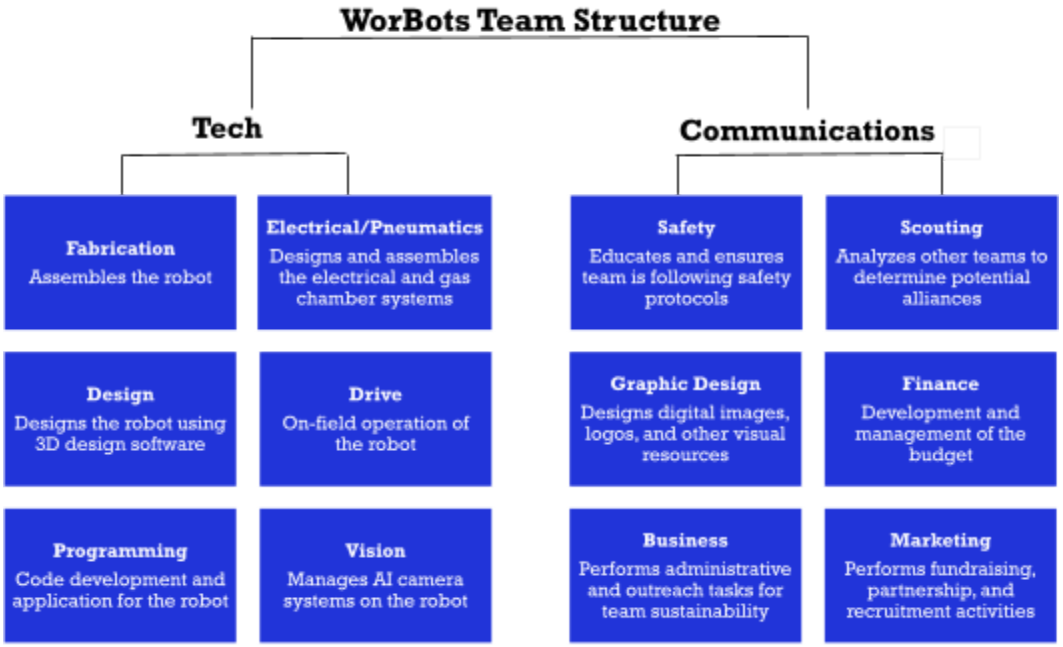
- Innovation
- Education
- Inspiration
- Initiative
- Teamwork
- Professionalism

Team Summary

Founded in 2012, the WorBots have grown from a small team with less than twenty members to a pathway program encompassing five FIRST® teams with 36 students in FRC. We connect both high schools within our district, allowing us to leverage STEM, business, and art programs from Thomas Worthington and Worthington Kilbourne. Since our founding, our focus has been providing STEM opportunities to those in Worthington. As such, we have started teams for younger students — three FLL and one FTC — which we have sustained through funding and mentorship since their inception to provide consistent opportunities for Worthington students. To further fulfill our mission, our team is consistently expanding our involvement in giveback and outreach. This season, we have added to our seasonal giveback activities — Turn for Troops, Habitat for Humanity, and a food drive — with a LEGO drive for the holidays in partnership with our FLL teams. We have also completed forty-two outreach events this year.

Team Description

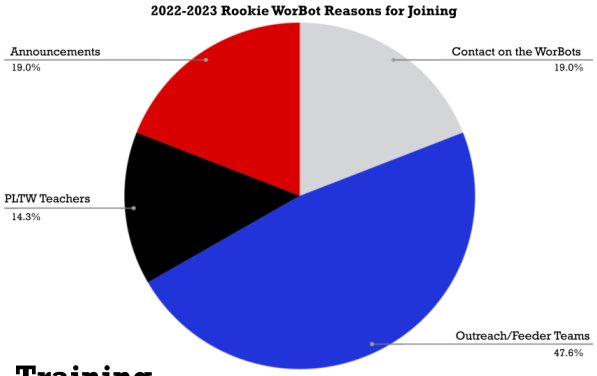
Rookie Season	2012
Location	Worthington, Ohio
School Affiliations	Worthington Kilbourne and Thomas Worthington High School
Team Demographics	36 Team Members ☼ 15 Female ☼ 21Male ☼ 21 New ☼ 15 Returning
Mentors	11 Mentors ☼ 5 Alumni ☼ 3 Employees of Sponsors ☼ 3 Parents of Alumni
Team Organization	☼ Fabrication ☼ Design ☼ Drive ☼ Programming ☼ Vision ☼ Electrical ☼ Pneumatics ☼ Safety ☼ Scouting ☼ Graphic Design ☼ Business ☼ Finance ☼ Marketing

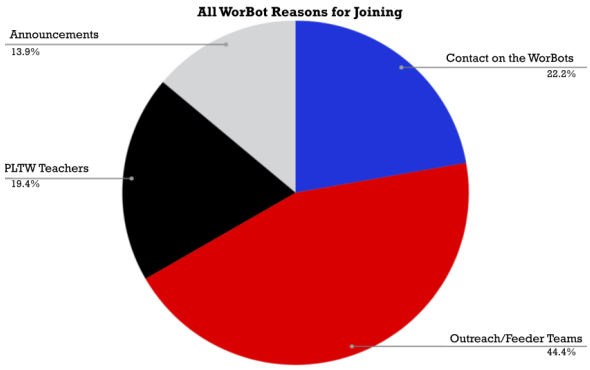


Operational Plan

Recruitment

The WorBots take a multifaceted approach to recruiting team members each season. Our primary means of recruitment comes from our partnership with the Project Lead the Way (PLTW) program in our schools; these teachers allow us to present in their classrooms and promote our program. Alongside our PLTW partnership, a large portion of our rookie team members seasonally come from outreach events such as activity and involvement fairs, feeder teams, STEM fairs, and local competitions. Supplementary to these sources, our team appears in announcements and newsletters, individually recruits students, and communicates with the business program to reach a broader non-technical audience. At the beginning of the season, we produce a recruitment plan outlining seasonal needs for each subteam and corresponding method revisions.





Training

The WorBots have developed and refined a training program we run prior to the start of the season that involves students regardless of their experience with PLTW or feeder programs. Our training model involves pairing rookie and returning students to foster communication, technical skill, and confidence in new students as they move into the build season. The program has evolved from all of the new members concentrating on building one large robot to crash courses in various skills applicable to fabrication specialties, which are then applied to multiple rookie robots as returning members provide guidance. Programming rookies work to develop basic code for the robots before they are built, and modify it when the fabrication rookies are done with their crash courses. In conjunction with this training technique, rookie team members work to build an off-season competition robot to ensure that all students are engaged. This season, we developed a business-specific training program that builds skills such as formal writing, presenting, communication, phone calls, and emails. The training is capstoned by a sustainability, marketing, and operations presentation, which is a collaborative effort between new and returning members of our business sector.

Expectations

All team members are expected to uphold and emulate our mission of cultivating a culture of STEM in Worthington, Ohio through exemplary professionalism within their communication and work, as well as significant contribution to their subteam, team fundraising efforts, and team outreach events. All team members must adhere to safety rules and communicate safety information to the appropriate leads and mentors when warranted. Members are expected to maintain strong academic standing. Furthermore, team members are expected to pay the team fee unless they have discussed a scholarship with the team mentors.

Officers are in charge of either a specific branch of the team (presidents) or administrative oversight (secretary and treasurer). They are responsible for communicating with the subteam leads, mentors, and boosters. Their role is to ensure that all of the aforementioned parties are operating cohesively. They oversee and approve all major operations on their respective sectors of the team.

Leads are defined as those in charge of a specific subteam. They are expected to ensure proper communication at all times with other leads, team officers, and mentors. They are further expected to maintain consistent attendance and punctuality, as they have a time-intensive role and serve as models for new team members to emulate. When working with all team members, they are expected to maintain good teaching practices and prioritize education.

Mentors are expected to follow the mentor description provided by *FIRST*®. They provide a knowledge base for the team and support students throughout the build season as well as through off-season endeavors. Mentors supplement the learning process — they do not produce any work such as code, parts of the robot, designs, business plans, or award documents (excluding Dean's List).

Contribution Recognition

For the WorBots, it is of the utmost importance that we recognize the outstanding contributions of our dedicated students and mentors; as such, we submit Woodie Flowers essays and Dean's List submissions to acknowledge them. At competition dinners, we recognize our members through a student award series run by team leads to highlight events throughout the season. At the end-of-season banquet, leads and mentors discuss and distribute awards such as Rookie of the Year and Future Lead to commend members of the team for their commitment to excellence on the team.

Subteam Roles

Fabrication: Works with the design team to determine the components of the robot needed for the game. They transfer the design from CAD models produced by design to the prototypes and final robot.

Design: Works with the fabrication team to consolidate team ideas into a CAD file that corresponds with the team strategy for the seasonal competition. They lay out the parts of the robot prior to the final build.

Programming: Works to develop code to operate the robot as dictated by the necessities of the game and the design of the robot. They are responsible for the autonomous portion of the robot and work with the drive team to determine controls.

Electrical and Pneumatics: Works to ensure that all electrical and pneumatic systems are operational and on the robot.

Drive: Maneuvers the robot at competitions and events the team attends during, before, and after the season.

Vision: Manages the AI vision systems on the robot and works with the system used for the season to maximize success when the robot is operating autonomously.

Safety: Ensures that all team members are informed of proper safety procedures and have access to safety equipment such as safety goggles and earplugs.

Graphic Design: Produces designs and media cohesive with the team brand to promote the team on social media, in the schools, and at events.

Business: Monitors team sustainability, runs administrative efforts, plans outreach events, produces award submissions, and creates business and actions plans.

Scouting: Collects information regarding team performance for the WorBots and those we compete with to analyze trends and determine potential alliance partners.

Finance: Develops and maintains a budget with the business team and the boosters.

Marketing: Performs fundraising activities and maintains corporate partnerships through communicative efforts to ensure successful team operations. Runs recruitment efforts to ensure sustainability in conjunction with the business team.

Safety

The WorBots work to maintain safety on our team through implementing strict documentation of safety certifications, accessible safety resources, and injuries. In addition to maintaining documentation for our team, our safety team produces resources such as kits, posters, checklists, and report forms to maintain consistency each year and support the growth of other teams.

Preseason and Postseason

Before and after the start of the competition season, the WorBots prioritize the following:

- Working to promote the Worthington Robotics Program through outreach events and mentoring feeder teams.
- Recruiting and training team members to ensure strong succession and adequate preparation for the build season.
- Documenting strengths, weaknesses, opportunities, and threats of the whole team as well as efforts to maintain continuous improvement.
- Preparing for off-season events, documenting lessons learned, and filling gaps that would otherwise exist with the lack of seniors.
- Acquiring sponsorships for the coming season.

It is an expectation that team members are consistent with their attendance and contributions regardless of if the meetings precede or follow the beginning of the build season.

Build Season

During the build season, the team meets Monday through Thursday from 3:30 p.m. to 7:30 p.m. and Saturdays from 10:00 a.m. to 4:00 p.m. The focus is work necessitated by member-specific subteams, and consistent attendance is expected. While the strategic goals remain a focus, short-term goals are emphasized during this period.

Communication

The WorBots' team members are expected to communicate with one another and the mentors using the team Discord. Leads, officers, and mentors communicate important whole-team and subteam specific information here. Additionally, we communicate meeting information through Instagram and Twitter, and we developed a whole-team calendar available through our website along with subteam-specific calendars run by corresponding leads to communicate important dates.

Finances

Fundraising

The WorBots officially begin the fundraising season during May each year. Members of the marketing team research companies, prioritizing not only potential monetary sponsors, but service and parts sponsors that reduce expenses. As part of our fundraising efforts, we connect with companies through three common interests:

- Supporting the community
- Building a pathway for future employment
- Increasing public awareness of their company

The WorBots initiate this process by sending letters and emails as well as cold calling companies, with the goal of securing an in-person meeting. At an initial meeting, members give a brief presentation of the *FIRST*® program, team accomplishments, and sponsor benefits. Sponsor benefits include 501(c)(3) tax deductions, and the aforementioned common interests. Sponsor benefits vary based on level.

Triple Diamond
$25,000+
*Inclusion in team name (**COMPANY** WorBots) to be announced at all competitions each time the team is introduced, and all previous benefits.*

Diamond
$10,000
*Branded banners displayed at all competitions, Name and logo displayed **prominently (in largest font)** on team shirts and in all marketing and informational material, and all previous benefits.*

Platinum
$5,000
Name and logo displayed on team shirts and in all marketing and informational material, and all previous benefits.

Gold
$1,000
Name and logo displayed on team shirts, and all previous benefits.

Silver
<$500
Company sticker to be displayed on WorBots robot during all exhibitions and competitions, Recognition in our end of year publication.

Once a new sponsor has been acquired, the WorBots invite them into our workshop for a tour and to meet our members. It is essential that we express our gratitude for their contribution and have them see our team in action.

During the 2021-2022 Rapid React season, the WorBots had seventeen corporate sponsors and five private donors. Our sponsors Lake Shore Cryotronics and ATS Automation both met with us in our shop to see our progress as a team and provide professional advice in 2022. In 2023, they visited our shop again for a shop tour and discussed internships with our team members.

One of our focuses is maintaining sponsor relationships seasonally. To ensure this, we maintain contact and communication through email updates, sponsorship renewal letters, and in-person meetings. Sponsor relationships are further strengthened through team alumni acting as interns.

Income and Expenses

2022-2023 Income	
Sponsors	**$30,500.00**
L3 Harris	$2,500.00
Lake Shore Cryotronics	$5,000.00
The Electric Connection	$500.00
DHL	$500.00
ATS Automation	$10,000.00
JP Morgan/Chase	$2,000.00
NASA Grant	$3,000.00
Safelite Grant	$2,000.00
AEP Grant	$5,000.00
Restaurant Fundraisers	**$900.00**
Chipotle	$600.00
City BBQ	$300.00
Other	**$17,700.00**
Private Donations	$4,000.00
Wolfpack Gymnastics Invitational	$3,000.00
CORI Concessions	$700.00
Team Fee	$4,000.00
Worthington City Schools (World's Only)	$6,000.00
Total Income:	**$49,100.00**

2022-2023 Expenses	
Miami Valley Regional	$6,000.00
Buckeye Regional	$3,000.00
Greater Pittsburgh Regional	$3,000.00
FRC Championship	$6,000.00
Robot *(including shipping and unused parts)*	$7,000.00
Team Meals	$3,000.00
Practice Field	$1,000.00
Team Merch	$1,000.00
Feeder Programs	$1,400.00
Total Expenses	**$31,400.00**
Net Income	**$17,700.00**

Financial Plan

The WorBots work to ensure financial sustainability by building a reserve fund in the event that sponsorships are not seasonally retained and, therefore, cannot fund all necessary seasonal costs. To maintain this fund, we work to add a total net income between ten and twenty thousand dollars. To ensure that we fall within this range, we maintain sponsor relationships throughout the season with invitations into our shop, emails updating our sponsors during the season, annual presentations, and post-competition summaries, including photos, discussion of any awards won, our ranking, and match videos. Internships with two of our key sponsors, ATS Automation and Lake Shore Cryotronics, connect them with our alumni.

To decrease team expenses, the WorBots work to build relationships with parts and service companies; these sponsorships provide free or reduced costs for plastics and aluminum or waterjet cutting and CNC milling services, as we do not have the capability to do either in our workshop space. Some of these sponsors joined us at our kickoff event, allowing them to see what the team would be working on for the season as well as meet our team members.

Our largest non-sponsorship fundraising effort is the Wolfpack Gymnastics Invitational. Each January, the WorBots assist the Worthington Kilbourne gymnastics team in the hosting all-Ohio meet through setup, tear-down, timing, and scoring through the event. Additionally, the WorBots run a concession stand throughout the

two-day event. We further fundraise through restaurant fundraisers such as Chipotle and City Barbeque as well as corporate match programs.

While each student is expected to participate in the fundraising activities, the team offers scholarships and provides transportation to competitions for those in need. We ensure every student has an opportunity to be part of the WorBots no matter their financial means

In the past three seasons, the aforementioned methodology has resulted in a fund able to sustain operations for over one season without any revenue, and two seasons when team fees are accounted for as a constant source.

Strategic Plan

Strategic Planning

Before each season, the WorBots discuss successes and challenges from the previous season. These are compiled into lists to guide our off-season team development. Outcomes of the previous season also help us determine our strengths, weaknesses, opportunities, and threats as well as next steps to maintain sustainability.

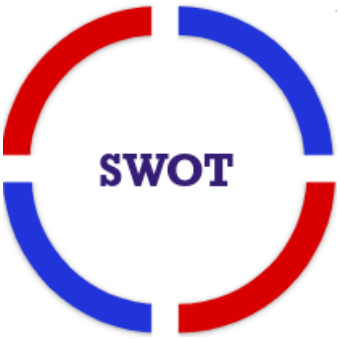
SWOT Analysis

Strengths

- Financial accessibility
- Recruitment
- Sponsor retention
- Community outreach
- Strong FRC relationships

Weaknesses

- Minimal teacher involvement
- Community giveback
- Social media presence



Opportunities

- School board relationship
- Local business relationships
- Feeder pathway
- Mentorship from sponsors

Threats

- Longevity of our training program
- Heavy reliance on the lead mentor

Strengths

The WorBots have developed a program designed to ensure that all students have access to STEM through *FIRST*®. To do this, we offer scholarships to students who cannot afford team fees. We exponentially increased our recruiting efforts within our second school by presenting to all of the PLTW classes and ensuring that business students learn about the non-technical aspects of the team. Part of this also comes from our outreach events, which have inspired many students and community members to get involved with STEM. Furthermore, we have strong relationships with both sponsors and FRC teams that help us to succeed.

Weaknesses

One of the WorBots' current weaknesses is involvement from teachers within our school. While we have made efforts to improve this through presenting to TWHS PLTW classes, most of our team's mentors do not work at Worthington Schools. Along with this, we have a low number of mentors, which we are trying to combat by contacting returning sponsors to engage them through mentorship. Furthermore, we have limited presence on almost all social media platforms, and we are looking to expand seasonal participation in giveback activities.

Opportunities

The WorBots have many opportunities to further expand our program. One area is our relationship with our school district. We have worked to expand our partnership through meetings and presentations, and we are looking to continue expanding this relationship as both high schools are re-done to ensure that STEM opportunities in Worthington continue to grow. Through our consistently-growing feeder pathway, we are expanding beyond our FRC level and encouraging young students to expand STEM knowledge.

Threats

The WorBots seasonally identify threats in order to ensure that we are sustainable. One of our biggest identified threats is a longevity of succession planning because members typically reach leadership positions within their last year on the team, causing seasonal rotation of leads. To mitigate this, we are maintaining our training program and implementing more meticulous documentation practices to ensure that team members are prepared each season and we don't face seasonal knowledge loss. Another identified threat is the large number of tasks our head mentor handles. To mitigate this, we are working with our sponsors to acquire new mentors and consultants for our subteams.

Season Goals

At the beginning of each season, in response to documented lessons learned, the team mission, and reasonable progression, the WorBots work to develop seasonal goals. These goals are referenced throughout the season to ensure that the team continuously improves. For the 2022-2023 season, our goals are as follows:

- Retain sponsors from the 2021-2022 season
- Start two new feeder programs
- Mentor all four feeder programs
- Qualify for the *FIRST*® Championship
- Complete two new giveback activities
- Develop a more cohesive team brand

Long-Term Goals

With the mission of cultivating a culture of STEM in Worthington, Ohio, the WorBots have developed specific goals and paired them with indicators of success to ensure consistent team development and impact on our community. These goals are worked toward through various events, program revisions, projects, and meetings; then, the success is documented in our outreach plan. This plan analyzes each event in terms of measurable results, reach, and growth from previous seasons — allowing us to regularly improve upon and audit our work on the team and in our community.

Goal	Time	Indicators of Success
Develop a high retention of students from elementary school to high school robotics programs.	Five years	☼ At least 80% of elementary school robotics program students join FRC teams. ☼ All feeder team students have the opportunity to connect to WorBots annually
Expand the presence of *FIRST* within Worthington and Worthington Schools.	Two years	☼ Every school has an FLL/FTC team. ☼ Run or participate in at least 3 whole-community events seasonally. ☼ Run or participate in events at all schools — regardless of feeder team status.
Develop a training system that improves team succession and consistently gain new members.	Three years	☼ Returning students feel prepared to enter each season. ☼ 90% rookie retention. ☼ At least three students per subteam obtained and retained.
Mature our relationship with the SWE Next group within both schools.	Two years	☼ 10 members join from that program. ☼ 2 or more events with them annually.
Develop cohesive team social media and website branding and management.	Two years	☼ 500% increase in social media engagement. ☼ Communication is consistent on all social media. ☼ Have consistent graphics in all media and publications.
Develop a resource library for incoming team members to prevent information loss.	Yearly effort	☼ Have all produced resources available through the website. ☼ Document all technical changes to ensure sustainability.
Sustain and grow the rainy day fund to ensure team sustainability.	Two years	☼ $35,000 rainy day fund available consistently at the end of each season.
Mature partnerships with businesses, schools, and educational institutions.	Four years	☼ Retain machine shop and sponsor relationships ☼ Have 5 members of the Worthington City School Board in our shop annually. ☼ Reach groups beyond our small community and maintain means of doing so.
Maintain long-term development data and statistics.	Yearly effort	☼ Have all statistics available in the master folder. ☼ Have statistics for each season.
Strengthen partnership at TWHS to retain members from both schools.	Five years	☼ 5 consecutive seasons of equal membership between schools.
Serve our community through giveback activities.	Three years	☼ 4,145 hours of active community outreach work.

Outreach and Feeder Teams

FIRST® LEGO League

The WorBots have proudly started three *FIRST*® LEGO League Teams: FLL 44451, FLL 44452, and FLL 57154. Since their inception, we have provided student mentors for each of the teams weekly, providing guidance on both technical skills and *FIRST*® Core Values as the students progress throughout the build season. We also offer shop tours and robot demonstrations to engage students in *FIRST*® and promote ongoing pathway membership.

FIRST® Tech Challenge

The WorBots have started one *FIRST*® Tech Challenge team: FTC 16284, the 8-Bit Bandits. We provide student mentors to guide the students through the engineering design process, marketing, and the Core Values. We have seen high retention rates from this program, with twenty-five percent of our team members coming from this program, which we promote through shop tours and program demonstrations.

CORI Invitational

Each year, the WorBots host an FRC off-season invitational sponsored by the Center of Robotics Innovation (CORI) in conjunction with the PAST Foundation. This even brings together over thirty teams from Central Ohio and the surrounding area to compete in the competition for one last time. CORI engages Worthington community members, students on our feeder teams, prospective rookies, and school board officials as they see *FIRST*® in action.

Shop Tours

Seasonally, the WorBots invite students from our middle schools, elementary schools, SWENext chapters, and feeder teams to join us in our workshop to learn more about *FIRST*®. This provides students with an opportunity to learn about *FIRST*® and how to get involved regardless of their age range, and it gives us an opportunity to promote the *FIRST*® pathway in Worthington.

Robot Demonstrations

The WorBots bring our robot all over Worthington. At Worthington Market Day, Science Day, Freshmen Day, STEM fairs, activities fairs, elementary schools, playgrounds, school board meetings, and many other places, we have showcased our program by demonstrating the capabilities of our robot and letting attendees interact with robotics hands-on.

STEM Nights

At science fairs and STEM nights throughout the year, the WorBots volunteer to present about STEM through interactive activities and robot demonstrations. This engages young students in robotics and encourages them to get involved with STEM.

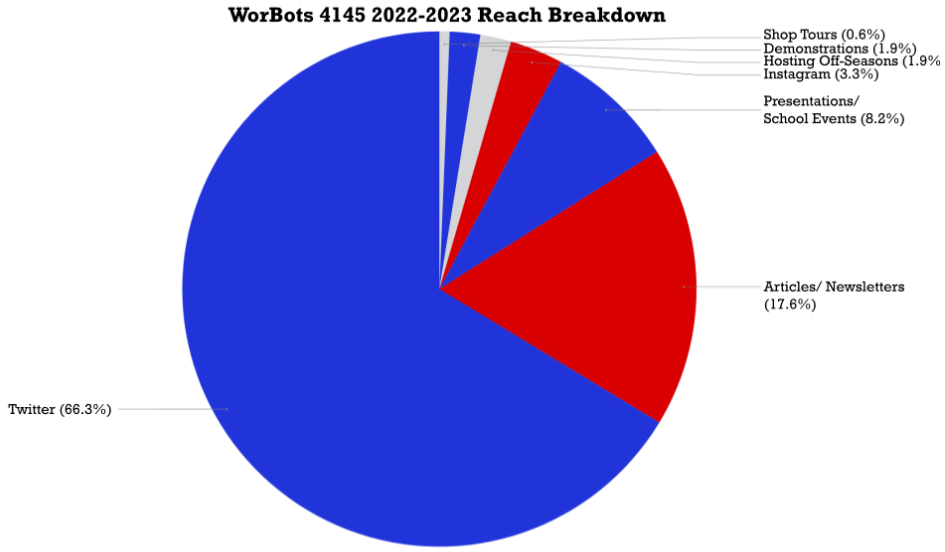
Worthington School Board

The WorBots consistently build upon our relationship with our school district. We rely heavily on STEM teachers to promote our program to their students and ensure that we have open communication with both the board and teachers in our schools. Each fall, we formally invite the Worthington school board, superintendent, and principals from both high schools to join us at the CORI Invitational. As a result of our close relationships and in an effort to further promote the STEM programs in our schools, the Worthington School administration has provided financial support for the WorBots to attend the FRC World Championships each year we have qualified.

For the 2022 season, we ran a robot reveal event for our district. This brought board leaders into our space to hear from our business team about the importance of Worthington STEM and see our robot *Mercury* in action for the first time. This meeting led to a second discussion about expanding into elementary schools and coach stipends. As the discussion about re-doing the high schools was underway, we spoke at a school board meeting on the importance of STEM education.

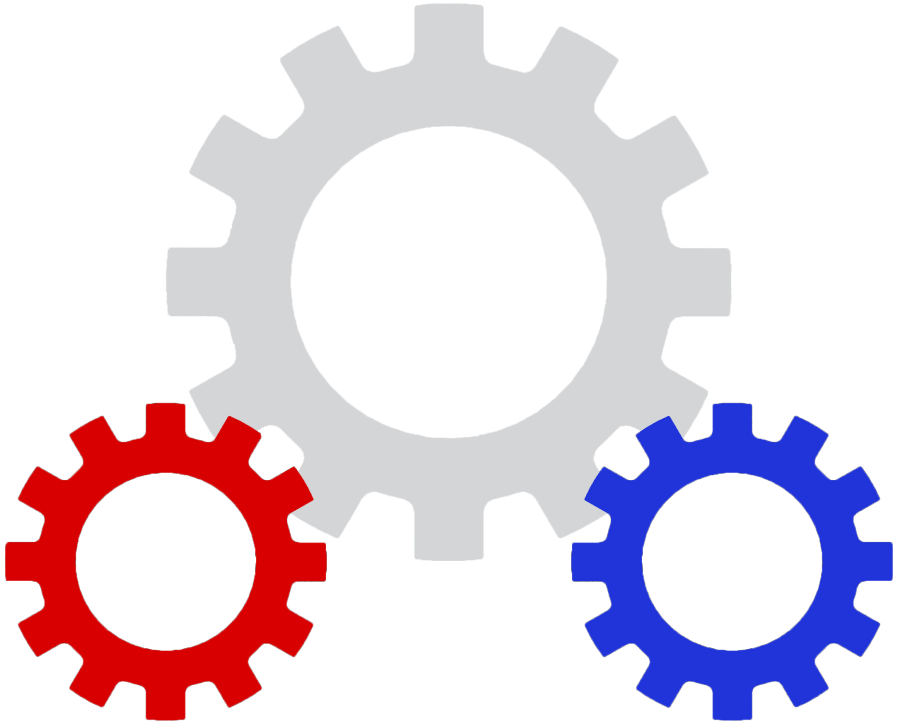
Giveback Activities

The WorBots seasonally work to give back to our community. We participate in Turn for Troops, an event at Woodcraft, where our team turns pens on lathes and writes letters for veterans on Honor Flights. We also participate in Habitat for Humanity and run annual food drives. This season, we joined our FLL teams to run a LEGO drive for children at Nationwide Children's Hospital for the holidays.



Contact Information

Website	https://worbots4145.org/
Team Email	worbots4145@gmail.com
Social Media	Instagram: @worbots4145 Twitter: @worbots4145
Lead Mentor	Tom Karns tkarns@wscloud.org 614-783-4620
Team Meetings	Worthington Kilbourne High School 1499 Hard Road, Columbus, OH 43235
Sponsorship Information	Checks should be made payable to: **Worthington Robotics Boosters** Worthington Robotics Boosters is a 501(c)(3) organization dedicated to furthering the *FIRST*® program in the Worthington Schools. Donations are tax deductible. Our W9 and 501(c)(3) Authorization forms are located on our website.



WorBots 4145

Engage, Inspire, Impact

Thank You, Mr. Karns

- WorBots 4145 Founding Mentor
- Passionate about our students growth and development
- Spends countless hours mentoring our students and leading the robotics program
  - During build and competition season, Mr. Karns spends an average of 40+ hours a week
  - In the offseason, he spends on average 20+ hours a week
- **Nominated for the Woodie Flowers Award, which recognizes outstanding impact on students**

3

Mission Statement

Our mission is to cultivate a culture of STEM in Worthington, Ohio through:

- **Engaging** the community through our STEM and non-STEM outreach
- **Inspiring** future generations of lifelong STEM learners through our constantly improving cohesive K-12 pathway while increasing retention and diversity in STEM fields
- **Impacting** our community through giveback activities and contributing to the workforce with our growing internship programs

4

This Season

Our goals for the 2022-2023 season are to:

- Retain sponsors from the 2021-2022 season
- Start two new feeder (FLL and FTC) teams
- Develop a cohesive team brand

But we haven't stopped at *just* goals:

- 42 community/school events completed within the past year
- Created giveback that is in collaboration with elementary school students
- Effectively trained 21 new students

7

Training Season

Each season, we run a six-week program to develop STEM knowledge and foster confidence in incoming team members. This ensures that *FIRST* is accessible to all students and that all in-shop operations are safe.

Build Season

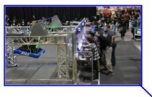
Each build season begins with kickoff in early January. From there, students have six weeks to design, build, prototype, and program the robot. After the robot is completed, we take it to regional competitions and work to qualify for Worlds.

Outreach Season

Before, during, and after build season, we work to engage the Worthington community through outreach efforts. We have participated in over forty events since our robot reveal last year.

8

Worthington *FIRST* Pathway



***FIRST* LEGO League**
Worthington has three teams:
- 44451 (Worthington Hills)
- 44452 (Worthington Hills)
- 57154 (Wilson Hill).

***FIRST* Tech Challenge**
Worthington has one FTC team:
- 16284 (Kilbourne Middle School).

***FIRST* Robotics Competition**
Worthington has one FRC team:
- 4145 (Worthington Kilbourne High School)

9

Student Impact

FIRST is a lot more than just robots — its impact is not limited to one year or one competition:

- 3.89 Average Unweighted GPA
- 92% of alumni pursued STEM
- 100% of students cite *FIRST* as a guiding factor in their career choice
- 2 seniors this season received STEM internships
- 1:1 Kilbourne to Thomas Worthington student ratio for the first time
- 80 Worthington students K-12 currently expanding STEM knowledge out of the classroom

10

Broader Impact

11

CORI Invitational

- Hosted at WKHS
- Offseason regional robotics competition
- Brought over 20 teams from across Ohio to Worthington
- Over 1,000 attendees each year
- Significant recognition from the Midwestern STEM community

12

Worthington STEM Growth

Your support would greatly improve STEM access.

- Preserve the shop space — including the workshop and the practice field
- Help us bring more STEM opportunities to the elementary level through the opportunity to present at an elementary principals meeting.
- Help us connect with teachers through events such as Worthington Convocation.

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WorBots 4145
2022 Robot Reveal

Robot Reveal Day Agenda

1. Shop Tour
2. Brief Presentation
3. Overview of Robot Capabilities
4. Robot Demonstrations
   a. Autonomous
   b. Drive
   c. Shoot
5. Team Pictures

2020 Robot: Atlas

Thank You, Mr. Karns

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- Passionate about our students growth and development.
- Spends countless hours mentoring our students and leading the robotics program.
  - During build and competition season, Mr. Karns spends an average of 40+ hours a week.
  - In the offseason, he spends on average 20+ hours a week.

Mission Statement and Goals

- Our mission is to cultivate a culture of STEM in Worthington, Ohio through:
  - Engaging the community through our STEM and non-STEM outreach
  - Inspiring future generations of lifelong STEM learners through our constantly improving cohesive K-12 pathway while increasing retention and diversity in STEM fields
  - Impacting our community through giveback activities and contributing to the workforce with our growing internship programs
- Our 2022 Goals
  - Build a sustainable fundraising pipeline
  - Expand our giveback activities

What is *FIRST* - The Ultimate Sport for the Mind™

FIRST **(For the Inspiration and Recognition of Science and Technology) Mission**

- To inspire young people to be science and technology leaders and innovators, by engaging them in exciting mentor-based programs that
  - Build science, engineering, and technology skills
  - Inspire innovation
  - Foster well-rounded life capabilities — including self-confidence, communication, and leadership.

Team Overview

- **42** total students
- **3.95** average GPA
- **Diverse Student Body**
  - **48%** of team members participate in sports.
  - **45%** of team members are in music programs.
- **Promoting STEM**
  - **93%** of team members plan to pursue STEM careers.
  - **53%** cite *FIRST* involvement as primary influencer for interest in STEM.

Team History

Our team was founded.

For the second time, the WorBots advanced to the World Championship!

2012 — 2018 — 2019 — 2020 — 2022

Won Buckeye Regional and qualified for the Championships.

Won the Entrepreneurship Award at Miami Valley

Giveback Activities

- Turn for Troops
- Habitat for Humanity
- Worthington Resource Pantry – Food Drive
- 3D-Printing Face Shields for Delaware County
- Buddy Boxes
- Worthington C.A.R.E.S. Coalition

Future of STEM in Worthington

WorBots 4145 Strategic Goals

- Expand *FIRST* LEGO League (FLL) to all elementary schools
  - Initiated contact with four principals and PTAs
- Extend *FIRST* Tech Challenge
  - Desire to add a second team to the Worthington Kilbourne side
- Exploring a summer robotics camp
- Grow our corporate partnerships – financially and in terms of mentorship

How can you help?

During the high school transformation…

- Preserve practice field at Worthington Kilbourne High School
- Enhance student learning opportunities through new technology

Expand *FIRST*'s Reach

- Support and encourage participation within our elementary and middle schools
  - Principal and PTA introductions
  - Elementary and middle school stipends
- Expand FRC (high school) coach stipends
- Bring back the Worthington Science Day

2022 School Board Meeting Speech on STEM

Hello, everyone. My name is Natalie Diebert, and I am a sophomore from Thomas Worthington High School. I am a member of the Worthington Robotics Team, also known as the WorBots.

In the past thirty years, STEM employment has increased by over eighty percent (Pew Research Center). This growth will not stop. Within the next ten years, the Bureau of Labor Statistics estimates that over eight hundred thousand STEM jobs will open across America, yet STEM education is not expanding to accommodate this. Within Ohio, these statistics are only becoming more relevant. As Intel becomes a keystone for the local job market in Central Ohio, it is imperative to support all students interested in STEM careers throughout the Worthington School District.

As a member of the WorBots, I have seen the impact our program has had on myself and my peers. We are a part of an international program called *FIRST* — For the Inspiration and Recognition of Science and Technology — which engages students from all backgrounds. The level I'm involved with, the high school program, gives students the chance to work together to design, prototype, build, and program a robot in only six weeks to then compete against 180 other teams from around the world. This season, the robot used AI vision targeting to track, intake, and shoot balls into an over eight-foot-high basket in addition to climbing and traversing four bars (similar to the monkey bars). Working through the engineering design process in such a short period of time provides an experience parallel to that of professionals working in the STEM industry. This hands-on experience allows them to apply what they learned in the PLTW classroom and prepared ninety-two percent of our team's alumni as they pursued STEM careers. These opportunities start in elementary school, where students can also gain exposure to fundamental STEM concepts by creating smaller robots with guidance from the high school team. And they do not stop, with these opportunities moving up to middle school, and then high school.

As you consider redesigning the schools, it is crucial to consider how the new design impacts student's education. Whether it be at Thomas or Kilbourne, having additional space and equipment would be pivotal in creating both a killer robot and the future of STEM education in Worthington. As a community, we have the opportunity to make the next step, take our education to the next level, and expand our students' futures.

Thank you.

Community Informational Materials

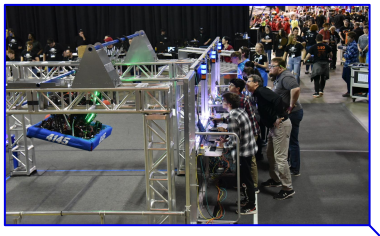
WorBots 4145: Feeder Pathway

Cultivating a Culture of STEM in Worthington, Ohio

***FIRST*: For the Inspiration and Recognition of Science and Technology.** *FIRST* is an international program connecting students, mentors, and communities with realistic, engaging STEM opportunities. It is more than just robots. Through emphasizing the *FIRST* Core Values such as Gracious Professionalism, teamwork, and inclusion students develop valuable knowledge and skills they carry with them throughout their lives.

Through *FIRST*, real-world opportunities develop knowledge and empower students to get involved. Every student from the WorBots, the Worthington high school *FIRST* team, has gone to college, with 92% majoring in STEM. Team members are connected with STEM professionals through upperclassmen internship opportunities and engineers serving as team mentors. Within the broader *FIRST* program, 50% of female alumni declare a major in engineering or computer science by their fourth year of college and 81% of alumni overall declare a STEM major.

In Worthington, we have five *FIRST* teams and are developing a cohesive pathway to ensure all students have access to STEM education. Levels of the pathway preceding *FIRST* Robotics Competition are connected with our high school students, fostering confidence in all students. To get connected with a team, you can email us through worbots4145@gmail.com or look on worbots4145.org.



FIRST LEGO League

FIRST LEGO League teams are composed of elementary and middle school students. Using LEGO kits and block programing, students develop foundational STEM knowledge. Through presentations, students emphasize community impact, innovation, and teamwork. Worthington has three teams: 44451 (Worthington Hills), 44452 (Worthington Hills), and 57154 (Wilson Hill).

FIRST Tech Challenge

FIRST Tech Challenge teams are composed of middle and high school students who develop STEM knowledge through designing, prototyping, programming, and building 18x18x18 robots. Teams also participate in marketing and acquiring financial support. Through outreach events, Worthington has one FTC team: 16284 (Kilbourne Middle School). It is open to all district students.

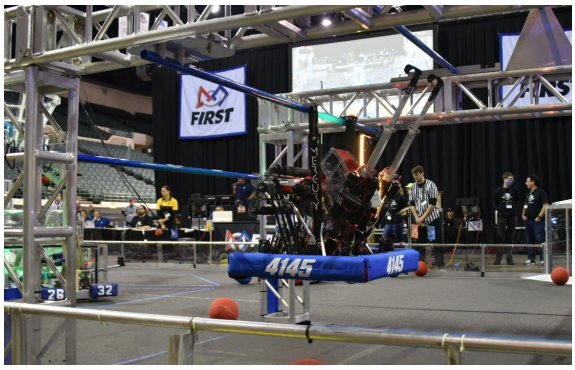
FIRST Robotics Competition

FIRST Robotics Competition teams are composed of high school students. It combines real-world engineering skills through 125-pound robots, CAD, and programming with business through acquiring sponsors. Teams participate in community events. Worthington has one FRC team: 4145 (Worthington Kilbourne High School) that is open to all high school students.

For more information about FIRST programs: https://www.firstinspires.org/

WorBots 4145: Team Information

Cultivating a Culture of STEM in Worthington, Ohio



The WorBots are at the high school level of the *FIRST* program, meaning we build robots that are approximately 120 pounds. For the first fifteen seconds, the robot runs off of programming alone, and then it is controlled by the driver for the remaining time.

During competitions, robots work in alliances, meaning three robots compete against three other robots. Alliances during qualification matches are random, so your partner for one match may be your opponent for the next.

Last season, we were tasked with building a robot that could shoot into multiple levels (sort of like basketball) then traverse up bars and hang (sort of like monkey bars).

For the Inspiration and Recognition of Science and Technology

We are a part of the *FIRST* program, which encourages students K-12 to explore STEM through hands-on learning experiences. It is open to all students who are interested in learning more, and it far more than robots.

Subteams:

- Business
- CAD
- Electrical
- Fabrication
- Graphic Design
- Marketing
- Programming
- Safety
- Scouting
- Strategy

@WorBots4145

WorBots4145@gmail.com

https://worbots4145.org/

WorBots 4145: Family Involvement

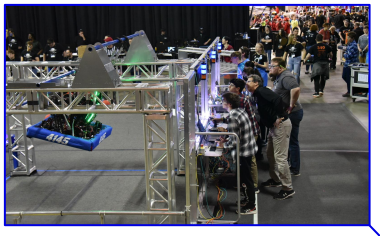
Cultivating a Culture of STEM in Worthington, Ohio

Students in elementary school can get involved through *FIRST* LEGO League (FLL). Worthington current has three teams: FLL 44451 (Worthington Hills), FLL 44452 (Worthington Hills), and FLL 57154 (Wilson Hill). These teams are open to forth and fifth grade students at their respective schools. For less time-intensive opportunities, the Worthington PLTW Summer Camp and various school outreach events connect students to STEM annually. Communication with schools informs students and families of these events ahead of time.

Students in middle school can get involved through *FIRST* Tech Challenge (FTC). Worthington currently has one FTC team, FTC 16284 (Kilbourne Middle School); however, it is open to all students in the district. For less time-intensive opportunities, students can participate in the Worthington PLTW Summer Camp or attend any of the events held in Worthington. Communication with schools informs students and families of these events ahead of time.

Students in high school can get involved through *FIRST* Robotics Competition (FRC). Worthington has one FRC team, FRC 4145 (Worthington Kilbourne High School), which is open to all Worthington high school students. We also attend large school events at Thomas and Kilbourne — providing annual STEM opportunities. Communication with schools informs students and families of these events ahead of time.

Caregivers can get involved with pre-existing teams as mentors — sharing professional experience with STEM students. They can also join our team in building opportunities through joining Worthington advocacy efforts. To connect their students with the team, inquire about demonstrations, discuss event possibilities, or get involved in any capacity, the WorBots are reachable at worbots4145@gmail.com.



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WorBots 4145: Local Involvement

Cultivating a Culture of STEM in Worthington, Ohio

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Based out of Worthington Kilbourne High School, the WorBots connect both Worthington City Schools high schools, connecting students with educational opportunities. We work with students across the district to expand STEM education and engage them in science, technology, engineering, and mathematics early-on

Community members can get involved with the *FIRST* program by sharing their industry experience with Worthington students through mentorship or short-term events. Because *FIRST* is very holistic, students benefit from learning about a broad range of fields and applicable concepts. Mentors work with the team regularly in subteam-specific areas such as fabrication, programming, design, marketing, and business to ensure preparedness and provide support in the learning process. Through short-term events, community members can review specific presentations or work with teams on very specific aspects of team operations. To meet with our team and robot or learn more about 4145, we are reachable at worbots4145@gmail.com.

Local businesses can also support student learning through sponsorship. In approximately six weeks, students design, prototype, and build a complex robot to complete a series of tasks and challenges — expanding STEM education access throughout Worthington. Sponsorship support goes to building our robot, competition entrance fees, new equipment, and travel-related expenses. To meet with our team and robot or learn more about the WorBots, we are reachable at worbots4145@gmail.com.

WorBots 4145: 2022-2023 Flyer

Cultivating a Culture of STEM in Worthington, Ohio

The WorBots are *gearing up* for the 2022-2022 season and are looking for curious individuals to get involved. If you're interested in fabrication, CAD, business, marketing, graphic design, or programming, it's an opportunity to do what you enjoy and grow your knowledge. Regardless of prior experience, we will guide you through the process.

Through the team, you can learn how to build a robot, use complex computer engineering software, and successfully present to companies. Through 4145, you can build preparedness for the future.

Interested? For more information, you can contact Mr. Brown (TWHS) or Mr. Karns (WKHS) in the STEM hallway to learn more. Our first meeting is October 19th.

The Columbus Dispatch

WORTHINGTON

Worthington Schools students building skills for career and life on Worbots robotics team

Stephen Borgna
ThisWeek

Published 2:20 p.m. ET Jan. 27, 2022 | **Updated 4:02 p.m. ET Jan. 28, 2022**

Four days a week after school and on Saturdays, a group of students from Worthington Kilbourne and Thomas Worthington high schools make their way to a workshop at Kilbourne.

There, instead of playing sports or instruments or doing other extracurricular activities, they build robots.

The 43 students comprise Worbots 4145, a Worthington Schools robotics team that builds and programs robots to compete in annual international FIRST Robotics Competition events, which draw thousands of robotics teams and high schoolers from around the world.

"It's a lot of fun; it's pretty competitive," said Tom Karns, a STEM teacher at Worthington Schools who has been running the program since it was founded a decade ago. "It's actually considered to be the sport of the mind."

One of the Worbots 4145 students is Owen Marano, a Kilbourne junior in his third year with the team. Marano is the fabrication lead who heads the development of the team's robots; he also serves as the driver.

“I’ve learned so much about the whole building aspect of the robot,” he said. “I’ve learned a lot about the engineering process that we focus heavily on.

“We start with an initial design and move onto prototyping and final build. And we just test it further and try to keep improving. It’s kind of helped me learn you can always continue to do better, and there’s no one great solution.”

Worbots 4145 was launched in 2012 with fewer than a dozen members and limited resources, according to its website, worbots4145.org. Since then, the group has increased in size and capabilities and has experienced success, having won the FIRST Buckeye regional event in 2018 and 2019.

This year, the team is lined up to compete at regional competitions at the California University of Pennsylvania from March 16-19, at the Cleveland State University Wolstein Center from March 23-26 and at the University of Illinois Chicago from April 6-9.

If the team performs well, it will compete in the world championship at the University of Houston in Texas from April 20-23.

Each competition takes place on a court where robots have to complete such feats as shooting oversized tennis balls into a large hub and traversing a set of metal bars akin to monkey bars on what is termed a hangar, according to a FIRST Robotics Youtube video describing the competition.

At each contest, three Worthington students are matched up with two teams of three students from other schools to create a nine-person team, and they then compete against another nine-person team on the playing field.

“It’s not easy – there’s about 60 teams at each event,” Karns said. "You roll in there, and every game you play you play (is) with someone different. And what’s interesting is the people you just played with, they’re on the other team the next time.”

The students build and program Worbots’ robots, including a large, complicated build named Atlas that is programmed to shoot tennis balls into a bucket.

They include Tyler Zupfer, a senior at Thomas in his fourth year with Worbots 4145 who serves as the assistant program lead.

“I’ve learned not only a lot of programming and software skills, but I’ve also learned how a lot of the electrical and electrical mechanical aspects interface with a lot of that,” he said.

The robots and the program itself aren’t cheap.

Karns said in the 2019 season, FIRST Robotics teams were permitted to spend up to $4,000 overall on their projects. That figure was increased to $5,000 in the 2020 season.

This year, Karns said, teams are permitted to spend up to $600 per individual part, but there’s no limit to how much they can spend.

There’s where business outreach and corporate sponsorships come in.

Braylee Hsu, a junior at Thomas in her second year with Worbots 4145, works on business outreach and securing sponsorships for the team and works on such community outreach efforts as a food drive planned in the coming weeks.

Hsu said she has worked this year to acquire sponsorships from ATS Ohio and Lake Shore Cryotronics.

“It’s taught me how to interact with other businesses, and how to reach out to these people,” she said. “And get to know my team and understand our strengths and weaknesses so I can communicate with others, ‘This is what we’re doing, and this is how we can make our community better.'"

The work during their extracurricular time develops STEM and business skills for the students, Marano said.

And if all goes according to plan, they’ll win more FIRST Robotics accolades this year to show their efforts, he said.

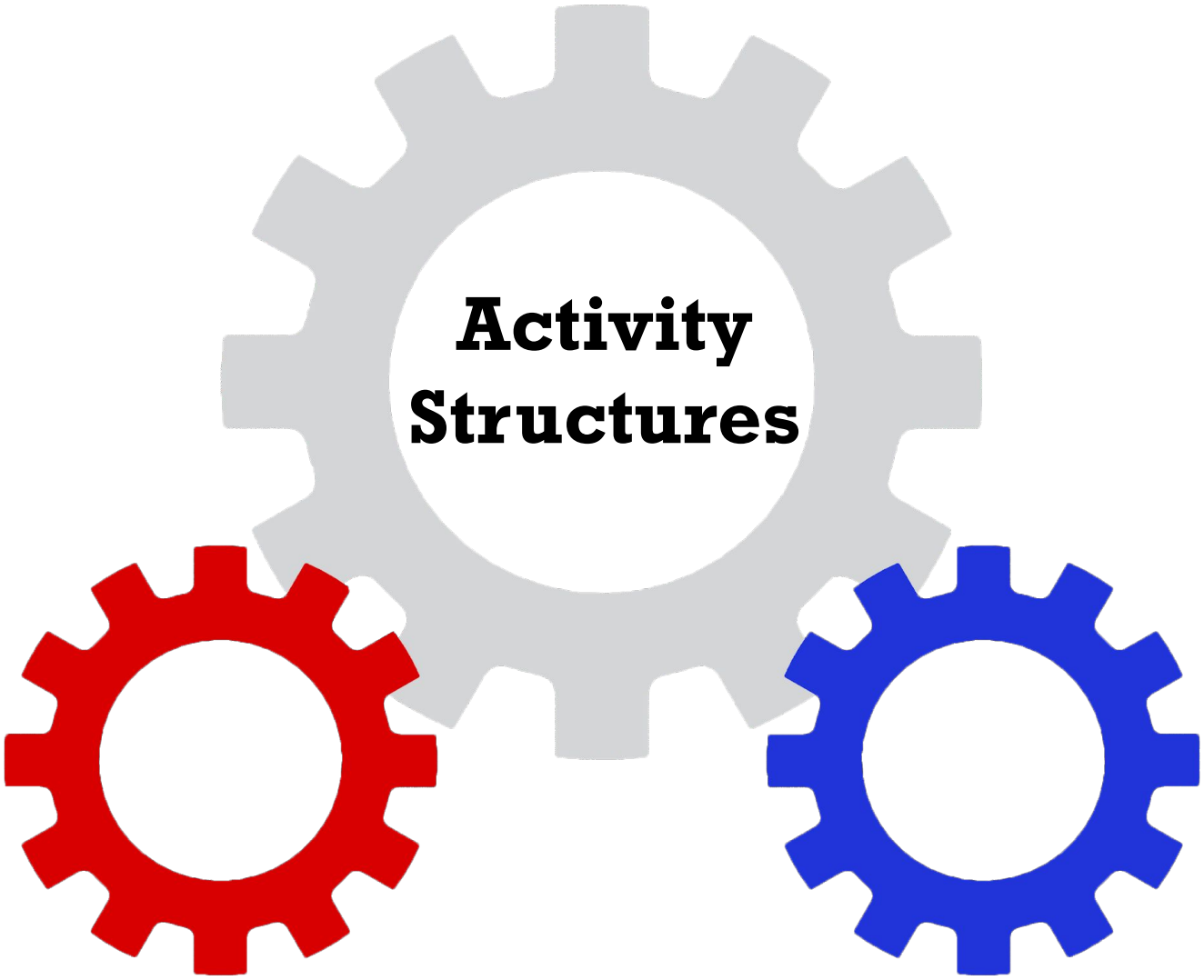
“I think it really helps the students and our team to prepare for what’s ahead,” Marano said. “Around 90-95% of the kids that do our program go into engineering.”

For more information on the Worbots team, go to worbots4145.org.

sborgna@thisweeknews.com

@ThisWeekSteve

Activity Structures



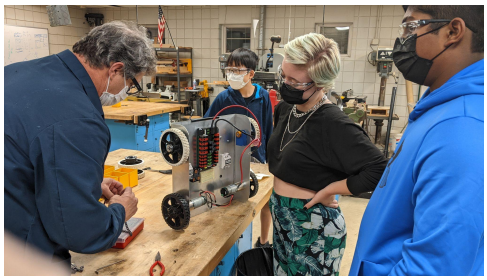
WorBots 4145: Rookie Training

Cultivating a Culture of STEM in Worthington, Ohio

Program Overview

Each season, we guide prospective rookie team members through designing, building, and programming a robot in approximately six weeks with guidance from our returning students and mentors. For our business team, new members create formal presentations and learn formal writing, presenting, phone calls, and emails. All new members learn about team history and our mission, building a cohesive program.

By having returning and new team members work together while rookies move throughout the aspects of our training, rookies **develop relationships with one another.**



By working through a technical challenge in a short span, new technical members **develop fundamental STEM knowledge and confidence**, which they carry into the build season.

Through working with one another throughout the duration of rookie training, our program **fosters a sense of teamwork** between new and returning WorBots.

Training Timeline

Week 1

All new students are introduced to the principles and history of the team. Technical students are introduced to the challenge, while business students work on a more in-depth version of the team overview and begin a presentation assignment.

Week 2

Students get to know their subteam leads and returning members as they progress throughout the challenge given. Technical team members finalize the design process at this point and move onto prototyping. Business students work on presentations.

Week 3

Technical students finish prototyping and move onto either fabrication or programming. Business students finish their presentations and get structural feedback. All students are expected to have joined the Discord server.

Week 4

Technical students carry on with work in their respective subgroup. Subteams should be one-third of the way done. Business rookies begin presenting their presentations to returning members and getting feedback from the business team.

Week 5

Fabrication students finish building the rookie bot to pass it on to the programming students. Programming students finalize the code they were able to work on before getting the robot. Business students run their final presentation and work on mock sponsorship calls.

Week 6

Programming students finish working on the rookie bot and we run a "robot reveal" for the rookie robot. Business students participate in a sustainability presentation. All rookies should apply for the team on the *FIRST* website at this time.

Shop Tour Schedule

Tour Dates:

[Day], [Month] [Day], [Year]
[Day], [Month] [Day], [Year]
[Day], [Month] [Day], [Year]

Stations:

Drive
Programming
Business
Pneumatics/Electrical
Programming

Schedule:

**All transitional periods between station rotations are to last 1 minute, excluding the first transition from 6:20-6:22*

5:30	WorBots arrive at workshop
5:55	Finish setup of all stations
	1 to 2 WorBots stand by the main entrance to greet visitors
6:00-6:05	Visitors arrive at workshop
6:05-6:20	Brief introduction to team members
	Game description
	Mercury demonstration
	General questions
	Group Photo
	Split students into groups
6:20-6:22	Transition into stations
6:22-6:28	Station rotation 1
6:29-6:35	Station rotation 2
6:36-6:42	Station rotation 3
6:43-6:49	Station rotation 4
6:50-6:56	Station rotation 5
6:56-7:00	Wrap-up and hand out WorBots pins

2023 Eagle Expert Extravaganza

Time: 6:30 p.m. to 7:30 p.m.

Session One: 6:30 p.m. to 6:50 p.m.
Session Two: 6:50 p.m. to 7:10 p.m.
Session Three: 7:10 p.m. to 7:30 p.m.

Provided Event Description: "Do you have expertise with a particular skill, hobby, or creative activity? Are you interested in sharing your creativity with others? If you answered "YES" to these questions, then we NEED YOU! Evening Street is hosting an "Expert Extravaganza" on Wednesday, March 22, 2023 from 6:30 to 7:30 P.M. We need volunteers to run breakout sessions in which to demonstrate or teach about your expertise and to give time to families to practice. We envision that you would have 3 sessions, 20 minutes each with a transition time in between. We encourage any type of activity, as long as it can be completed indoors and in a classroom setting. Some possibilities: hand crafts or art, computer/tech/engineering, drama, a life skill, or games, etc."

Location: Evening Street Elementary School, 885 Evening St, Worthington, OH 43085

Program Goal: To connect young students with real-world engineering concepts and inspire them to further explore STEM.

Team Program Focus: Working with elementary school students to build engineering knowledge and confidence — inspiring them to get involved with it from a young age. All material should be connecting to ideas and elements of their life they frequently interact with, providing an informational yet engaging experience.

Agenda:

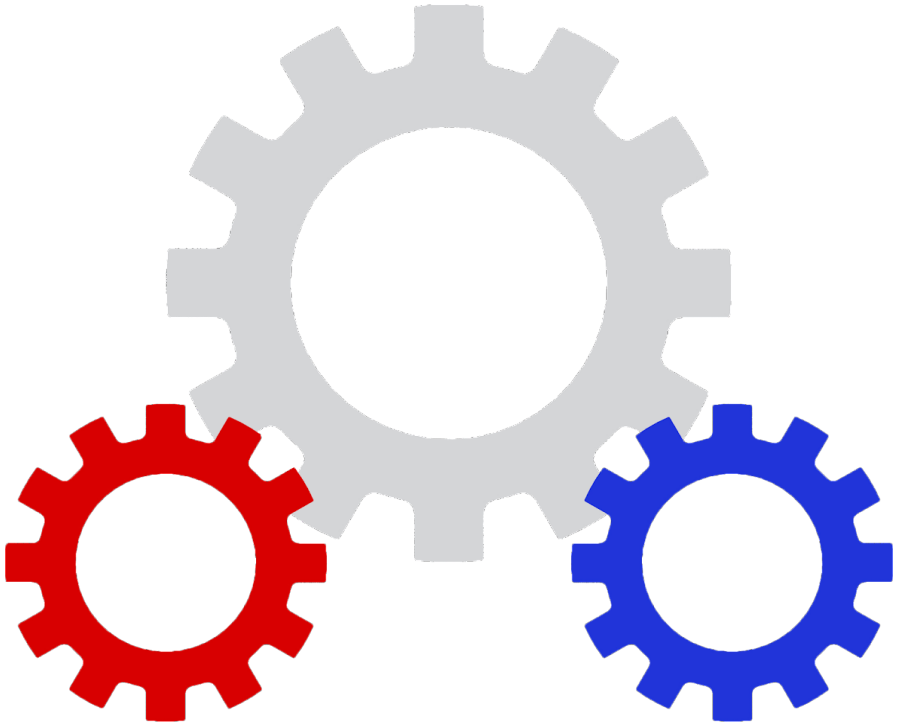
Introductions/Robot Demonstration (Five Minutes)
"What do you think it means to be an engineer?" (Two Minutes)
Connection to how they are already engineers (Minecraft) (One Minute)
Introduction to the design challenge/distribute paper (Three Minutes)
Students work on robot design ideas in small groups (Seven Minutes)
Talk about FLL at their school and distribute pins/stickers (Two Minutes)

Focus Points:

- Empowering students and guiding them as opposed to giving them one set answer
- Encouraging creativity within designs
- Ensuring that all students have the opportunity to get involved with their group
- Demonstrating that engineering is not something they have to wait to get involved with.
- Connecting students with engineering opportunities through *FIRST* LEGO League.

The WorBots 4145

Outreach Discussion Guidelines



Cultivating a Culture of STEM in Worthington, Ohio

ENGAGE, INSPIRE, IMPACT

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General Guidelines

At all events, the goal should be to engage community members in the mission and ideas of both the *FIRST* program at large as well as the WorBots more specifically. Within the focus of innovation, education, inspiration, initiative, teamwork, and professionalism — the WorBots' core values — discussions team members may have must be modified based on who they are speaking to, the nature of the event, and the context in which they are interacting. Regardless of who any representative of the WorBots is talking to, members must remain professional in their speech and presentation. All attendees of events should feel listened to, respected, and as though they have gained something from their interaction with the team — whether that be more information about STEM itself or a better understanding of what *FIRST* is and how they can get involved. Curiosity and questions should always be encouraged and celebrated. Students are more important than planning or curriculum in *every* case.

When discussing *FIRST* as opposed to the specific team, only the Core Values of *FIRST* — discovery, innovation, impact, inclusion, teamwork, and fun — should be referenced. When talking about *FIRST* and the team or just the team, both sets of values should be highlighted. Regardless of the audience — even groups of engineers or STEM professionals — it is important to highlight the "more than just robots" aspect of the program. As the WorBots expand our presence in Worthington and focus on advocating for STEM and *FIRST* throughout the district, it is imperative that the community understands that the program is multidisciplinary and students from all backgrounds and interests have opportunities.

The appropriate references to the WorBots are "program" or "team." The WorBots are sustaining Worthington STEM as a cohesive unit, making us a program, but we also operate within the high school level competitively and fit the description of a team more accurately. The formalized team name is "The Worthington Robotics Team," which should be used only in sponsorship meetings or events outside of the community, as it ties directly to the team's location and is similar to the 501(c)(3) name, promoting cohesiveness.

All major outreach activities are to include both returning and rookie members, ensuring the sustainability of events. A returning member should not intervene unless it is necessitated when rookie members are speaking to event attendees. Rookie members are to attend a briefing on events and read through this document before participating in outreach events. The former is not a requirement for members of the business subteam unless the Outreach Lead or Communications President feel as though it is necessitated.

The ultimate goal of outreach activities is to cultivate a culture of STEM and *engage, inspire,* and *impact* the Worthington community. All events are intended to be fun for attendees and students from the WorBots. There is no need for scripts or practice beyond a briefing unless a student does not feel comfortable or prepared enough — it is important to demonstrate a passion for STEM and *FIRST* and have fun!

Kindergarten Through Third Grade

For this age group, it is important to ensure consistent engagement and monitor how members are discussing the team. This is likely one of their first introductions to robotics and STEM, so it is important to use vocabulary that is understandable and comparisons they can understand. Based on our previous outreach events, these students are very eager to learn more through questions, so approximately half of the time working with a group should be dedicated to that unless the kids seem disinterested. When answering questions, it is important to remember that all information must be clear and that they are asking because they are genuinely curious. It is important that their curiosity is met with enthusiasm and encouraged. There should never be a point where questions are shut down. Younger students may also be excited to talk about their previous interactions with STEM — listen to them and match their excitement with opportunities they can have at the event or through FLL.

If they are enthusiastic about certain aspects such as programming, design, fabrication, or business, connect them with a student from that team to talk to them more. This provides a more personal and impactful experience and can foster confidence in younger students because they are able to connect what they are doing with *FIRST*. All returning members are also familiar with the FLL program because many of them serve as mentors and the team sustains those programs, so connecting students with a WorBot familiar with those opportunities can excite and empower students. Remember that it is important to meet students where they are and show them all the possibilities available. Some students may feel as though it isn't possible when they first see it, so it's important to recognize that and show them that anyone can build a robot.

Analogies are one of the most effective ways to connect with younger students. For the design station, in addition to the design activity, the WorBots also show CAD designs for the current or most recent season. When talking about how they are developed, connections to Minecraft are one way to reach students more effectively because it is something they have experience with. Furthermore, this builds confidence and demonstrates that these opportunities are attainable. This model is further emulated in business, where the team often talks about what it means to run a business and connects to that, providing a more exciting experience.

Standard Event Materials:

- LEGOs
- Engineering paper
- Pencils
- Season robot
- Demonstration robot

Key Focuses:

- Developing a baseline
- Building confidence
- Inspiring young students
- Showing that STEM is for everyone
- Presenting understandable information

Fourth Through Sixth Grade

For this age group, it is important to foster confidence while connecting to the experience they already have. These students are also eligible for all district FLL teams, so emphasizing that opportunity is crucial for both students and Worthington *FIRST* sustainability. Team members are still expected to monitor their descriptions to ensure all information is understandable; however, it is less likely to be a major concern for this age group because, from team experience, they tend to be more willing to ask questions. Nonetheless, technical terms that are overly complicated should either be simplified or explained depending on what is warranted by the context. While these students are still curious, they are also looking at speakers as role models and are eager to listen, so approximately one-fourth of the time should be allotted to questions unless otherwise directed by the lead of the respective subteam, Communications President, or Outreach Lead.

Students are always curious, and that is great! Curiosity builds knowledge and fosters confidence. When answering questions, it is important to remember that all information must be clear and that they are asking because they are genuinely curious. It is important that their curiosity is met with enthusiasm and encouraged. There should never be a point where questions are shut down. Younger students may also be excited to talk about their previous interactions with STEM — listen to them and match their excitement with opportunities they can have at the event or through FLL. If students are interested in something specific and it is reasonable, focus on that when working with them. Students are the focus — a curriculum is to support them but should never be focused on instead of genuine engagement. For structured events with specific groups (such as camps or Scouts workshops), connect the necessary ideas with what groups are enthusiastic about. Leadership and STEM are always flexible when those presenting are willing to see them as such.

In addition to the general discussion about feeder programs, it is important to connect interested students with WorBots who can provide them more specialized information. Many students each season work with mentorship and all returning members are knowledgeable about feeder programs. When possible, connect students with the mentor for the team they are eligible for; otherwise, connect students with returning members.

Standard Event Materials:

- LEGOs
- Engineering paper
- Pencils
- Season robot
- Demonstration robot
- Subcomponents

Key Focuses:

- Expanding upon current knowledge
- Building confidence
- Inspiring students
- Engaging students and families with STEM and *FIRST*

Seventh Through Eighth Grade

The key focus for this age group is building upon what they already know and expanding upon their perspective of what STEM is. For many students, their understanding of STEM will be very class-oriented, so we want to build the interactive component and show how fun it can be. Technical terms should be more integrated into the descriptions of each part of the team and robot, with explanations as needed. These events are also typically longer, meaning each subteam should strive to provide a fairly in-depth understanding of their field, and students should be more guided toward their areas of interest after the basic overview. Questions will likely be more specific, so after the basic presentation, the event should be student-guided. For students passionate about STEM or in STEM courses, this may mean elaboration on specific functions; for others, this may mean a longer presentation or more explanation-based questions.

Students in this age group tend to be less outwardly curious, but that does not mean they are not. If students aren't actively asking questions, try and develop a more conversational atmosphere and connect to their interests. If one student is particularly excited about an aspect of the program, try to connect them to a team expert after the group event to discuss further and build their understanding of what their interest looks like in a *FIRST*-specific context. When demonstrating subcomponents of the robot or design, tie it into steps of the engineering-design process and talk about the thought process and prototypes leading up to the final decisions. Students are the focus — a curriculum is to support them but should never be focused on instead of genuine engagement. For structured events with specific groups (such as camps or Scouts workshops), connect the necessary ideas with what groups are enthusiastic about. Leadership and STEM are always flexible when those presenting are willing to see them as such.

When discussing opportunities through *FIRST*, it is important to be holistic in descriptions. Even if a student seems very interested in the technical aspects, communications should still be presented; conversely, communications-focused students should still be shown the technical side. Many students on 4145 are FTC alumni and mentors, so they can talk to the students about opportunities through that program.

Standard Event Materials:

- Annotated CAD Designs
- Engineering paper
- Pencils
- Season robot
- Demonstration robot
- Subcomponents

Key Focuses:

- Expanding upon current knowledge
- Providing specific STEM understanding
- Broadening student perspective of STEM
- Engaging students and families with STEM and *FIRST*

Ninth Through Twelfth Grade

For this group, the goal is to connect students to their existing knowledge, encourage a focus on STEM careers, recruit, and encourage involvement in Project Lead the Way (PLTW) classes. For students on the Project Lead the Way track, it is important to highlight that the WorBots serve as a direct extension of classroom knowledge developed in the PLTW program. For all students, highlighting the principles of computer science, physics, math, engineering, design, communications, financial literacy, and entrepreneurship integrated within team and program operations is important for demonstrating the opportunities available within *FIRST*. Regardless of the age or course load of a student, it is important to highlight that if they are passionate and willing to learn, *FIRST* will provide them with many opportunities to develop their knowledge and access to a diverse community.

At all events within Thomas Worthington or Worthington Kilbourne — excluding those with *FIRST* teams or other schools (*see "FIRST Teams"*) — the focus should be education and recruiting students to the WorBots. If a student is not interested in joining, it is still important to maintain the educational aspect and focus on teaching about STEM through interactive opportunities involving the robot. For presentations, there should be close to a fifty-fifty ratio of highlighting technical operations and community impact, as that provides a holistic understanding of exactly what the team is. For students who don't immediately seem interested or seem hesitant, talk about rookie training opportunities and the unlimited opportunities through all of the different subteams — oftentimes, regardless of how the team is initially discusses, it is hard to understand exactly what is meant by "robotics is so much more than just robots," so elaborating is imperative.

For broader community events or those in other schools, the focus should shift from recruiting specifically for the team to encouraging overall involvement in *FIRST* or other accessible STEM programs. If someone expresses that they are interested in the team but do not have access to a program in their school, work to acquire contact information so outreach can work on team development and connect that student with the local STEM opportunities.

Standard Event Materials:

- Annotated CAD designs
- Impact Award video
- Competition videos
- Engineering paper
- Pencils
- Season robot
- Demonstration robot
- Subcomponents

Key Focuses:

- Expanding upon current knowledge
- Providing specific STEM understanding
- Broadening student perspective of STEM
- Engaging students and families with STEM and *FIRST*

Feeder Team Students

For feeder team students, it is important to highlight the progression of the Worthington *FIRST* Pathway and what taking the next step looks like for them. It is also important to highlight that their mentors were once in their position and that they will still have opportunities to remain in their team even when they move to the next step. Further, showing students that they do not have to stay in the same field — or even sector — of their team is necessary. Student retention is directly threatened when students feel stuck in one place. *FIRST* is an opportunity to learn, and any student who wants to learn from multiple teams should absolutely have the opportunity to do so.

When students are coming into the WorBots' spaces, it is necessary to provide an overview of the team's operations and connect what 4145 does to what their level of the *FIRST* program and their specific team is doing. Ideally, one of the student mentors for that team will be running the event, as they are required to work with the Outreach Team for specialized event modifications, curriculums, and all communication. When specific subteams are presenting, their framing should be designed to be parallel with the experience of younger students, maximizing the impact of these events (as determined by the *Impact Analysis* and testimony from WorBots who were on feeder teams).

For students who choose to learn more about the extension of their current subteam on the FRC level, they should be connected with the newest students on that subteam to hear about their experiences and perspectives as well as the lead. When they have questions, the lead should not answer unless absolutely necessary — the goal is for students to see the opportunities starting their first year on the team. When a student on that subteam from that feeder team or program level is available, they should also be working with the student to talk about their experience moving from FLL and/or FTC to FRC and how adapting to that change went for them.

Standard Event Materials:

- Annotated CAD designs
- Impact Award video
- Competition videos
- Engineering paper
- Pencils
- Season robot
- Demonstration robot
- Subcomponents

Key Focuses:

- Showing the connections between their team and 4145
- Fostering confidence in young students
- Demonstrating the opportunities available through continued *FIRST* involvement
- Connecting alumni and current students of a feeder team
- Providing a look at what comes next in *FIRST*
- Building excitement for future opportunities

Broader *FIRST* Community

Within the broader *FIRST* community, it is important to maintain professionalism and all team standards as well as Gracious Professionalism, as expected for all team events. As opposed to Worthington events, 4145 explicitly used "The WorBots" within the *FIRST* community — the team does not use "The Worthington Robotics Team" unless explaining the meaning of the shortened name is necessitated. This ensures consistency with our official team and upholds how the team has always represented itself within *FIRST*, minimizing confusion. Team members may access any resources developed by the team to assist other teams so long as it has been labeled "published." If published resources do not cover the need, contact the Outreach Team to quickly proof, improve, or develop resources in conjunction with the appropriate subteam. For technical resources, this may result in a slight delay because both sectors need to approve publishing the resource, but this should take no longer than an hour within all reasonable hours. Prior to events, Communications and Technical work to ensure that all necessary resources are available, so the team has never come into a situation where the aforementioned procedure was needed. The team always aims to serve as a resource for any team who needs support and is happy to provide the necessary documents for doing so.

At *FIRST* events, all students are encouraged to learn from other teams and assist whenever necessary. If a team needs more assistance than that one student can provide, go to the pits or stands and let members of the team know — every member is encouraged and eager to help. When hosting CORI at WKHS, the team is typically scattered, so Discord is recommended for quick communication. At events with other teams we are hosting or when we are working individually in our shop to assist another team, all students should serve as support systems and are encouraged to work together when another team needs support. For support specific to a subteam, all events should be confirmed with that lead in addition to the Outreach Team and Communications President. The team being prepared ahead of time allows us to best organize resources, information, and any additional planning for support. If a student is connected with other teams, they are encouraged to foster partnerships, as Ohio STEM and STEM generally grows from collaboration and willingness to support one another. Supporting one another supports tremendous growth in and beyond Ohio, and the goal is always to build opportunities for people to access STEM.

Standard Event Materials:

- Subteam-specific resources
- General overview documents
- Any applicable documentation

Key Focuses:

- Supporting the *FIRST* community
- Expanding opportunities for everyone to participate in STEM

Worthington School Board and Administrators

The focus of communicating regularly with the school board and administrators is expanding STEM education opportunities in Worthington and further fostering district connections to build access points. When communicating with the Worthington School Board, the team may be referred to as "The Worthington Robotics Team," "The Worthington Robotics Program," or "The WorBots 4145." The penultimate option is preferred for communication regarding more than just 4145; however, season updates, reveals, and post-competition presentations may use either the first or last option.

With the board, the framing is primarily education and advocacy based. The schools are great tools for building opportunities and the team greatly values their support and partnership in our mission of cultivating a culture of STEM. Students should do the majority of district communication; however, due to our relationship with PLTW-specific programs and general year-over-year continued operations, Karns should be CCed on all emails and subteam mentors who may be involved should be BCCed in addition to any leads whose teams may be affected and both presidents. If it is a one-on-one administrator meeting, only Karns needs to be CCed. Generally, the WorBots' team email should be used to invite them to the Robot Reveal as well as seasonal events and students should reach out through school accounts for team advocacy projects, individual meetings, or post-meeting follow-ups. Mentors, the Communications President, the Technical President, and the Outreach Lead should be made aware of all team-affiliated school board communication prior to contact.

Because we operate as an independent 501(c)(3), we do not have any financial connection with the district; however, the schools do graciously promote our restaurant fundraising in newsletters upon request. Individual high school administrators should be contacted for this. For in-classroom efforts, contact the teachers directly.

Standard Event Materials:

- Pit technical materials
- Pit communications materials
- Board presentations
- Demonstration robot
- Season robot
- Impact Award video

Key Focuses:

- Joining Worthington City Schools in the idea of "empowering a community of learners to change the world" by connecting them with growing STEM opportunities
- Strengthening support for the Worthington *FIRST* Pathway
- Showing district leaders the impact of *FIRST*
- Highlighting seasonal growth
- Highlighting younger students in the program

Prospective Sponsors

For prospective sponsors, it is necessary to highlight that *FIRST* is training the future generation of STEM leaders. Within the Worthington community, it is also important to highlight that this program is revolutionizing STEM education and access within the district — building opportunities for students that never existed before it and impacting K-12 education as opposed to just high school. For most corporate sponsors, the process of reaching out involves a letter, which should always be framed using the aforementioned lenses and include a description of what *FIRST* is — both philosophically and in terms of the time span of the competition season.

For sponsor presentations, all students who have first gone through appropriate training with the Business Team should be involved. At at least one point throughout a student's four years at the FRC level, they should be involved in sponsor presentations to develop that skill, as it is important regardless of what career the student is looking to pursue. Presentations should include a robot demonstration unless otherwise coordinated with the sponsor, as it provides the best possible understanding of exactly what students accomplish during the build season and the skills directly developed through the *FIRST* program at the high school level and beyond.

The WorBots often connect with sponsors beyond the monetary aspect. Some sponsors support our team by partnering with us in our mission through joint community events or presentation reviews. Some other sponsors provide consultations on designs at the beginning of the season, serving as a vital knowledge base for our team; oftentimes, this fosters a strong connection and can even lead to mentorship. Two of our sponsors for the 2022-2023 season supported the team further through offering seniors and alumni internships because they saw the skills they developed through *FIRST* — expanding our pathway beyond the initial K-12 vision to a life-long impact.

Standard Event Materials:

- Pit technical materials
- Pit communications materials
- Sponsor presentation
- Sponsor letter
- Competition video
- Demonstration robot
- Season robot

Key Focuses:

- Connecting companies with *FIRST*
- Securing sustainable program funding
- Fostering connections to increase student and community impact
- Developing partnerships and a knowledge base

Feeder Team Events Schedule

Event Dates:

[Day], [Month] [Day], [Year]
[Day], [Month] [Day], [Year]
[Day], [Month] [Day], [Year]

Stations:

Drive
Programming
Business
Robot Design
Outreach

Schedule:

**All transitional periods between station rotations are to last 1 minute, excluding the first transition from 6:20-6:22*

5:30	WorBots arrive at the workshop
5:55	Finish setup of all stations All feeder team mentors await student arrival and guide them to the workshop
6:00-6:05	Visitors arrive at the workshop
6:05-6:20	Brief introduction to team members FRC Description Discussion of the feeder team next steps *Eclipse* demonstration General questions Group Photo Split students into groups
6:20-6:22	Transition into stations
6:22-6:28	Station rotation 1
6:29-6:35	Station rotation 2
6:36-6:42	Station rotation 3
6:43-6:49	Station rotation 4
6:50-6:56	Station rotation 5
6:56-7:00	Pins
7:00-7:30	Students choose one subteam that seems the most appealing to them as they reach FRC and work with them.

Girl Scouts Schedule

Event Date: March 9th, 2023

Stations:

Drive - Emily F.
Programming - Kayla L.
Robot Design - Claire R.
Leadership - Natalie D.

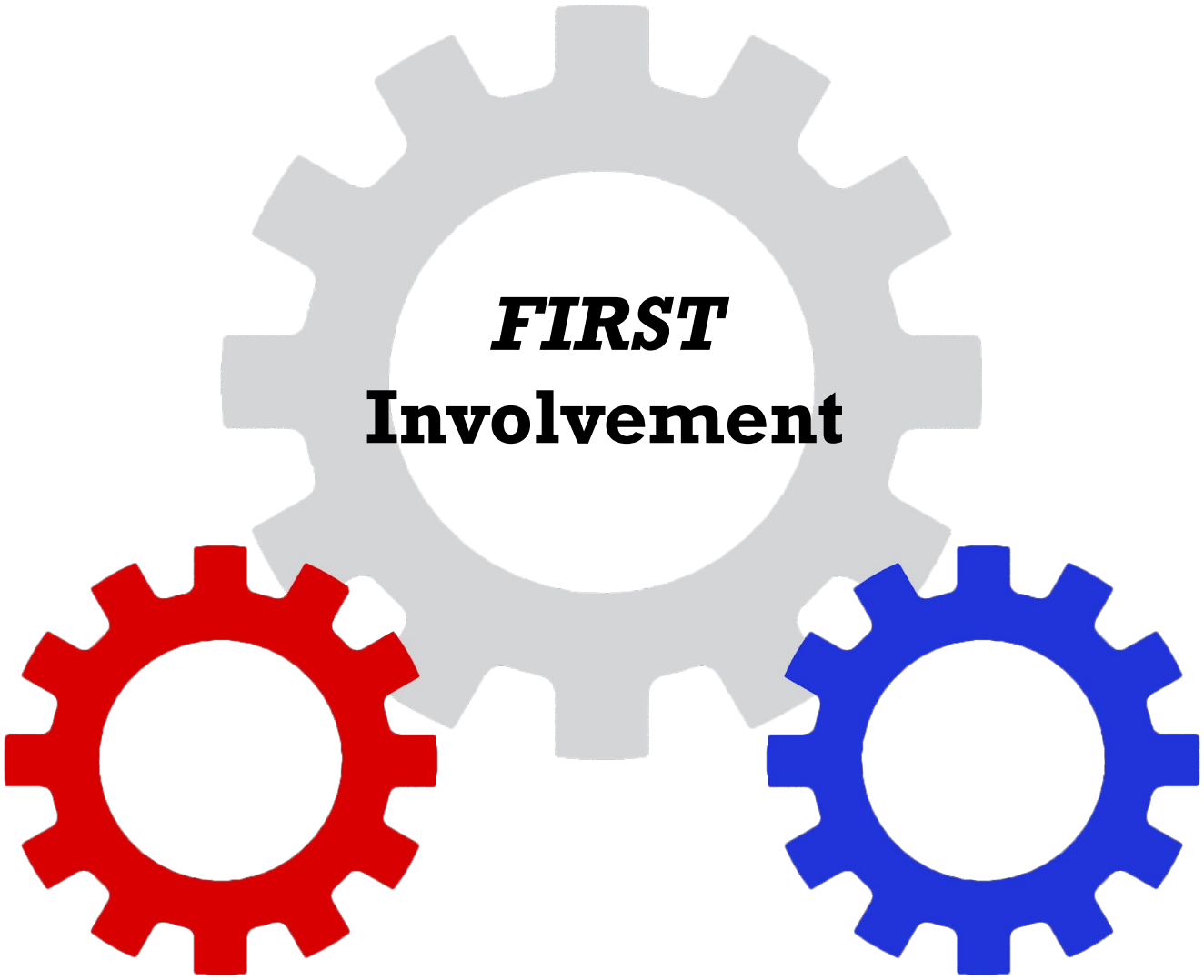
Student Guides

Joelle M.
Kylie B.
Sinnai S.

Schedule:

**All transitional periods between station rotations are to last 1 minute, excluding the first transition from 6:20-6:22*

4:30	WorBots arrive at the workshop
4:50	Finish setup of all stations
4:55-5:00	Girl Scouts arrive at the workshop
5:00-5:15	Brief introduction to team members
	FRC Description
	Eclipse demonstration
	General questions
	Group Photo
	Split students into groups
5:20-5:30	Station rotation 1
5:30-6:40	Station rotation 2
5:40-5:50	Station rotation 3
5:50-6:00	Station rotation 4
6:00-6:15	Pins


FIRST
Involvement

2022 CORI ROBOTICS INVITATIONAL

The CORI Invitational is a PAST Foundation-Run, Worthington-hosted event bringing FRC teams together to compete for one last time before the beginning of the next season. Everyone is invited to see the competition and all of the students' work this season!

Where?

Worthington Kilbourne High School
1499 Hard Road,
Worthington, Ohio, 43085

The competition is in the Auxillary Gym and the pits are in the Main Gym.

October 23rd, 2022

cori
center of robotics innovation

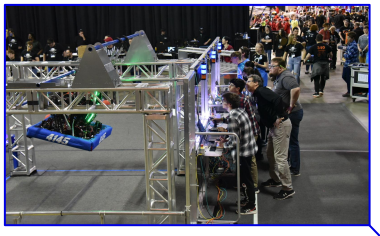
WorBots 4145: Feeder Pathway

Cultivating a Culture of STEM in Worthington, Ohio

***FIRST*: For the Inspiration and Recognition of Science and Technology.** *FIRST* is an international program connecting students, mentors, and communities with realistic, engaging STEM opportunities. It is more than just robots. Through emphasizing the *FIRST* Core Values such as Gracious Professionalism, teamwork, and inclusion students develop valuable knowledge and skills they carry with them throughout their lives.

Through *FIRST*, real-world opportunities develop knowledge and empower students to get involved. Every student from the WorBots, the Worthington high school *FIRST* team, has gone to college, with 92% majoring in STEM. Team members are connected with STEM professionals through upperclassmen internship opportunities and engineers serving as team mentors. Within the broader *FIRST* program, 50% of female alumni declare a major in engineering or computer science by their fourth year of college and 81% of alumni overall declare a STEM major.

In Worthington, we have five *FIRST* teams and are developing a cohesive pathway to ensure all students have access to STEM education. Levels of the pathway preceding *FIRST* Robotics Competition are connected with our high school students, fostering confidence in all students. To get connected with a team, you can email us through worbots4145@gmail.com or look on worbots4145.org.



FIRST LEGO League

FIRST LEGO League teams are composed of elementary and middle school students. Using LEGO kits and block programing, students develop foundational STEM knowledge. Through presentations, students emphasize community impact, innovation, and teamwork. Worthington has three teams: 44451 (Worthington Hills), 44452 (Worthington Hills), and 57154 (Wilson Hill).

FIRST Tech Challenge

FIRST Tech Challenge teams are composed of middle and high school students who develop STEM knowledge through designing, prototyping, programming, and building 18x18x18 robots. Teams also participate in marketing and acquiring financial support. Through outreach events, Worthington has one FTC team: 16284 (Kilbourne Middle School). It is open to all district students.

FIRST Robotics Competition

FIRST Robotics Competition teams are composed of high school students. It combines real-world engineering skills through 125-pound robots, CAD, and programming with business through acquiring sponsors. Teams participate in community events. Worthington has one FRC team: 4145 (Worthington Kilbourne High School) that is open to all high school students.

For more information about FIRST programs: https://www.firstinspires.org/

WorBots 4145 Feeder Team Involvement Description

The Worthington Robotics Team, The WorBots 4145, works to provide access to STEM education for all ages and access points. The primary method of connecting young students with STEM is FLL and FTC teams, which connect students with *FIRST* directly and develop both technical and professional skills.

For all *FLL teams* in Worthington that we start, we will provide a minimum of two student mentors seasonally who are prepared to fully support STEM education through *FIRST* and facilitate team discussions, development, and daily operations. At the FLL level, adult coaches are needed primarily for paperwork and supervision; however, they do not need a prior affiliation with STEM or *FIRST* — WorBots student mentors are there to connect students with that aspect of the program. Furthermore, we provide fifty percent of the startup funding and subsequent funding each operational season — as defined by the development of a robot and intent to participate in a minimum of one event per year. Currently, we work with FLL teams 57154 (Wilson Hill Elementary School), 44451 (Worthington Hills Elementary School), and 44452 (Worthington Hills Elementary School).

For all *FTC teams* in Worthington that we start, we will provide a minimum of one student mentor and two additional student consultants seasonally who are prepared to fully support STEM education through *FIRST* and facilitate team discussions, development, and daily operations. Consultants also address immediate concerns not covered by the specialty of the primary student mentor. At this level, we recommend prior teacher affiliation with STEM and ideally *FIRST*; however, it is not required. Furthermore, we provide fifty percent of the startup funding and subsequent funding each operational season — as defined by the development of a robot and intent to participate in a minimum of one event per year.

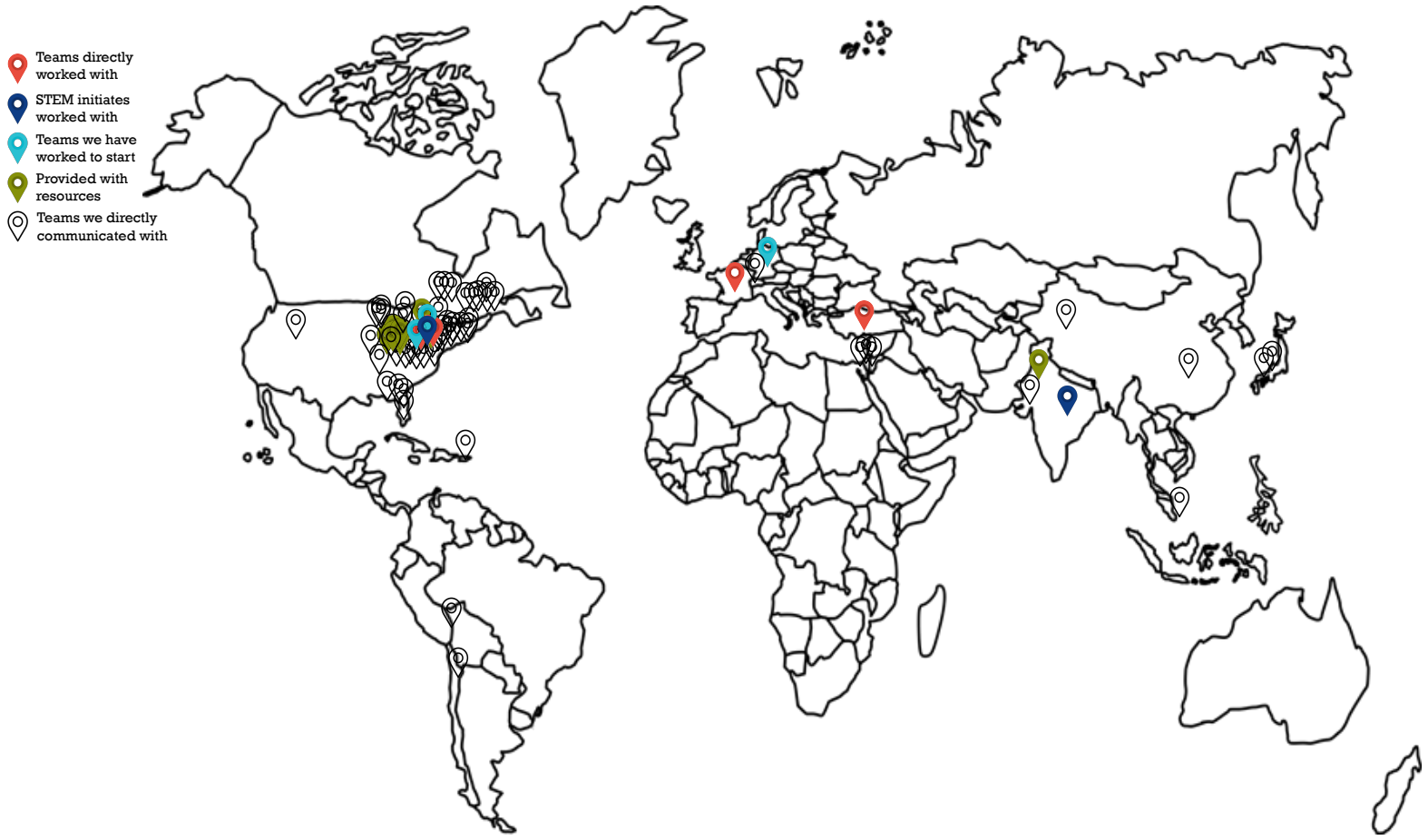
The role of a student mentor is to "help inspire and empower students to be innovators. [They're] working side by side with *FIRST participants* to build their leadership and problem-solving skills and, more importantly, their sense of belonging and self-confidence," as defined by *FIRST*. The aim of providing student mentors is to serve as a consistent knowledge base and role model for younger students, inspiring them to continue their involvement with STEM and *FIRST* as they progress through and beyond their time in Worthington Schools. Currently, we work with FTC team 16284 (Kilbourne Middle School).

All of our feeder FLL and FTC programs are expected to act as model FIRST teams and uphold the FIRST Core Values as well as the WorBots' core values.

WorBots 4145: Programs Worked With

Cultivating a Culture of STEM in Worthington, Ohio

Three-Year Impact Map

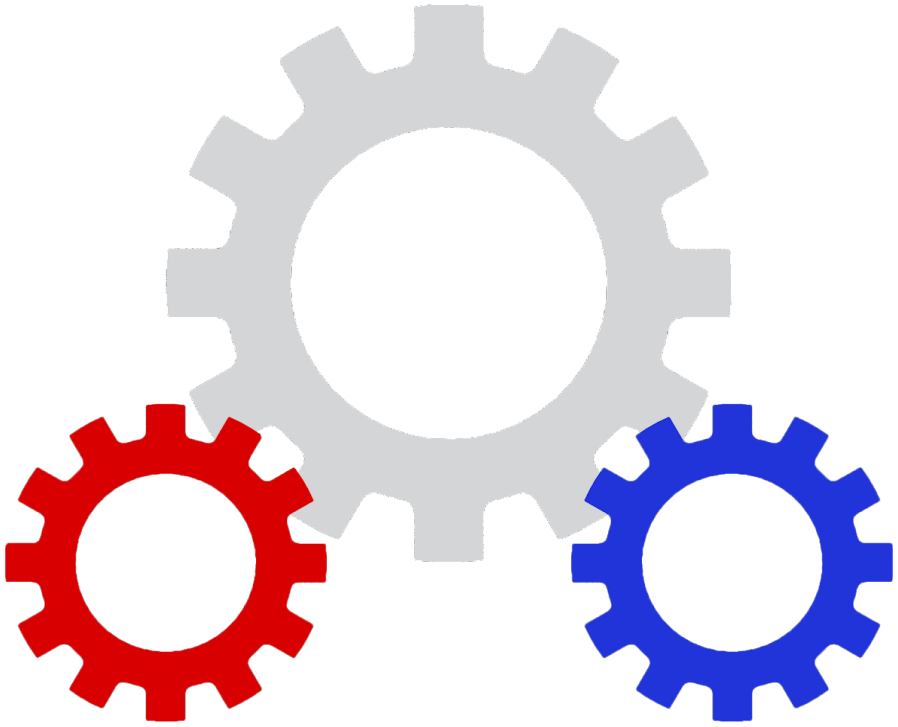


Highlights

- 5 *FIRST* teams directly mentored
- 6 additional consistent community FRC team partnerships
- Worked with a STEM initiative in India to connect them with *FIRST*
- Worked with a student in Germany to prepare for a university pitch
- Provided published resources to over one hundred teams
- Discussed outreach, giveback, and sustainability with a team from Tukey
- Hosted an off-season event bringing together *FIRST* teams throughout the Midwest
- Started all Worthington *FIRST* teams
- Worked to develop programs connecting young *FIRST* teams to community impact

The WorBots 4145

Team Development Guide



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FIRST LEGO League

To develop *FIRST* LEGO League (FLL) teams in Worthington, it is important to initiate communication with schools through a student who went there. When reaching out to schools, the standard procedure is to first meet with principals to discuss if it is possible within the school and provide an overview of what *FIRST* is, then reach out to specific teachers to identify a head coach. The EPP (gifted education) and library teachers are often good teachers to reach out to first unless a student on the team has a parent teaching at the school who is interested in mentoring. If the discussion regarding a team started from an outreach event, it is important to highlight the groups the team was working with and mention any parents who expressed interest in the team.

If challenges regarding team development arise, the first step should be an informal club (*see "Informal Robotics Clubs"*) to increase student, parent, and faculty interest in a team. These teams always thrive, which typically increases school support if there were any hesitations. This is also a good time to identify the mentor that will be working with the club and future team, ensuring that a rapport is developed between the students and mentor. These clubs typically do not follow a competitive structure, but they should integrate a challenge similar to that of the concurrent FLL season to introduce students to what that season looks like.

As highlighted by our "Feeder Team Involvement Description," the WorBots provide fifty percent of the cost for starting and sustaining teams. To acquire school support for the second half of the funding, the team often presents at a PTA meeting, which acquires parent and teacher support for the Worthington *FIRST* program and helps support these teams. This guideline for funding is in place because the WorBots are financially independent of Worthington Schools and work to engage individual schools with teams further. If funding is the only barrier to starting a team, this policy can be modified; however, this is typically a last-resort practice because teams are often challenging to sustain without schools caring about the programs and wanting to support those students.

Once teams are officially operational, in addition to our foundational commitment of funding and mentorship, we work to connect them with *FIRST* beyond just robots and at every level. For all programs, this includes an invitation to the CORI Invitational at Worthington Kilbourne and a shop tour. We also work with FLL teams by running giveback activities in conjunction with them, allowing them to collaborate with older students beyond just those mentoring them and see the importance of using their knowledge to impact the world around them.

FIRST Tech Challenge

To develop *FIRST* Tech Challenge (FTC) teams in Worthington, it is important to initiate communication with schools through a student who went there. When reaching out to schools, the standard procedure is to first meet with principals to discuss if it is possible within the school and provide an overview of what *FIRST* is, then reach out to specific teachers to identify a head coach. The STEM elective, science, and math teachers are often good teachers to reach out to first; finding space elsewhere typically poses more of a challenge, as tools are required and teachers supervising should know basic tool safety. If the discussion regarding a team started from an outreach event, it is important to highlight the groups the team was working with and mention any parents who expressed interest in the team.

If challenges regarding team development arise, the first step should be an informal club (*see "Informal Robotics Clubs"*) to increase student, parent, and faculty interest in a team. These teams always thrive, which typically increases school support if there were any hesitations. This is also a good time to identify the mentor that will be working with the club and future team, ensuring that a rapport is developed between the students and mentor. These clubs typically do not follow a competitive structure, but they should integrate a challenge similar to that of the concurrent FLL season to introduce students to what that season looks like. Another option if a club itself isn't possible is a LEGO robotics mini-competition that joins together multiple schools. This builds interest and connects students, providing the option of separate teams or one open enrollment program.

As highlighted by our "Feeder Team Involvement Description," the WorBots provide fifty percent of the cost for starting and sustaining teams. To acquire school support for the second half of the funding, the team often presents at a PTA meeting, which acquires parent and teacher support for the Worthington *FIRST* program and helps support these teams. This guideline for funding is in place because the WorBots are financially independent of Worthington Schools and work to engage individual schools with teams further. If funding is the only barrier to starting a team, this policy can be modified; however, this is typically a last-resort practice because teams are often challenging to sustain without schools caring about the programs and wanting to support those students.

Once teams are officially operational, in addition to our foundational commitment of funding and mentorship, we work to connect them with *FIRST* beyond just robots and at every level. For all programs, this includes an invitation to the CORI Invitational at Worthington Kilbourne and a shop tour. For FTC teams, this also means collaborating with them at community events to show the multiple levels of the *FIRST* program and connect younger students to community engagement throughout Worthington, sharing the importance of spreading STEM access.

Informal Robotics Clubs

All informal clubs are considered stepping stones to FLL or FTC teams, which means the experience should be as similar as possible while maintaining a focus on the accessibility aspect of the program to engage and build interest within the schools. These teams acquire support from administrators, teachers, and parents, which makes Worthington *FIRST* teams more sustainable when they start out of the program.

Informal robotics clubs are a tool to build interest and access to STEM when a feeder team is either not currently possible or in the process of developing. The commitment to these teams is typically a minimum of one student mentor at every practice, but there is still the requirement for a parent or teacher affiliated with the school to serve as a supervisor. These programs use LEGO kits already in the schools (all Worthington gifted programs have LEGO kits and all Worthington middle schools have VEX kits).

At the middle school level, these clubs are typically paired with connections to one another, as the WorBots work to start these teams at the same time each year to provide consistency. A competition or more intricate challenge is used to ensure that the program is engaging, and creativity-based challenges are added to engage non-technically focused students in a group that will prepare them for the *FIRST* team in their school the following year.

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Sponsorship Information Sheet

Hello! We are the WorBots 4145, an FRC team based in Worthington, Ohio. We've noticed the difficulties many teams have faced with the Covid-19 pandemic in terms of getting sufficient funding, and we wanted to share some strategies that have worked well for us. During the off-season, we acquired funding effectively allowing us to double our budget and promote team sustainability. Here is what we did!

Key Strategies:

1. **Do your research!** By simply researching online and driving around corporate parks around our community, we discovered many robotics-adjacent companies that were willing to cooperate with us.
2. **Identify their goals!** Before you contact the group, make sure you know their basic mission and goals! By showing genuine interest and knowledge in what they do, you can easily make a better impression.
3. **Find the higher-ups!** With some basic research on LinkedIn and similar sites, it is quite easy to get the contact information of people who are both interested in robotics, and have the power in the company to back it up.
4. **Make cold calls!** While having pre-established relationships with companies is ideal, this often isn't the case. One of the best ways to reach out to companies who aren't familiar with your team is to call them and discuss the benefits and logistics of a partnership.
5. **Appeal to their needs!** Identify needs facing surrounding companies — whether it be employment, struggling online presence, or lack of publicity — and discuss the benefits of a reciprocal relationship.
6. **Be persuasive!** Be loud and confident — but not abrasive! Talk about your strengths, and how your team is uniquely suited for addressing anything they are trying to grow.
7. **Bring in the bot!** While messages and calls are great ways to connect, in the end, they are just words. Make sure to set dates for personal meetings with the company — demonstrating your robot in the process! This gives you much more legitimacy in the eyes of the sponsors.
8. **Send frequent emails and updates!** Basic emails are a great way to establish a relationship, but don't end it there! Make sure to keep new sponsors and contacts in the loop, and let them know of any ways they can help.

If you have any questions, you can reach us at:
Email: worbots4145@gmail.com
Instagram: @worbots4145
Twitter: @worbots4145

Recruiting Information Sheet

Hello! We are the WorBots 4145, a team based in Worthington, Ohio. With COVID-19 decimating a lot of teams' numbers, including our own, we wanted to share some strategies that have helped us bounce back quickly from the pandemic, and that will hopefully work for your team as well.

Key Strategies:

1. **Contact the Administration!** By working with the administration of the schools your team comes from, you can get on the announcements, participate in school events, and get free advertising at other events as well. Having the administration on your side benefits all other recruiting methods!
2. **Reach outside STEM!** An FRC Team is not only for students that are already participating in STEM programs, and there are a multitude of awards for fields in art, business, and graphic design. Reach out to the business and arts programs at your school, and your team will have a wider skill set to pull from.
3. **Contact Teachers!** Teachers can be the link between your team and the general school population, or even help as mentors for your team! Taking the time to have a conversation could boost your team for years to come.
4. **Make Posters!** How are students going to know your team if they aren't reminded? Make some fun designs and summaries that they will walk by each day, and watch the students roll on in. Having some name awareness around your school is key to having a successful team.
5. **Meet With Younger Grades!** Our team has had a lot of success with bringing our robot to STEM days in our nearby middle and elementary schools, and doing simple demonstrations. While it does not immediately benefit your numbers, interested students will soon move up to join!
6. **Set Up Feeder Teams!** While it takes a lot of effort, having a more solid pathway of robotics K-12 can really boost your team to another level! Not only will more people come into your team, they will also already have some basic skills and knowledge about robotics.
7. **Get a Social Media Presence!** Make sure your team has some basic accounts set up on the major platforms, so that you can share competition and workshop photos! If you do it well, you can not only get student recognition, but also parental knowledge and support!

If you have any questions, you can reach us at:
Email: worbots4145@gmail.com
Instagram: @worbots4145
Twitter: @worbots4145

Accident Report:

Name:_____ Date:_____

Incident & Severity:

_____
_____
_____
_____
_____

Mentor:_____ Safety Officer:_____

Accident Report:

Name:_____ Date:_____

Incident & Severity:

_____
_____
_____
_____
_____

Mentor:_____ Safety Officer:_____

Welcome to the Lab!

For your safety, please follow these rules while working:

- Wear your safety goggles while using tools and while machines are running
- No running
- Wear appropriate clothing
  - Closed-toed shoes
  - No loose clothing
  - Tie back long hair
- Get safety certified before using machines
- Clean up your workspace
  - Tools put away
  - Unplug power tools
  - Sweep workbench/floor
- Report any accidents to the Safety Captian immediately and address any medical issues
- Stay alert at all times!

STOP
Are you safety certified?
Do not use this machine unless you have passed your safety certification exam!
Hand Tools

STOP
Are you safety certified?
Do not use this machine unless you have passed your safety certification exam!
Bandsaw (Metal)

STOP
Are you safety certified?
Do not use this machine unless you have passed your safety certification exam!
Miter Saw

STOP
Are you safety certified?
Do not use this machine unless you have passed your safety certification exam!
Bandsaw (Wood)

STOP
Are you safety certified?
Do not use this machine unless you have passed your safety certification exam!
Power Sander

STOP
Are you safety certified?
Do not use this machine unless you have passed your safety certification exam!
Drill Press

STOP
Are you safety certified?
Do not use this machine unless you have passed your safety certification exam!
Horizontal Bandsaw

STOP
Are you safety certified?
Do not use this machine unless you have passed your safety certification exam!
Table Saw

STOP
Are you safety certified?
Do not use this machine unless you have passed your safety certification exam!
Metal Press

STOP
Are you safety certified?
Do not use this machine unless you have passed your safety certification exam!
Power Drill

STOP
Are you safety certified?
Do not use this machine unless you have passed your safety certification exam!
Insert Tool Name Here

Pit Safety Rules

Simple Rules for a Safer Shop

- Goggles are *required* by everyone in the pit
- Wear the proper protective clothing
  - Closed toed shoes
  - No flowing sleeves
  - Hair tied back

- Stay alert at all times and be ready to react
- Robots have the right-of-way
- Keep all pit items within the pit
- Don't obstruct the aisles
- Power down all tools at the end of the day
- Clean up your tools before leaving

Safety Tools (Shop)

- ❑ First Aid Kit
  - ❑ Bandaids
  - ❑ Antibacterial
  - ❑ Ice Pack
  - ❑ Ace Bandages
  - ❑ Body Fluid Cleanup Kit
  - ❑ Hair Ties
- ❑ Goggles
  - ❑ A pair of chemical goggles
- ❑ Fire Extinguisher
- ❑ Eye Wash Station
- ❑ Battery Spill Cleanup Kit
  - ❑ Baking Soda
  - ❑ Acid-Resistant Gloves
  - ❑ Shop Towels
  - ❑ Battery Box
- ❑ Work Gloves
- ❑ Safety Rules Poster

WorBots 4145: Safety Kits

Cultivating a Culture of STEM in Worthington, Ohio

Kits Materials

- Bandages (2x)
- Hair Tie
- Vinyl Gloves
- Ear Plugs
- Alcohol Wipes (2x)
- WorBots Safety Pin
- Informational Safety Card

Kits

Safety in the Pits

- Keep area neat
- Control access to who can access your pit station on your team.
- **Always** Wear safety goggles in the pits
- Do not "Daisy chain" electronics
- Alert Neighbors of any hazards in the pits
- Steer clear of teams loading/ unloading robots from the competition field
- Keep full control of a robot at all times

Safety in the Shop

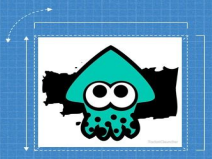
- Refrain from wearing dangling jewelry or baggy clothing near the robots
- Tie back long hair when working on the robot or machinery to prevent it from getting caught
- Protect hands and fingers when handling the robot or the robot crate; finger injuries are one of the most common injuries in the shops and *FIRST*® events.
- Always **walk** in the shops, and walk with purpose
- Keep full control of a robot at all times

WORBOTS COMPREHENSIVE SAFETY SEMINAR

Hello!
I AM SYDNEY WHITE

I am the safety captain of FRC team 4145

You can find me at:
SafetyCap.Squid@gmail.com



OUR SAFETY PROGRAM

Let's start from the very beginning.

From small beginnings comes great things
Proverb

WHERE WE STARTED:

- Team was founded in 2012
- No files passed on
- Started from scratch in 2014

While our team's technology has improved with the time, our lack of files from previous team members left us rebuilding our brand every year.

60 students
That's a lot of people

300+ Hours
And a lot of time

100%
Hard work & dedication

SO WE BUILT
Our team banded together to create something we can pass on to future members.

SO WHO ARE THE PEOPLE IN THE YELLOW VESTS?

The 4145 Safety Squad is a subunit of the Worbots, is tasked with keeping our team safe and within regulations. We set the bar for our members and other teams with our courtesy.

TRAINING PROCESS

semis & certs
↓
practical apps.
↓
Ready!

WHAT DO WE HAVE TO START WITH?

Website
This site holds all of our current scheduling information, previous meeting minutes, and resources for all Safety Captains to benefit from.

Accident Reports
These half sheets are to be filled out when someone injures themselves in the shop. They are mandatory, and will be kept on the goggles table during the season.

Safety Squad
This individual subunit, dedicated specifically to safety is responsible for team safety and projecting a good image for the team on how to keep yourself and other people safe.

Outreach
We promote community-wide safety through outreach with elementary schools, retirement homes, and in our attitudes toward other teams. Gracious Professionalism!

Shop Safety
Shop Safety is machine regulations, cleanliness, wearing goggles when the machines are on, closed toed shoes, gloves, tying back long hair...

Pit Safety
This includes the battery spill kit, fire extinguisher, exit plans, and pit setup. Know where the AED is and know how to keep your team within regulations.

SHOP RULES AND LOCATIONS

Goggles & Gloves
Are required as machinery is used. Gloves are found in the safety drawer, goggles are found on the goggles table. They must be put back when people are through using them.

Accident Reports
Are kept on the goggles table. These reports help us keep track of injuries for our personal records and also tell us if someone needs to be recertified.

Machine Certification
People are not allowed to use the machines if they are not certified. I keep a log to check if people are or not. Send them to me and I will get them certified.

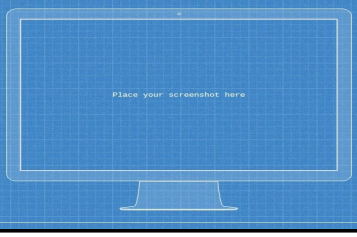
PIT SAFETY

Battery Spill Kit
This kit is kept in the shop during the season, but we take it with us to competitions. It contains a neutralizing powder, industrial paper towels, gloves, and chemical goggles.

New Rules
The pit comes with its own set of new safety rules. Goggles must be worn in the pit area at all times, and the area must be cleaned and powered off at the end of the day. There are also judges walking around inspecting our performance. They will ask questions about our program.

OUR WEBSITE

Worbots4145.org is the hub for all information and communication regarding the team. Check it regularly for updates.



That should cover the basics!

ANY QUESTIONS?

Email me at:
sw0071@wscloud.org

CREDITS

Special thanks to all the people who made and released these awesome resources for free:

- Presentation template by SlidesCarnival
- Photographs by Unsplash

That should cover the basics!

ANY QUESTIONS?

Email me at:
sw0071@wscloud.org

Submitted
Materials

Describe the impact of the *FIRST* program on team participants within the last 3 years. This can include but is not limited to percentages of those graduating high school, attending college, in STEM careers, and in *FIRST* programs as mentors/sponsors.
In the last three years, 100% of our alumni graduated high school (92% is the district average), 100% went to college (83% is the district average), 92% pursued STEM in college (compared to the estimated 32% of Worthington alums), 2 volunteered at 2022 off-season events, and 4 returned to mentor this season. Our team members have an average 3.89 unweighted GPA (3.07 is the district average), and 69% of students are in PLTW courses. 89% of members cite *FIRST* as a reason they want to pursue STEM.

Describe your community along with how your team addresses its unique opportunities and circumstances.
Worthington Schools includes 11 elementary, 5 middle, and 2 high schools. Before our team, high school courses made up most of the STEM education opportunities. To catalyze STEM growth, we started 4 *FIRST* teams in the last 5 years, promoted STEM at community events, educated students about robotics, and advocated for STEM in our district. Recently, after finding out our high schools were remodeling, we advocated for STEM/PLTW spaces at both schools—expanding STEM access for years to come.

Describe the team's methods, with emphasis on the past 3 years, for spreading the *FIRST* message in ways that are effective, scalable, sustainable, and creative. How does your team measure results?
Through hosting the CORI Invitational with the PAST Foundation (2018, 2019, and 2022), hundreds of community members, district officials, and FLL/FTC students see the impact of *FIRST* as 30 teams from the Midwest compete. By mentoring young students in feeder programs and creating training programs, we ensure that everyone can build a robot. 39% of our team comes from a feeder team (compared to 25% in 2021), and 78% of our team attended an outreach event before joining (compared to 55% in 2021).

Please provide specific examples of how your team members act as role models within the *FIRST* community with emphasis on the past 3 years.
Published resources (safety seminars, posters, checklists, and kits; sponsor information sheets; and recruiting guides) and shared awards submissions at competitions have assisted 300 teams. We helped FRC 6916 get parts, cut parts, figure out design and strategy, and prepare for the season and now mentor the team. We assist teams at competitions with programming bugs, cheer teams on after presentations, and answer questions on social media. Mentoring FLL and FTC inspires future generations.

Describe your team's initiatives to Assist, Mentor, and/or Start other *FIRST* teams with emphasis on activities within the past 3 years.
We started, financially assisted, and mentored 3 FLL and 1 FTC team. At one school, we started a robotics club in early 2022 to engage students; they are now on FLL 57154. We assisted FRC 6916 in getting parts pre-season and now mentor them. We answer team's questions on social media and through publishing resources. Recently, we helped FRC 8856 from Turkey learn more about outreach, talked to a STEM initiative in India about *FIRST*, and helped a student in Germany prepare to start a team.

Beyond starting teams, what initiatives have you done to help inspire young people to be science and technology leaders and innovators? What results have you seen from your efforts in the past 3 years?
We demonstrate at after-school programs, curriculum nights, STEM camps, PLTW classes, orientation events, activities fairs, and community gatherings. We provide interactive activities at local library workshops, STEM fairs, science days, schools without formal programs, and in our shop for students from any Worthington school. These events introduced 78% of our current team members to *FIRST*, resulted in the creation of an FLL team, and encouraged students to join our FTC team when it started.

Describe the partnerships you've created with other organizations (teams, sponsors, educational institutions, philanthropic entities, etc.) and what you have accomplished together with emphasis on the past 3 years
PATH Robotics provided a facility tour, and we have now acquired an electrical engineering mentor from there. Lake Shore Cryotronics and ATS Automation offered us engineering advice and internship opportunities. We have mentors who work for Honda and L3 Harris, two of our sponsors. PLTW teachers provide mentorship and assistance in reaching their students. FC Bank offered us space at Worthington Market Day. Impower.ai and Merrill Lynch reviewed our business plan and presentation.

Describe your team's efforts in the past 3 years to promote equity, diversity, and inclusion within your team, *FIRST*, and your communities.
We make STEM more accessible in our K-12 pathway through contacting SWENext leaders, having an all-girls off-season drive team/pit crew, working with Girl Scouts, offering need-based scholarships to waive team fees, and lowering our overall team fee by 60%. Our pathway ensures that early access to STEM is unrestricted. 80% of our leads and 64% of members are from an underrepresented minority in STEM. With 92% of alumni pursuing STEM, increasing early STEM access diversifies local STEM careers.

Explain how you ensure your team and the initiatives you have created will continue to run effectively for the foreseeable future
78% of WorBots saw the team before through FLL/FTC and outreach, so they're eager to share *FIRST* with community members and mentor FLL/FTC. Each subteam documents what they have done and run a training program to ensure that knowledge is passed down from returning to new members. We built a rainy day fund and strong sponsor relationships, ensuring financial sustainability. We document and analyze the results of all outreach, allowing us to identify areas for improvement and preserve strengths.

Describe your team's innovative strategies to recruit, retain, and engage your sponsors within the past 3 years
Each summer, we drive through industrial parks to note STEM companies. We send letters, make cold calls, and present —emphasizing that *FIRST* is building innovators. Invitations to kickoff, tours, and season updates show the impact of sponsor support. Internships with sponsors engage them with our mission and demonstrate the program's impact. In 2 seasons, our team shifted from operating on a limited budget to entering each season with sufficient funding thanks to corporate sponsors.

Highlight one area in which your team needs to improve and describe the steps actively being taken to make those improvements.
We are working to improve social media presence to reach beyond our locality. This season, we appointed a member to run our existing pages and created a schedule to ensure consistency. We had new members look through our website and share questions they still had, allowing us to identify needed improvements. We have increased our average reach per post by 600 in the past year. We outlined benchmarks of success with current pages, which will allow us to start other social media pages when met.

Describe your team's goals to fulfill the mission of *FIRST* and the progress you have made towards those goals.
Our goal is to ensure accessible STEM education in Worthington. We grew from a team of less than 20 students to a pathway with over 80 students across 5 teams. In the past 3 seasons, we increased our reach by thousands through appearances in local news and participation in 50 outreach/advocacy events. We built and mentored a feeder pathway starting in elementary school, recruiting students of all ages through local events, and leading to internship opportunities with corporate partners.

Briefly describe other matters of interest to the *FIRST* Judges, including items that may not fit into the above topics. The judges are interested in learning about aspects of your team that may be unique or particularly noteworthy.
We participate in Turn for Troops, where we turn pens on lathes and write letters for veterans on Honor Flights. In 2020, at the height of the pandemic, we 3D printed face shields to address a lack of PPE for essential workers in Delaware County. We participate in Habitat for Humanity. We also run food drives for the Worthington Resource Pantry. This season, we started a LEGO toy drive with our FLL teams for children at the Nationwide Children's Hospital—collecting 32 kits.

Please use this space to ask 1 question to your *FIRST* Impact Award Judges which will be answered after each event with feedback from the judges (250 characters maximum).
What are some effective ways you have seen teams create a cohesive brand?

Established in 2012, the WorBots are dedicated to cultivating a culture of STEM in Worthington, Ohio by engaging, inspiring, and impacting our community. We join both Worthington high schools, Worthington Kilbourne (WKHS) and Thomas Worthington (TWHS), as partners in STEM education and inspiration despite them traditionally being considered rivals. For 11 years, we have brought STEM to our community by providing opportunities to learn in and out of the classroom, get involved with robotics, and access *FIRST* regardless of their background.

WE ENGAGE

At the WKHS and TWHS activities fairs, curriculum nights, and orientation events, we demonstrate our robot and provide information to 800 incoming students annually, resulting in over 80 students expressing interest in becoming a WorBot this year. This summer, we demonstrated at the Olentangy Caverns geology camp to 68 kids ages 6-11. For middle school students, we ran a mini robotics competition where participants built sumo and maze robots. 33% of participants in this competition went on to join the WorBots, and this event led to increased student interest at Kilbourne Middle School—sparking the start of FTC 16284. In early 2022, we started an informal robotics club at Wilson Hill Elementary to inspire students to explore STEM; those students are now competing on FLL 57154!

To ensure STEM is accessible for all students, we offer scholarships to waive team fees for those who cannot afford them, and last season, we allocated new sponsorship funds to permanently reduce team fees by 60%—further promoting accessibility. We also contact both schools' SWE chapters to ensure that women interested in STEM know about the options available through *FIRST*. In 2019, we volunteered at an all-girls PLTW summer camp session (the pandemic disrupted this, but we are resuming this summer). For our off-season events, we had an all-girls drive team who served as inspirations for young girls in our feeder programs. We also worked with a group of 3rd grade Girl Scouts in 2023, connecting them with *FIRST* and teaching them about the engineering-design process by letting them drive our robot, complete a mock initial design meeting, and do hands-on STEM activities. In the past 3 seasons, we have gone from 18 to 43% female, including 70% of student leadership. Through these efforts, we are increasing diversity in STEM.

WE INSPIRE

After the season, we invite students and families from all grade levels in Worthington to tour our workshop and learn more about STEM and the *FIRST* program. We have seen the direct impact of these shop tours, as many students attending our 2018 middle school shop tour chose to progress to the FTC team started in their middle school the following year. In our Spring 2022 shop tour series, we ran stations where elementary and middle school students could drive the robot, learn about the engineering and design process, and hear more about how to get involved. This series of 3 shop tours engaged 100 families from all eleven Worthington elementary schools. 74% of the attendees requested more information about *FIRST*. In Winter 2022, we invited our FLL students into our shop to learn about FRC and see our robot in hopes of inspiring those students to remain involved with *FIRST*.

We introduced 30 students between the ages of five and ten to our program through a robot demonstration at an elementary after-school program in 2022. At science days and fairs, we bring our robot and information about our team to inspire hundreds of students and families to get involved. At a local library, during Summer 2022, we helped run a 2-hour workshop introducing 47 elementary-aged children to STEM by modifying various types of robots to compete in a mini battle bots-inspired competition. To inspire students to build upon their knowledge, we demonstrated our robot and presented it in PLTW classes.

In 2021, to inspire Worthington students to join 4145 regardless of prior STEM experience, we expanded our pre-season rookie training program, so students could work in groups of 5-10 to build robots alongside returning team members and mentors. This ensures that students find their passion within the WorBots, develop knowledge and confidence, and build necessary STEM skills. This season, we expanded this program to include crash courses in engineering concepts. 85% of students stayed with the team after training. Our team also builds 2 robots during the season—a competition and an off-season competition bot—ensuring all students have opportunities to work on a robot.

For every "traditional sport," there are cohesive pathways to encourage students of all ages to get involved; we are ensuring the same is available for robotics. We started four teams—FLL 44451, 44452, and 57154 as well as FTC 16284. Beyond starting teams, we sustain them by providing financial assistance and student mentors to our feeder programs. 39% of our current team members are from feeder teams compared to 25% of team members last year. Along with our *FIRST* pathway, relationships we developed during the 2021 season with ATS Automation and Lake Shore Cryotronics resulted in the team working with professionals who provided sponsorship, advice, and internship opportunities. Despite starting 11 years ago with little STEM presence in our community, Worthington students from kindergarten through college now have STEM opportunities.

WE IMPACT

To impact Worthington STEM, we believe it is imperative to maintain our strong partnership with our school district. In 2021, we started a Robot Reveal event to strengthen our relationship. We invite board members, administrators, and principals into our shop to discuss the expansion of the Worthington STEM pathway, opportunities to grow STEM education, and the preservation of STEM classes and events (such as Worthington Science Day, which is operating again this year). They then see our robot and have the opportunity to drive it. Additionally, we seasonally invite them to the CORI Invitational, which we host at WKHS, where they can see *FIRST* in action and the importance of STEM events—solidifying discussions started at the Robot Reveal. The result of this event has been support from our directors of primary and secondary education in identifying coaches. Between 2021 and 2022, our schools began discussing remodeling TWHS and WKHS—a rare opportunity to expand generational STEM access. We advocated at board meetings to highlight the importance of preserving STEM classrooms and spaces, which the board recognized through both preserving WKHS shop space and expanding TWHS STEM spaces.

Within the *FIRST* community, we impact teams by consistently providing resources and mentorship. For FRC 6916, Iron Thunder, we provided parts, sponsorship advice, administrative advice, and mentorship. We also invited them to meet with a supplies sponsor to help them develop corporate relationships, helping them remain involved as they were struggling with student engagement and retention. Throughout the season, we assist teams in many regards—from helping FRC 4121 with their code to sharing how we train new business members with FRC 4611. We impact *FIRST* globally through efforts in person and via social media. When a team member traveled to India, he brought team resources and discussed their potential with *FIRST* in India. Through social media, we talked to FRC 8856, Lapis Lazuli, about off-season events, engaging sponsors, and improving community involvement. We then shared resources we distribute at competitions. We also talked to a student in Germany who is starting a *FIRST* team with a university—reviewing their budget, business plan, and outreach ideas.

In the past 3 years, we have exponentially grown our community's access to STEM through outreach and feeder programs. In the past season, we have completed 40 outreach events reaching 26,000 community members. 78% of our team members attended an outreach event before joining—an increase from the 55% of members last season and 39% the year prior. Because of this increase, we mapped out the effectiveness of our outreach efforts, categorizing events by the long-term goal they work toward. From there, we compare reach to the total possible audience and list outcomes—including mentors/members gained, reach, sponsors acquired, and feeder teams started—and make any necessary adjustments.

Worthington students of all ages now have opportunities to get involved with STEM and we continue to spread STEM across our community. Our vision for a K-12 pathway of STEM has grown from ending with high school opportunities through internships with sponsors. Our students and their academic pathways are affected by *FIRST*—whether through internships or a newfound passion for STEM. 89% of our returning team members reported changing their career goals within or towards STEM thanks to the *FIRST* program, and 100% of our seniors state that they intend to remain involved with *FIRST* after high school. As the WorBots, we have connected two "rival schools" to make an impact felt by thousands of community members—effectively cultivating a culture of STEM in Worthington, Ohio.

Team Name: The WorBots

Team Number: 4145

Impact Award Documentation Form

How to use this form

- In the chart, list all teams/events/items that you have documentation for. Please refer to the Official Impact Award Definitions for more information on the required/recommended documentation types.
- Label each piece of documentation with a "documentation ID". Attach the pieces of documentation to this form, in order of Documentation ID, and be sure to label each with its document id.
- **Please only turn in documentation for activities within the past 3-5 years.**

Team Number or Type of Activity & Location (i.e. *FIRST* Lego League Team 9999 or 2019 District Event - Salem, MA)	**Date of Activity** (i.e. Fall 2019)	**Choose one of the Official Impact Definitions:**	**Type of Documentation** (letter, screenshot, photo, thank you card, etc)	**Documentation ID** (use numerical numbers i.e. ID-001)
Worthington Schools Newsletter	**Summer 2018**	**Reached**	**Photo**	**ID-001**
8th Grade Night - Worthington, Ohio	**Fall 2018**	**Reached**	**Photo**	**ID-002**
Worthington Kilbourne Activities Fair - Worthington, Ohio	**Fall 2018**	**Reached**	**Photo**	**ID-003**
Hills STEM Night - Worthington, Ohio	**Fall 2018**	**Reached**	**Photo**	**ID-004**
Published Accident Report Form - Website	**Winter 2018**	**Provided Published Resources**	**Screenshot and Link**	**ID-005**
Published Safety Rules Poster - Website	**Winter 2018**	**Provided Published Resources**	**Screenshot and Link**	**ID-006**
Published Safety Certification Reminders - Website	**Winter 2018**	**Provided Published Resources**	**Screenshot and Link**	**ID-007**
Published Pit Safety Poster - Website	**Winter 2018**	**Provided Published Resources**	**Screenshot and Link**	**ID-008**
Published Safety Checklist - Website	**Winter 2018**	**Provided Published Resources**	**Screenshot and Link**	**ID-009**
Published Safety Seminar - Website	**Winter 2018**	**Provided Published Resources**	**Screenshot and Link**	**ID-010**

Team Name: The WorBots

Team Number: 4145

Destination Imagination Presentation - Worthington, Ohio	**Winter 2018**	**Reached**	**Photo**	**ID-011**
Developed and Distributed Safety Kits	**Spring 2018**	**Provided Published Resources**	**Photo**	**ID-012**
Worthington School Board Presentation	**Spring 2018**	**Reached**	**Photo**	**ID-013**
CORI Invitational - Worthington, Ohio	**Fall 2018**	**Hosted**	**Photo**	**ID-014**
District Science Day - Worthington, Ohio	**Winter 2019**	**Reached**	**Photo**	**ID-015**
Kilbourne Shop Tour - Worthington, Ohio	**Winter 2019**	**Reached**	**Photo**	**ID-016**
Bluffsview Elementary Science Night - Worthington, Ohio	**Winter 2019**	**Reached**	**Photo**	**ID-017**
WKHS Football Game	**Winter 2019**	**Reached**	**Photo**	**ID-018**
CORI Invitational - Worthington, Ohio	**Fall 2019**	**Hosted**	**Photo**	**ID-019**
Worthingway Middle School STEM Night - Worthington, Ohio	**Fall 2019**	**Reached**	**Photo**	**ID-020**
***FIRST* LEGO League Team 44451**	**Fall 2019**	**Started**	**Screenshot**	**ID-021**
***FIRST* LEGO League Team 44452**	**Fall 2019**	**Started**	**Screenshot**	**ID-022**
***FIRST* Tech Challenge Team 16284**	**Fall 2019**	**Started**	**Screenshot**	**ID-023**
***FIRST* LEGO League Team 44451**	**Fall 2019**	**Mentored**	**Photo**	**ID-024**
***FIRST* LEGO League Team 44452**	**Fall 2019**	**Mentored**	**Screenshot**	**ID-025**
***FIRST* Tech Challenge Team 16284**	**Fall 2019**	**Mentored**	**Photo**	**ID-026**
Middle School Robotics Competition - Worthington, Ohio	**Summer 2019**	**Reached**	**Photo**	**ID-027**
STEM Fair - Worthington, Ohio	**Winter 2020**	**Reached**	**Photo**	**ID-028**
Science Day - Worthington, Ohio	**Fall 2020**	**Reached**	**Photo**	**ID-029**
***FIRST* LEGO League Team 44451**	**Fall 2020**	**Mentored**	**Photo**	**ID-030**
***FIRST* LEGO League Team 44452**	**Fall 2020**	**Mentored**	**Photo**	**ID-031**

Team Name: The WorBots

Team Number: 4145

***FIRST* Tech Challenge Team 16284**	**Fall 2020**	**Mentored**	**Photo**	**ID-032**
***FIRST* LEGO League Team 44451**	**Fall 2021**	**Mentored**	**Photo**	**ID-033**
***FIRST* LEGO League Team 44452**	**Fall 2021**	**Mentored**	**Photo**	**ID-034**
***FIRST* Tech Challenge Team 16284**	**Fall 2021**	**Mentored**	**Photo**	**ID-035**
Freshman Orientation Robot Demonstration - Worthington Kilbourne High School	**Fall 2021**	**Reached**	**Photo**	**ID-036**
FLL Robot Demonstration - Worthington, Ohio	**Fall 2021**	**Reached**	**Photo**	**ID-037**
Columbus Dispatch Article - Worthington, Ohio	**Winter 2022**	**Reached**	**Photo**	**ID-038**
Meeting with School District Officials for *FIRST* Support - Worthington, Ohio	**Winter 2022**	**Advocated**	**Photo**	**ID-039**
Meeting with Principals and the Directors of Primary and Secondary Education for Worthington *FIRST* Support - Worthington, Ohio	**Winter 2022**	**Advocated**	**Screenshot**	**ID-040**
Wilson Hill LEGO Robotics Club - Worthington, Ohio	**Spring 2022**	**Started**	**Photo**	**ID-041**
Wilson Hill LEGO Robotics Club - Worthington, Ohio	**Spring 2022**	**Mentored**	**Photo**	**ID-042**
Worthington Kilbourne Activities Fair - Worthington, Ohio	**Spring 2022**	**Reached**	**Photo**	**ID-043**
Bluffsview CAS Robot Demonstration - Worthington, Ohio	**Spring 2022**	**Reached**	**Photo**	**ID-044**
Published Business Resources	**Spring 2022**	**Provided Published Resources**	**Photo of Resource**	**ID-045**
Published Recruiting Resources	**Spring 2022**	**Provided Published Resources**	**Photo of Resource**	**ID-046**
Worthington Kilbourne Student News Segment - Worthington, Ohio	**Spring 2022**	**Reached**	**Screenshot**	**ID-047**
Thomas Worthington Student News Segment - Worthington, Ohio	**Spring 2022**	**Reached**	**Screenshot**	**ID-048**
May 5th, 2022 Elementary School Shop Tour - Worthington Ohio	**Spring 2022**	**Reached**	**Photo**	**ID-049**

Team Name: The WorBots

Team Number: 4145

May 10th, 2022 Elementary School Shop Tour - Worthington Ohio	**Spring 2022**	**Reached**	**Photo**	**ID-050**
May 12th, 2022 Elementary School Shop Tour - Worthington Ohio	**Spring 2022**	**Reached**	**Photo**	**ID-051**
Olentangy Caverns Robot Demonstration Week 1 - Worthington, Ohio	**Summer 2022**	**Reached**	**Photo**	**ID-052**
Olentangy Caverns Robot Demonstration Week 2 - Worthington, Ohio	**Summer 2022**	**Reached**	**Photo**	**ID-053**
Worthington Libraries LEGO Battle Bots - Worthington, Ohio	**Summer 2022**	**Reached**	**Photo**	**ID-054**
Germany *FIRST* Support	**Fall 2022**	**Reached**	**Photo**	**ID-055**
School Board Meeting STEM Advocacy - Worthington, Ohio	**Summer 2022**	**Advocated**	**Photo**	**ID-056**
Thomas Worthington Freshman Activities Fair - Worthington, Ohio	**Summer 2022**	**Reached**	**Photo**	**ID-057**
Worthington Kilbourne Freshmen First Day - Worthington, Ohio	**Fall 2022**	**Reached**	**Photo**	**ID-058**
Demonstration for Freshmen PLTW Class 1 - Worthington, Ohio	**Fall 2022**	**Reached**	**Photo**	**ID-059**
Demonstration for Freshmen PLTW Class 2 - Worthington, Ohio	**Fall 2022**	**Reached**	**Photo**	**ID-060**
Thomas Worthington High School Newsletter - Worthington, Ohio	**Fall 2022**	**Reached**	**Screenshot**	**ID-061**
Thomas Worthington Student News Interview - Worthington, Ohio	**Fall 2022**	**Reached**	**Photo**	**ID-062**
Thomas Worthington Involvement Fair - Worthington, Ohio	**Fall 2022**	**Reached**	**Photo**	**ID-063**
POE Presentation 1 - Worthington, Ohio	**Fall 2022**	**Reached**	**Photo**	**ID-064**

Team Name: The WorBots

Team Number: 4145

POE Presentation 2 - Worthington, Ohio	**Fall 2022**	**Reached**	**Photo**	**ID-065**
POE Presentation 3 - Worthington, Ohio	**Fall 2022**	**Reached**	**Photo**	**ID-066**
CAD Presentation - Worthington, Ohio	**Fall 2022**	**Reached**	**Photo**	**ID-067**
Worthington Market Day - Worthington, Ohio	**Fall 2022**	**Reached**	**Photo**	**ID-068**
***FIRST* LEGO League Team 57154 - Worthington, Ohio**	**Fall 2022**	**Started**	**Screenshot**	**ID-069**
***FIRST* Tech Challenge Team 16284 - Worthington, Ohio**	**Fall 2022**	**Mentored**	**Photo**	**ID-070**
***FIRST* LEGO League Team 57154 - Worthington, Ohio**	**Fall 2022**	**Menored**	**Photo**	**ID-071**
***FIRST* LEGO League Team 44451 - Worthington, Ohio**	**Fall 2022**	**Mentored**	**Photo**	**ID-072**
***FIRST* LEGO League Team 44452 - Worthington, Ohio**	**Fall 2022**	**Mentored**	**Photo**	**ID-073**
***FIRST* Robotics Competition Team 6916**	**Winter 2022**	**Mentored**	**Photo**	**ID-074**
***FIRST* Robotics Competition Team 8856**	**Winter 2022**	**Assisted, Provided Published Resources**	**Screenshot**	**ID-075**
Worthington Middle School Shop Tour - Worthington, Ohio	**Fall 2022**	**Reached**	**Photo**	**ID-076**
CORI Invitational - Worthington, Ohio - Worthington, Ohio	**Fall 2022**	**Hosted**	**Photo**	**ID-077**
Lake Shore Shop Tour - Worthington, Ohio	**Winter 2022**	**Reached**	**Photo**	**ID-078**
ATS Shop Tour - Worthington, Ohio	**Winter 2022**	**Reached**	**Photo**	**ID-079**
FLL Shop Tour - Worthington, Ohio	**Winter 2022**	**Reached**	**Photo**	**ID-080**
Curriculum Night Presentation - Worthington, Ohio	**Winter 2022**	**Reached**	**Photo**	**ID-081**
Impower.ai Presentation - Worthington, Ohio	**Winter 2023**	**Reached**	**Photo**	**ID-082**
Chipotle Presentation - Worthington, Ohio	**Winter 2023**	**Reached**	**Photo**	**ID-083**
Merrill Lynch Presentation - Worthington, Ohio	**Winter 2023**	**Reached**	**Photo**	**ID-084**
Worthington School Board Presentation / Robot Reveal	**Winter 2023**	**Reached**	**Photo**	**ID-085**

Team Name: The WorBots

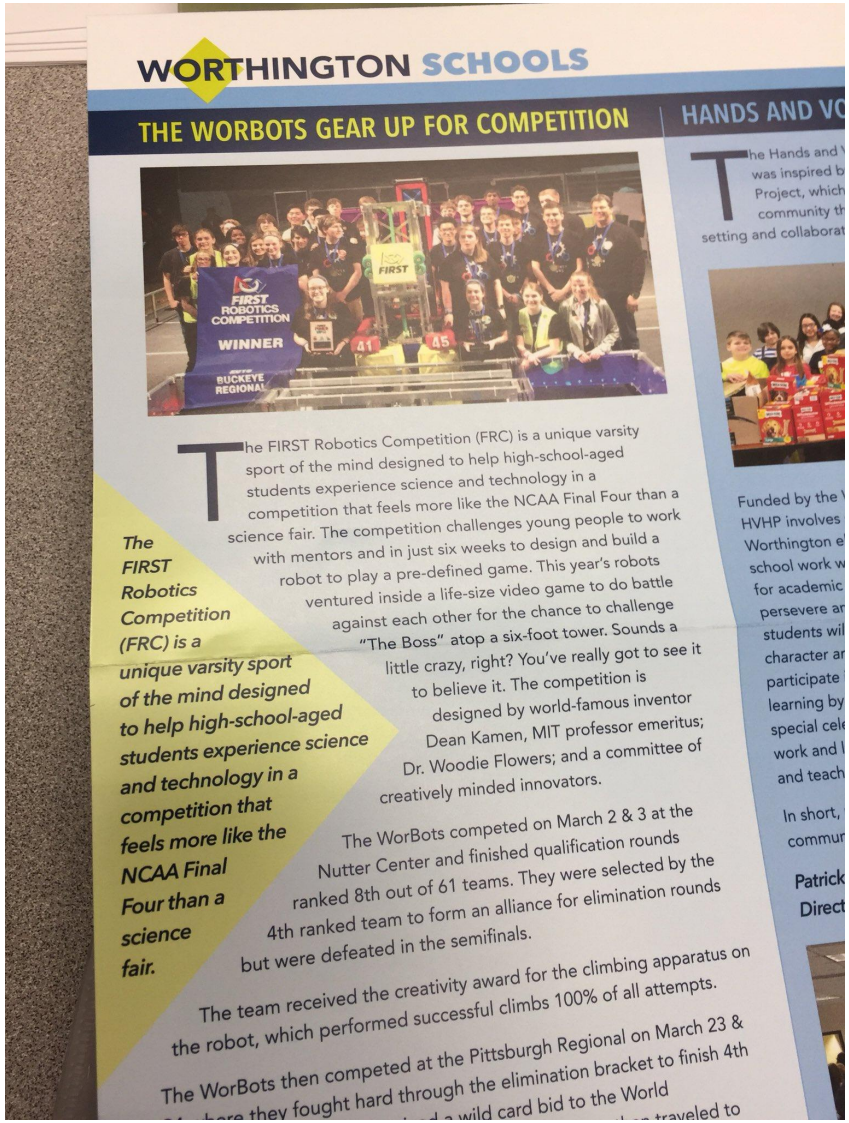
Team Number: 4145

Community Robot Reveal - Worthington, Ohio	**Winter 2023**	**Reached**	**Photo**	**ID-086**
Girl Scouts Event - Worthington, Ohio	**Winter 2023**	**Reached**	**Photo**	**ID-087**
Safety Kits	**Winter 2023**	**Provided Published Resources**	**Photo**	**ID-088**
Eagle Expert Extravaganza	**Winter 2023**	**Reached**	**Photo**	**ID-089**

Team Name: The WorBots

Team Number: 4145

ID-001



WORTHINGTON SCHOOLS

THE WORBOTS GEAR UP FOR COMPETITION

HANDS AND VO

The FIRST Robotics Competition (FRC) is a unique varsity sport of the mind designed to help high-school-aged students experience science and technology in a competition that feels more like the NCAA Final Four than a science fair. The competition challenges young people to work with mentors and in just six weeks to design and build a robot to play a pre-defined game. This year's robots ventured inside a life-size video game to do battle against each other for the chance to challenge "The Boss" atop a six-foot tower. Sounds a little crazy, right? You've really got to see it to believe it. The competition is designed by world-famous inventor Dean Kamen, MIT professor emeritus; Dr. Woodie Flowers; and a committee of creatively minded innovators.

The FIRST Robotics Competition (FRC) is a unique varsity sport of the mind designed to help high-school-aged students experience science and technology in a competition that feels more like the NCAA Final Four than a science fair.

The WorBots competed on March 2 & 3 at the Nutter Center and finished qualification rounds ranked 8th out of 61 teams. They were selected by the 4th ranked team to form an alliance for elimination rounds but were defeated in the semifinals.

The team received the creativity award for the climbing apparatus on the robot, which performed successful climbs 100% of all attempts.

The WorBots then competed at the Pittsburgh Regional on March 23 & [illegible] they fought hard through the elimination bracket to finish 4th [illegible] a wild card bid to the World [illegible] traveled to

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Team Name: The WorBots

Team Number: 4145

ID-002

Team Name: The WorBots

Team Number: 4145

ID-003

Team Name: The WorBots

Team Number: 4145

ID-004

Team Name: The WorBots

Team Number: 4145

ID-005

https://worbots4145.org/safety-2/safety-resources/

Accident Report:

*Name:*_____ *Date:*_____

Incident & Severity:

_____

_____

_____

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_____

*Mentor:*_____ *Safety Officer:*_____

Accident Report:

*Name:*_____ *Date:*_____

Incident & Severity:

_____

_____

_____

_____

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*Mentor:*_____ *Safety Officer:*_____

Team Name: The WorBots

Team Number: 4145

ID-006

https://worbots4145.org/safety-2/safety-resources/

Welcome to the Lab!

For your safety, please follow these rules while working:

- Wear your safety goggles while using tools and while machines are running
- No running
- Wear appropriate clothing
  - Closed-toed shoes
  - No loose clothing
  - Tie back long hair
- Get safety certified before using machines
- Clean up your workspace
  - Tools put away
  - Unplug power tools
  - Sweep workbench/floor
- Report any accidents to the Safety Captian immediately and address any medical issues
- Stay alert at all times!

Team Name: The WorBots

Team Number: 4145

ID-007

https://worbots4145.org/safety-2/safety-resources/

Team Name: The WorBots

Team Number: 4145

ID-008

https://worbots4145.org/safety-2/safety-resources/

Pit Safety Rules

Simple Rules for a Safer Shop

- Goggles are *required* by everyone in the pit
- Wear the proper protective clothing
  - Closed toed shoes
  - No flowing sleeves
  - Hair tied back

- Stay alert at all times and be ready to react
- Robots have the right-of-way
- Keep all pit items within the pit
- Don't obstruct the aisles
- Power down all tools at the end of the day
- Clean up your tools before leaving

Team Name: The WorBots

Team Number: 4145

ID-009

https://worbots4145.org/safety-2/safety-resources/

Safety Tools (Shop)

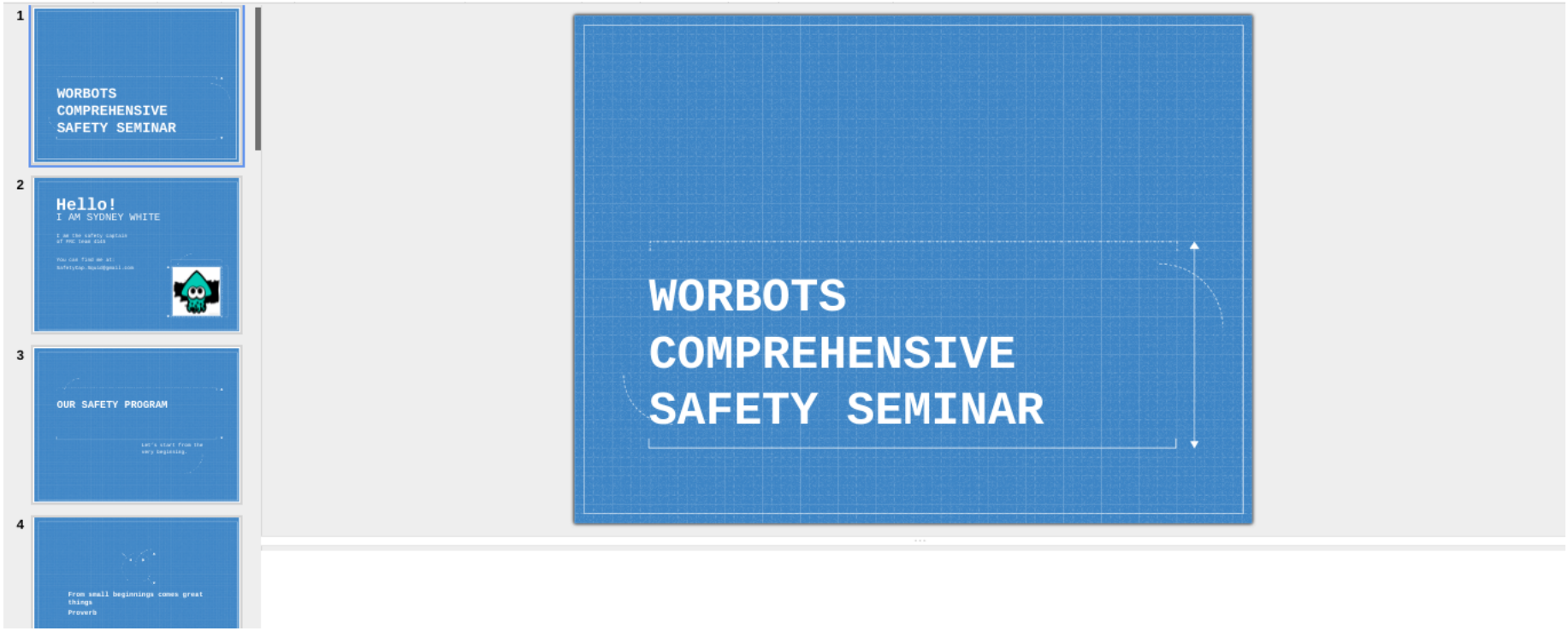
- ❑ First Aid Kit
  - ❑ Bandaids
  - ❑ Antibacterial
  - ❑ Ice Pack
  - ❑ Ace Bandages
  - ❑ Body Fluid Cleanup Kit
  - ❑ Hair Ties
- ❑ Goggles
  - ❑ A pair of chemical goggles
- ❑ Fire Extinguisher
- ❑ Eye Wash Station
- ❑ Battery Spill Cleanup Kit
  - ❑ Baking Soda
  - ❑ Acid-Resistant Gloves
  - ❑ Shop Towels
  - ❑ Battery Box
- ❑ Work Gloves
- ❑ Safety Rules Poster

Team Name: The WorBots

Team Number: 4145

ID-010

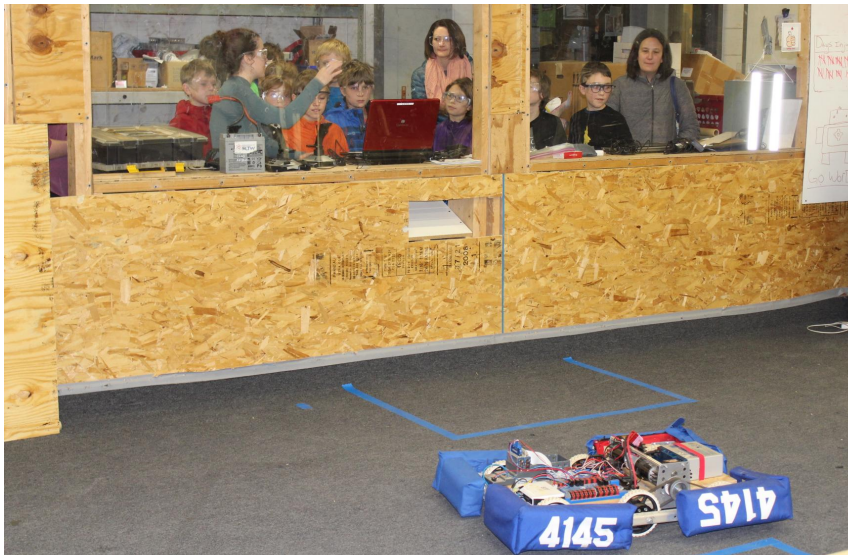
https://worbots4145.org/safety-2/safety-resources/



Team Name: The WorBots

Team Number: 4145

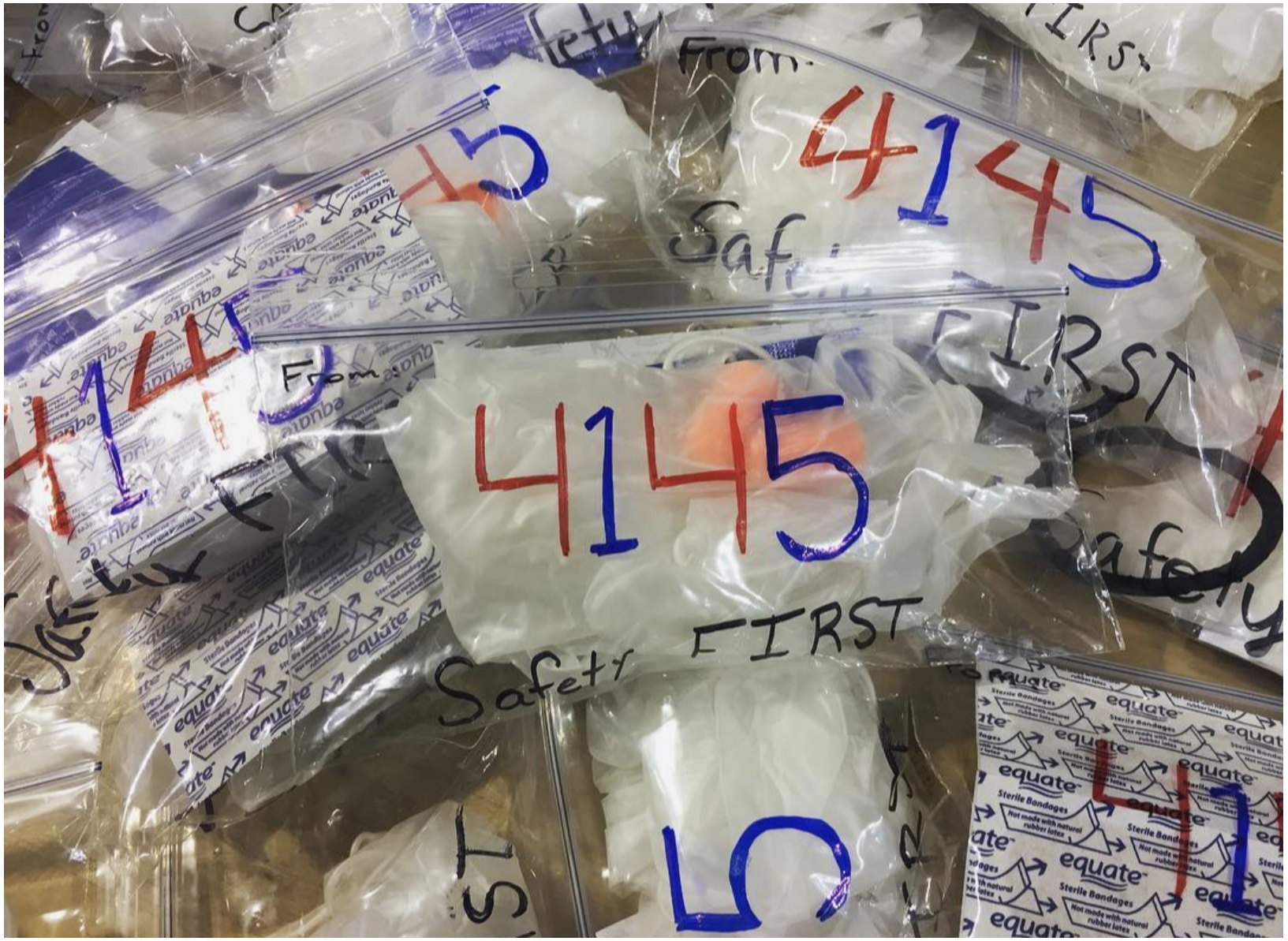
ID-011



Team Name: The WorBots

Team Number: 4145

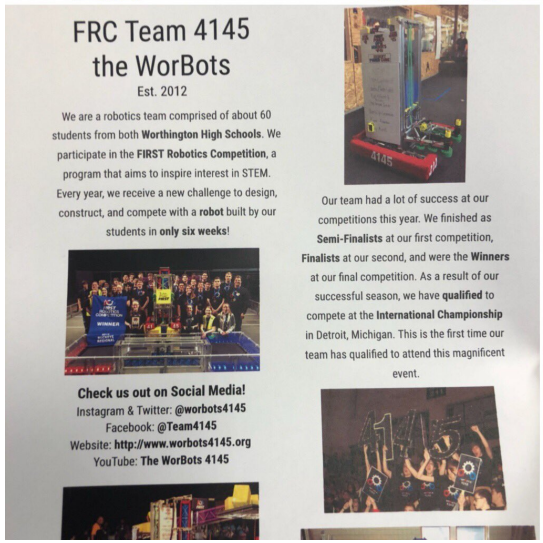
ID-012



Team Name: The WorBots

Team Number: 4145

ID-013



Team Name: The WorBots

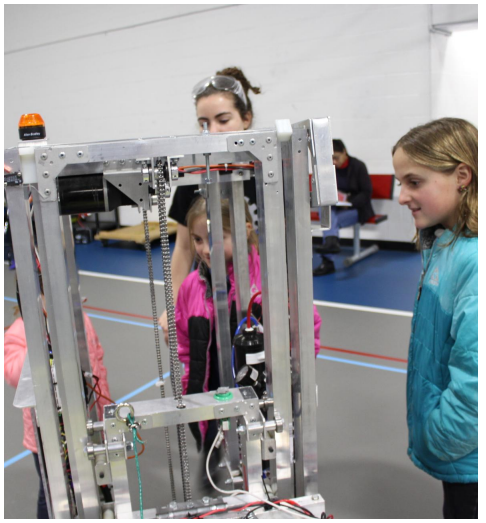
Team Number: 4145

ID-014

Team Name: The WorBots

Team Number: 4145

ID-015



Team Name: The WorBots

Team Number: 4145

ID-016

Team Name: The WorBots

Team Number: 4145

ID-017

Team Name: The WorBots

Team Number: 4145

ID-018

Team Name: The WorBots

Team Number: 4145

ID-019

Team Name: The WorBots

Team Number: 4145

ID-020

Team Name: The WorBots

Team Number: 4145

ID-021

to bmorgan, estack

Hello,

My name is Katherine and I'm a senior at Worthington Kilbourne High School. I'm also President and Captain of the WorBots, which is Worthington's combined high school robotics team. We were created in 2012 as part of the FIRST Robotics Competition, and each year we design and construct a robot to compete at competitions. We have recognized a need to establish a cohesive K-12 robotics pathway, and would therefore like to establish FIRST Lego League teams for Worthington elementary schools. Rather than run the teams, we would like to guide interested adults and students in creating them and provide support.

To do this, it is necessary to establish a link between our team and your school. If you do not believe you are the right person for me to communicate with, and would instead like to refer me to another science or math teacher, that is fine. I will need a liaison to aid in spreading this information and informing me of any interest expressed.

Here is an excerpt from the FLL website on how the organization works:

> Every year, *FIRST* LEGO League releases a Challenge, which is based on a real-world scientific topic.
>
> Each Challenge has three parts: the **Robot Game**, the **Project**, and the **Core Values**. Teams of up to ten children, with at least two adult coaches, participate in the Challenge by programming an autonomous robot to score points on a themed playing field (Robot Game), developing a solution to a problem they have identified (Project), all guided by the *FIRST* LEGO League Core Values. Teams may then attend an official tournament, hosted by our *FIRST* LEGO League Partners.

Visit http://www.firstlegoleague.org/ and https://www.firstinspires.org/ for more information.

Thank you,

Katherine Poe

Student President

Team Name: The WorBots

Team Number: 4145

ID-022

to bmorgan, estack

Hello,

My name is Katherine and I'm a senior at Worthington Kilbourne High School. I'm also President and Captain of the WorBots, which is Worthington's combined high school robotics team. We were created in 2012 as part of the FIRST Robotics Competition, and each year we design and construct a robot to compete at competitions. We have recognized a need to establish a cohesive K-12 robotics pathway, and would therefore like to establish FIRST Lego League teams for Worthington elementary schools. Rather than run the teams, we would like to guide interested adults and students in creating them and provide support.

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Visit http://www.firstlegoleague.org/ and https://www.firstinspires.org/ for more information.

Thank you,

Katherine Poe

Student President

Team Name: The WorBots

Team Number: 4145

ID-023

to kcermak, mgordon

Hello,

My name is Katherine and I'm a senior at Worthington Kilbourne High School. I'm also President and Captain of the WorBots, which is Worthington's combined high school robotics team. We were created in 2012 as part of the FIRST Robotics Competition, and each year we design and construct a robot to compete at competitions. We have recognized a need to establish a cohesive K-12 robotics pathway, and would therefore like to establish FIRST Tech Challenge teams for Worthington middle schools. Rather than run the teams, we would like to guide interested adults and students in creating them and provide support.

To do this, it is necessary to establish a link between our team and your school. If you do not believe you are the right person for me to communicate with, and would instead like to refer me to another science or math teacher, that is fine. I will need a liaison to aid in spreading this information and informing me of any interest expressed.

Here is an excerpt from the FTC website on how the organization works:

> **It's way more than building robots.** *FIRST* Tech Challenge teams (10+ members, grades 7-12) are challenged to design, build, program, and operate robots to compete in a head-to-head challenge in an alliance format. Participants call it "the hardest fun you'll ever have!"
>
> Guided by adult Coaches and Mentors, students develop STEM skills and practice engineering principles (like keeping an engineering notebook), while realizing the value of hard work, innovation, and sharing ideas. The robot kit is reusable from year-to-year and can be programmed using a variety of languages, including Java. Teams also must raise funds, design and market their team brand, and do community outreach for which they can win awards. Participants have access to tens of millions of dollars in college scholarships. Each season concludes with Super-Regional Championships and an exciting *FIRST* Championship.

Visit https://www.firstinspires.org/robotics/ftc for more information.

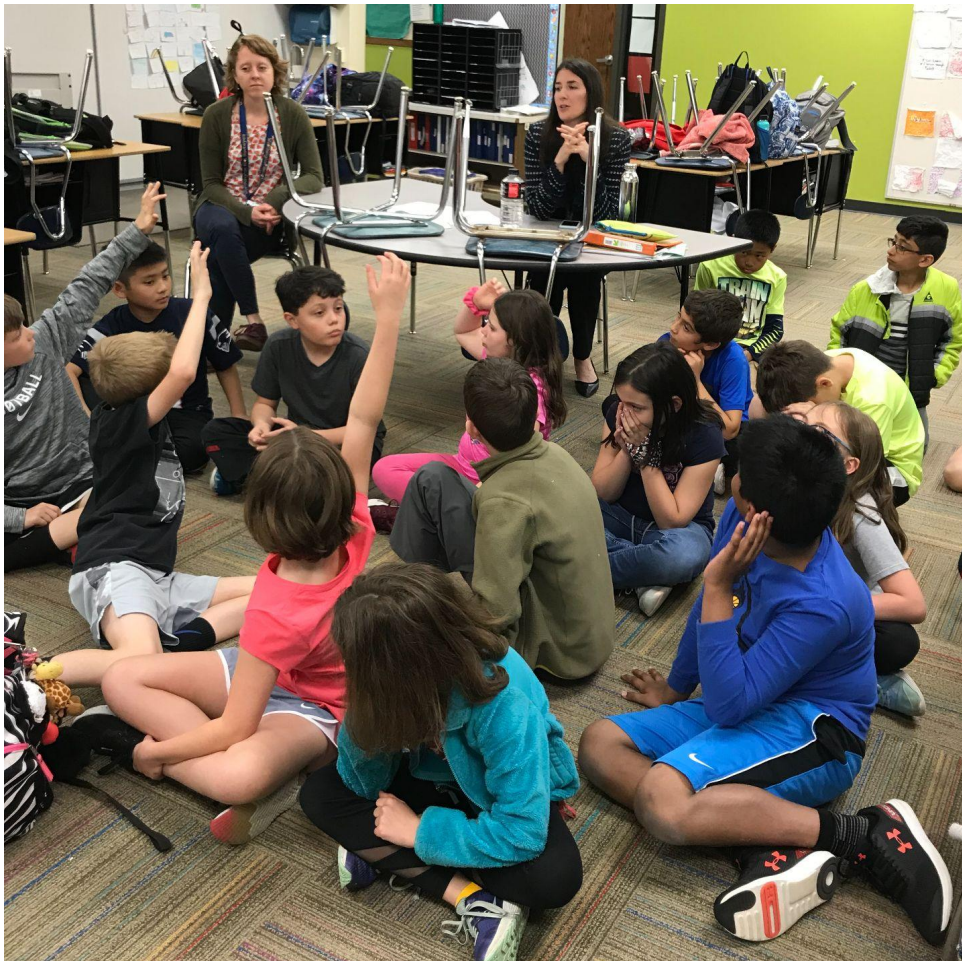
Thank you,

Katherine Poe

Team Name: The WorBots

Team Number: 4145

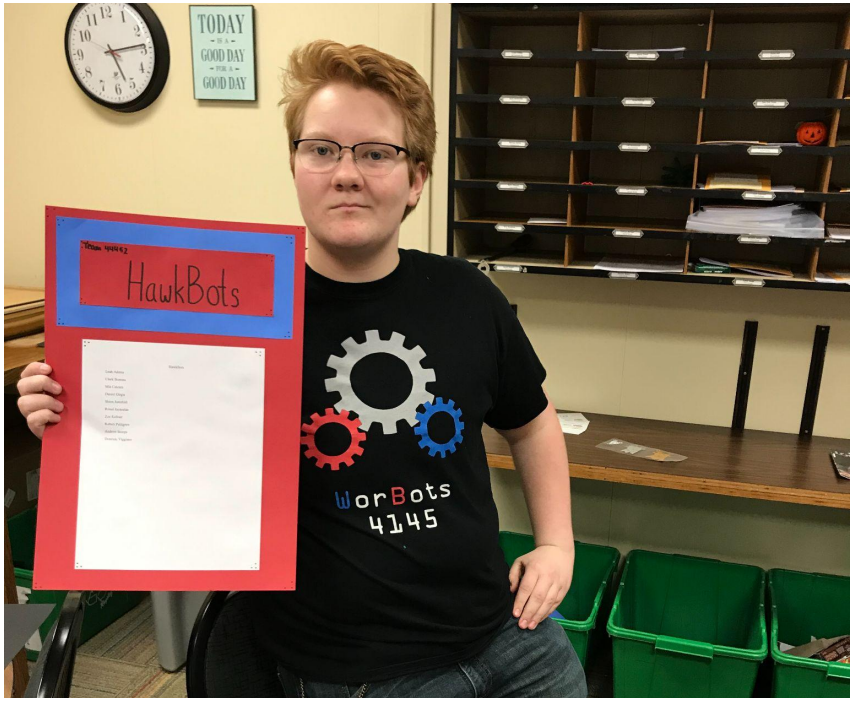
ID-024



Team Name: The WorBots

Team Number: 4145

ID-025



Team Name: The WorBots

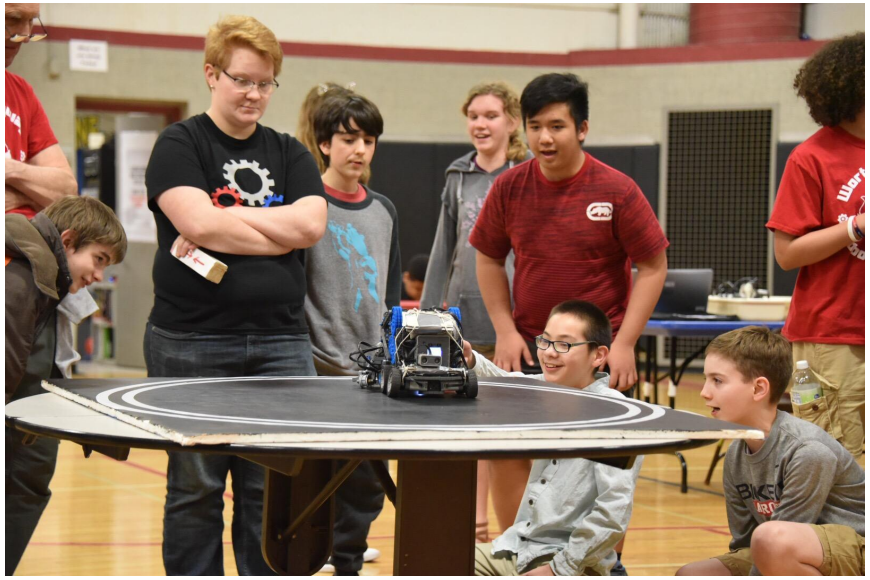
Team Number: 4145

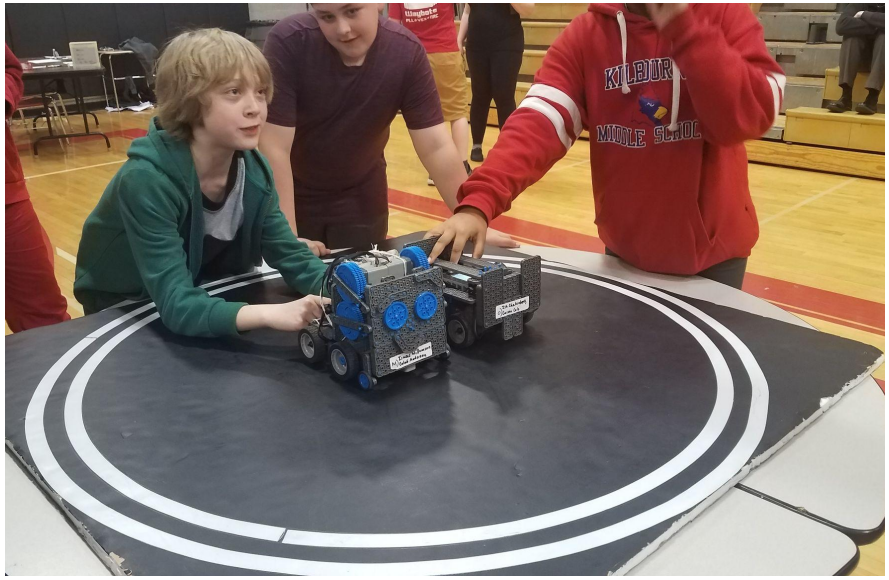
ID-026

Team Name: The WorBots

Team Number: 4145

ID-027

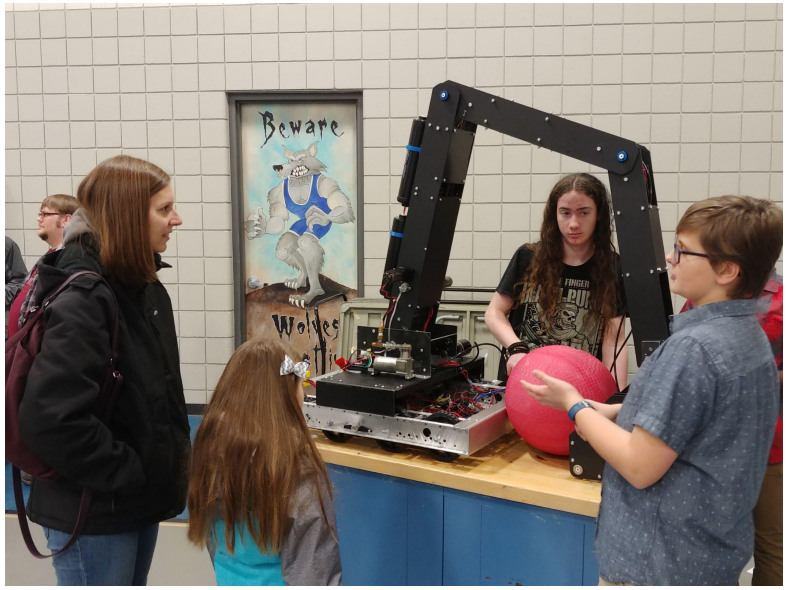


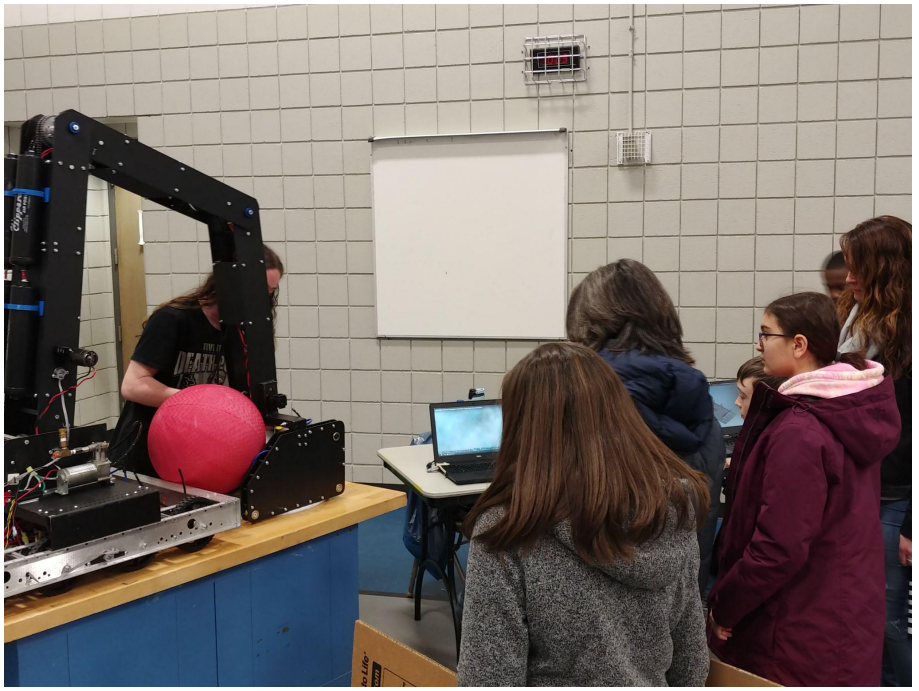


Team Name: The WorBots

Team Number: 4145

ID-028





Team Name: The WorBots

Team Number: 4145

ID-029

Team Name: The WorBots

Team Number: 4145

ID-030

Team Name: The WorBots

Team Number: 4145

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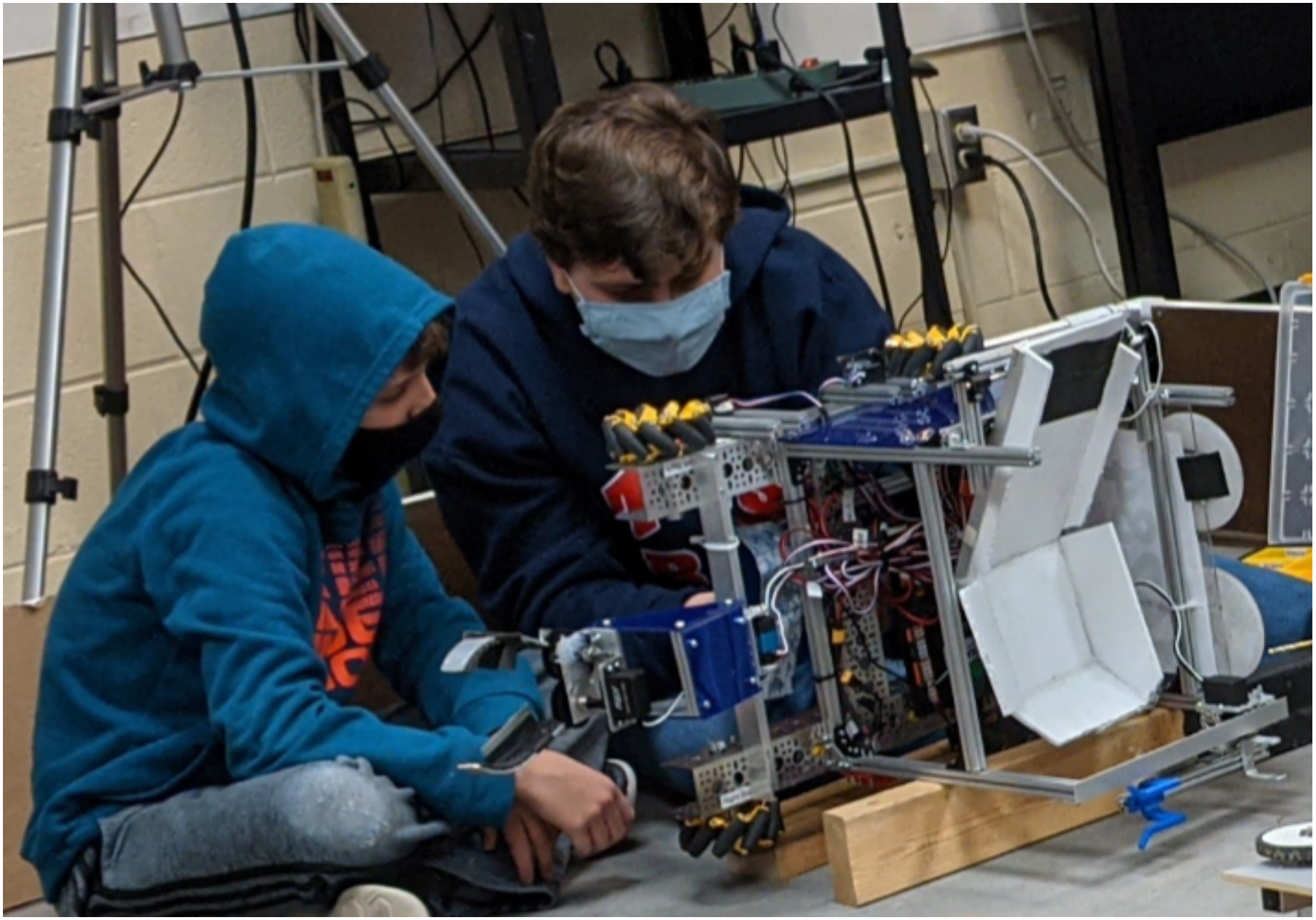
Team Name: The WorBots

Team Number: 4145

ID-032



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Team Number: 4145

ID-033

Team Name: The WorBots

Team Number: 4145

ID-034

Team Name: The WorBots

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ID-035

Team Name: The WorBots

Team Number: 4145

ID-036

Team Name: The WorBots

Team Number: 4145

ID-037

Team Name: The WorBots

Team Number: 4145

ID-038

https://www.dispatch.com/story/news/local/communities/worthington/2022/01/27/worthington-schools-students-building-career-and-life-skills-on-worbots-robotics-team/9217112002/

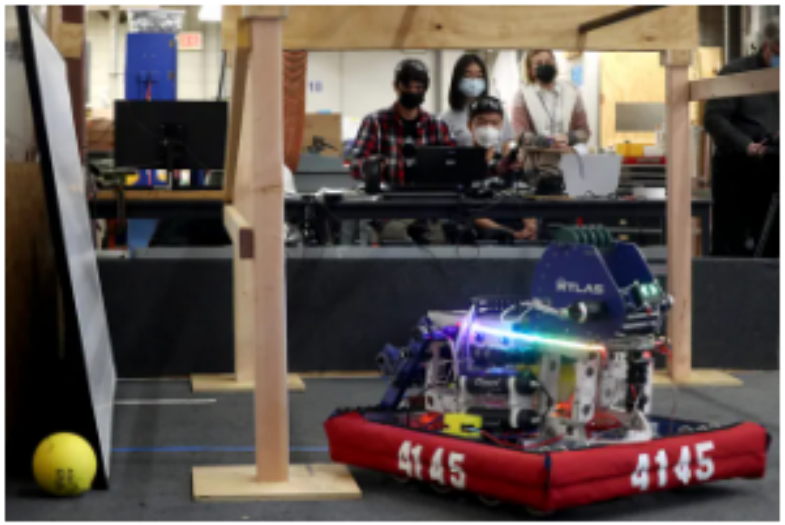
WORTHINGTON

Worthington Schools students building skills for career and life on Worbots robotics team

Stephen Borgna
ThisWeek

Published 2:20 p.m. ET Jan. 27, 2022 | Updated 4:02 p.m. ET Jan. 28, 2022

View Comments



Worthington Kilbourne High School junior Owen Marano (left), lead driver and fabrication lead, pilots Atlas, the Worbots 4145 team's competition robot from 2020, as Kilbourne senior George Fang, programmer, and Kilbourne sophomore Braylee Hsu, business and marketing lead, look on during a demonstration Jan. 25 at Kilbourne. The team includes students from both Kilbourne and Thomas Worthington High School. Shane Flanigan/ThisWeek

Four days a week after school and on Saturdays, a group of students from Worthington Kilbourne and Thomas Worthington high schools make their way to a workshop at Kilbourne.

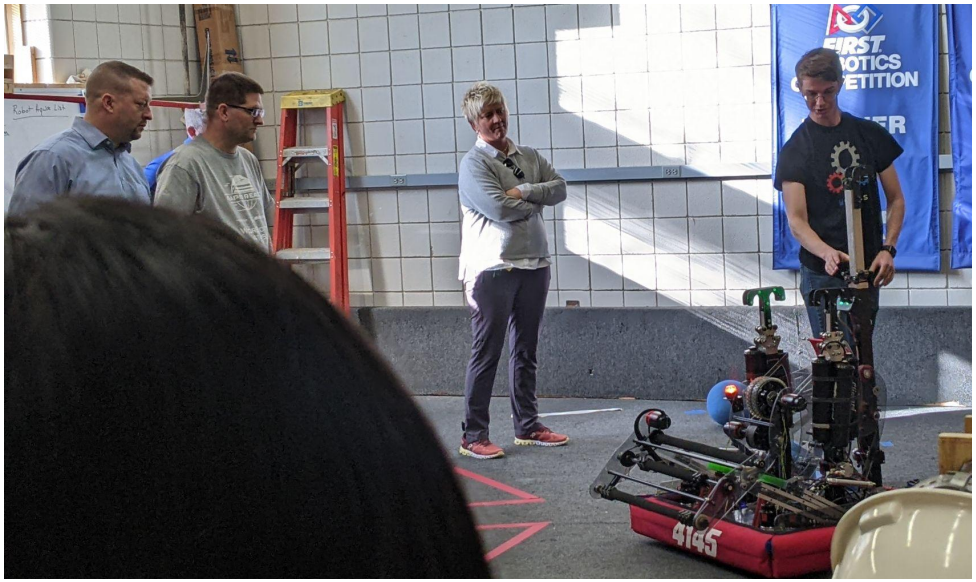
There, instead of playing sports or instruments or doing other extracurricular activities, they build robots.

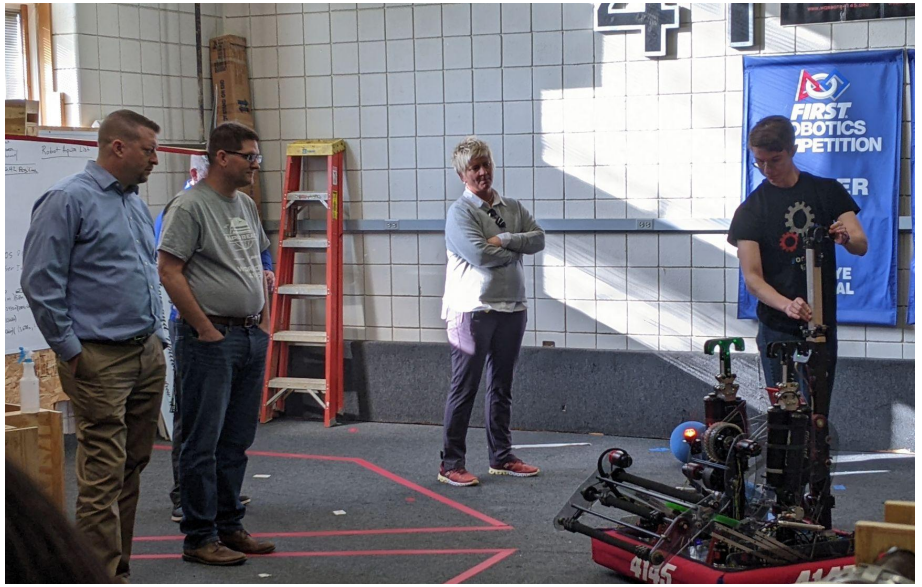
The 43 students comprise Worbots 4145, a Worthington Schools robotics team that builds and programs robots to compete in annual international FIRST Robotics Competition events, which draw thousands of robotics teams and high schoolers from around the world.

Team Name: The WorBots

Team Number: 4145

ID-039





Team Name: The WorBots

Team Number: 4145

ID-040

Worbots 4145 Follow Up Meeting

When **Changed:** Mon Mar 14, 2022 3:30pm – 4:30pm Eastern Time - New York **more details »**

Calendar nd0104@wscloud.org

Who
- Aric Thomas - organizer
- rmessenheimer@wscloud.org
- Neil Gupta
- Angela Adrean
- yh0612@wscloud.org
- ts0159@wscloud.org
- nd0104@wscloud.org

I am proposing we meet on Monday, March 14th and follow up with the Worbots presenters--Braylee, Toby, and Natalie. We would meet as soon as Braylee and Natalie arrived from TWHS in my office. Please let me know if you are unable to attend. I know we are working with several schedules.

Sincerely,
Aric Thomas

Team Name: The WorBots

Team Number: 4145

ID-041

Team Name: The WorBots

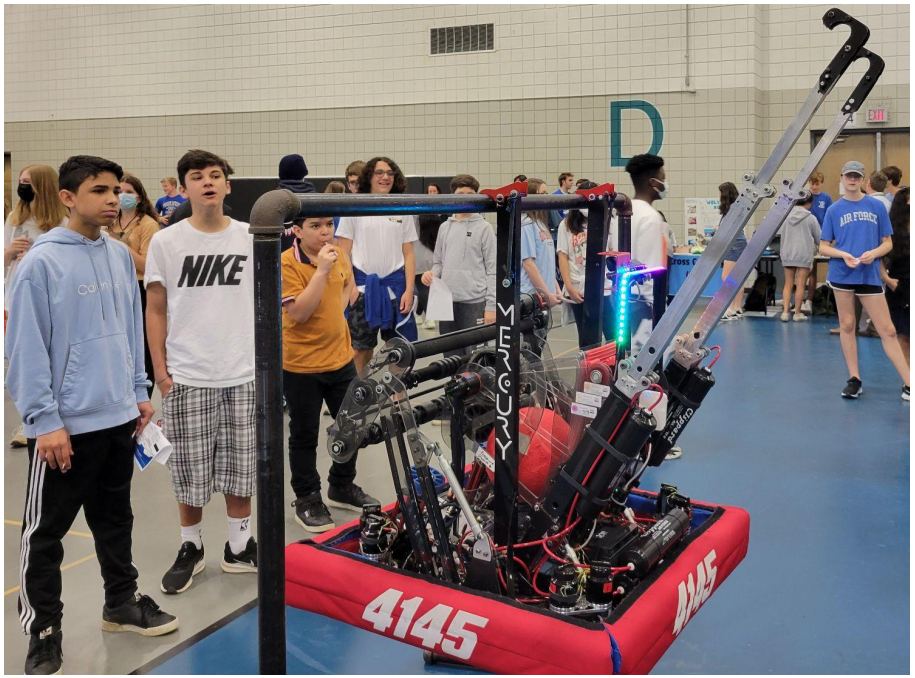
Team Number: 4145

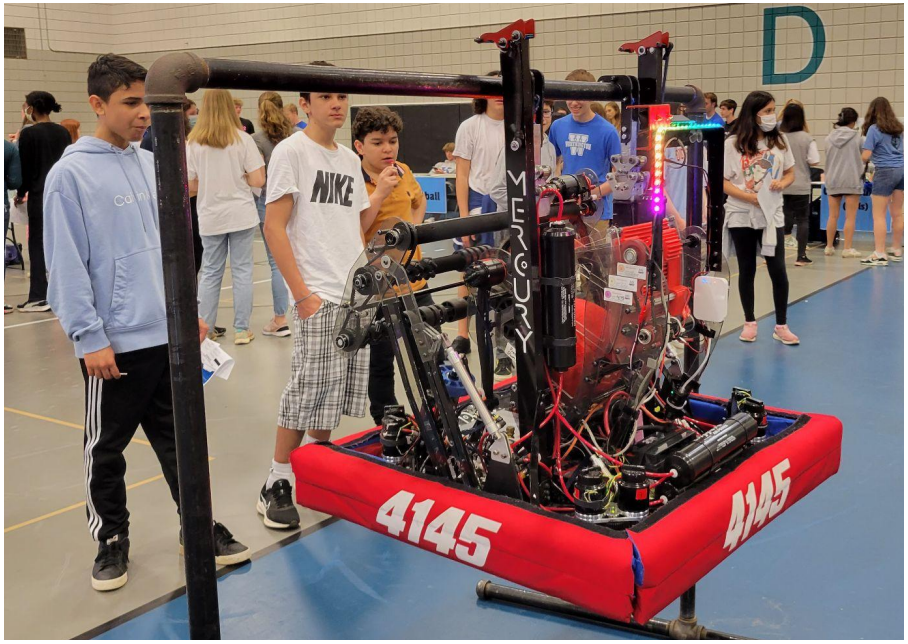
ID-042

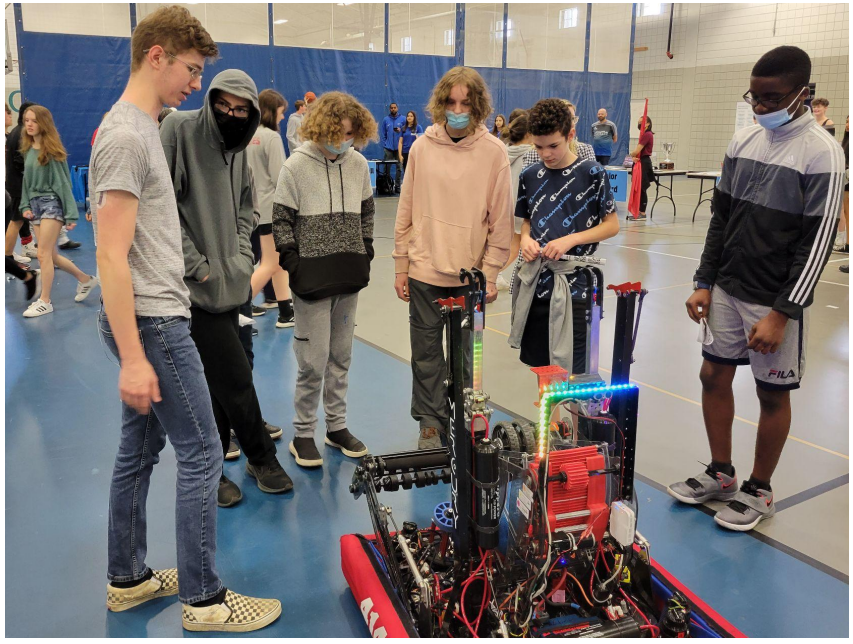
Team Name: The WorBots

Team Number: 4145

ID-043







Team Name: The WorBots

Team Number: 4145

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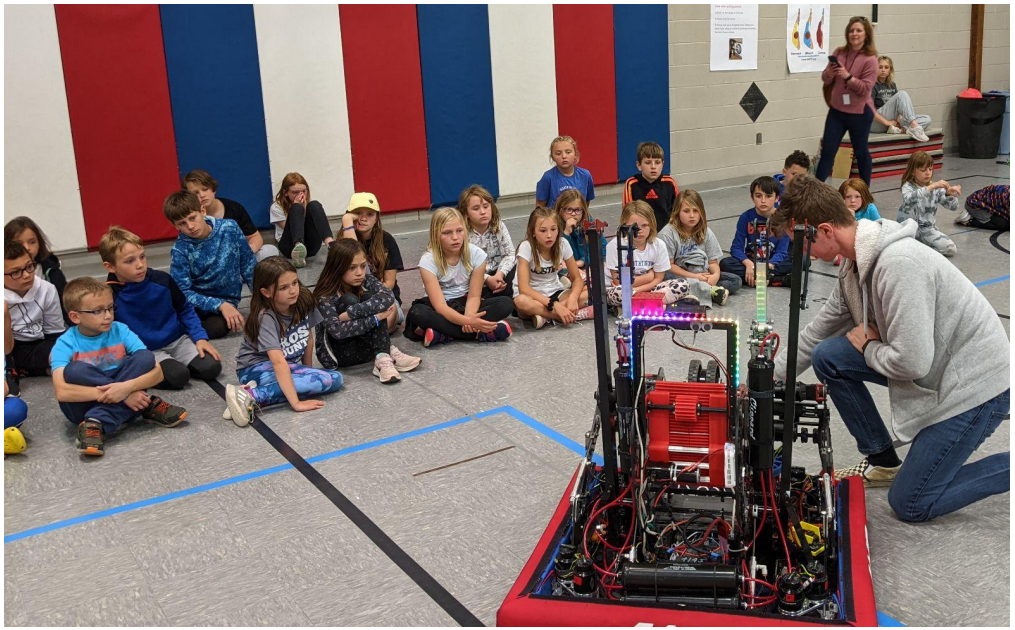

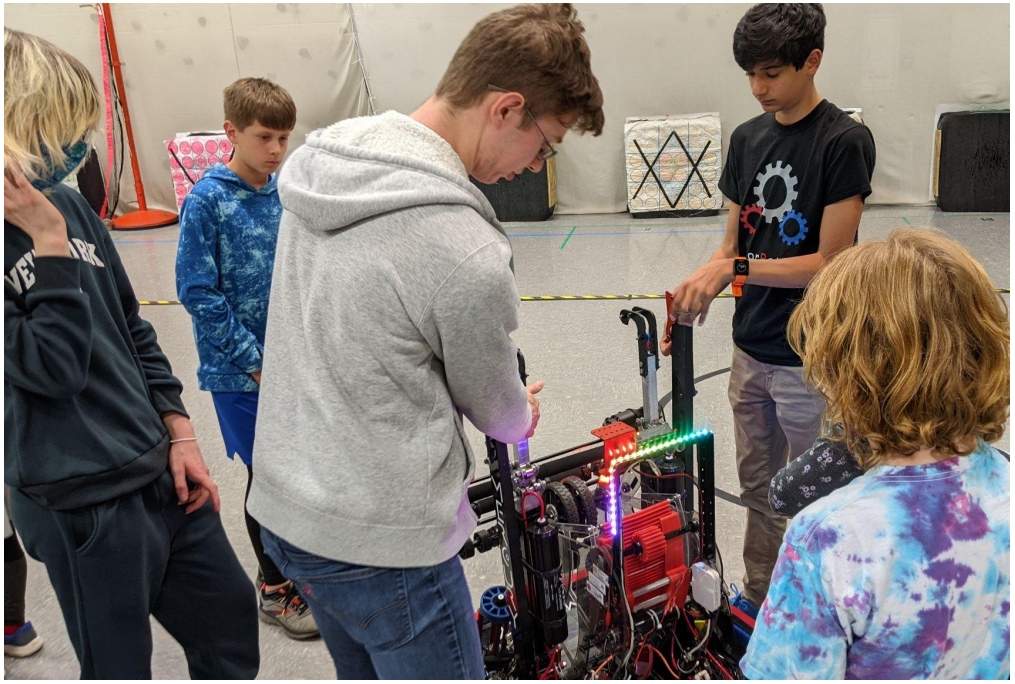

Team Name: The WorBots

Team Number: 4145

ID-045

The Worthington Robotics Team

The WorBots 4145: Cultivating a Culture of STEM in Worthington, Ohio

Hello! We are the WorBots 4145, an FRC team based in Worthington, Ohio. We've noticed the difficulties many teams have faced with the Covid-19 pandemic in terms of getting sufficient funding, and we wanted to share some strategies that have worked well for us. During the off-season, we acquired funding effectively allowing us to double our budget and promote team sustainability. Here is what we did!

Key Strategies:

1. **Do your research!** By simply researching online and driving around corporate parks around our community, we discovered many robotics-adjacent companies that were willing to cooperate with us.
2. **Identify their goals!** Before you contact the group, make sure you know their basic mission and goals! By showing genuine interest and knowledge in what they do, you can easily make a better impression.
3. **Find the higher-ups!** With some basic research on LinkedIn and similar sites, it is quite easy to get the contact information of people who are both interested in robotics, and have the power in the company to back it up.
4. **Make cold calls!** While having pre-established relationships with companies is ideal, this often isn't the case. One of the best ways to reach out to companies who aren't familiar with your team is to call them and discuss the benefits and logistics of a partnership.
5. **Appeal to their needs!** Identify needs facing surrounding companies — whether it be employment, struggling online presence, or lack of publicity — and discuss the benefits of a reciprocal relationship.
6. **Be persuasive!** Be loud and confident — but not abrasive! Talk about your strengths, and how your team is uniquely suited for addressing anything they are trying to grow.
7. **Bring in the bot!** While messages and calls are great ways to connect, in the end, they are just words. Make sure to set dates for personal meetings with the company — demonstrating your robot in the process! This gives you much more legitimacy in the eyes of the sponsors.
8. **Send frequent emails and updates!** Basic emails are a great way to establish a relationship, but don't end it there! Make sure to keep new sponsors and contacts in the loop, and let them know of any ways they can help.

If you have any questions, you can reach us at:
Email: Worbots4145@gmail.com
Instagram: @Worbots4145
Twitter: @Worbots4145

Team Name: The WorBots

Team Number: 4145

ID-046

The Worthington Robotics Team

The WorBots 4145: Cultivating a Culture of STEM in Worthington, Ohio

Hello! We are the WorBots 4145, a team based in Worthington, Ohio. With COVID-19 decimating a lot of teams' numbers, including our own, we wanted to share some strategies that have helped us bounce back quickly from the pandemic, and that will hopefully work for your team as well.

Key Strategies:

1. **Contact the Administration!** By working with the administration of the schools your team comes from, you can get on the announcements, participate in school events, and get free advertising at other events as well. Having the administration on your side benefits all other recruiting methods!
2. **Reach outside STEM!** An FRC Team is not only for students that are already participating in STEM programs, and there are a multitude of awards for fields in art, business, and graphic design. Reach out to the business and arts programs at your school, and your team will have a wider skill set to pull from.
3. **Contact Teachers!** Teachers can be the link between your team and the general school population, or even help as mentors for your team! Taking the time to have a conversation could boost your team for years to come.
4. **Make Posters!** How are students going to know your team if they aren't reminded? Make some fun designs and summaries that they will walk by each day, and watch the students roll on in. Having some name awareness around your school is key to having a successful team.
5. **Meet With Younger Grades!** Our team has had a lot of success with bringing our robot to STEM days in our nearby middle and elementary schools, and doing simple demonstrations. While it does not immediately benefit your numbers, interested students will soon move up to join!
6. **Set Up Feeder Teams!** While it takes a lot of effort, having a more solid pathway of robotics K-12 can really boost your team to another level! Not only will more people come into your team, they will also already have some basic skills and knowledge about robotics.
7. **Get a Social Media Presence!** Make sure your team has some basic accounts set up on the major platforms, so that you can share competition and workshop photos! If you do it well, you can not only get student recognition, but also parental knowledge and support!

If you have any questions, you can reach us at:
Email: Worbots4145@gmail.com
Instagram: @Worbots4145
Twitter: @Worbots4145

Team Name: The WorBots

Team Number: 4145

ID-047

Team Name: The WorBots

Team Number: 4145

ID-048

Team Name: The WorBots

Team Number: 4145

ID-049

Team Name: The WorBots

Team Number: 4145

ID-050

Team Name: The WorBots

Team Number: 4145

ID-051

Team Name: The WorBots

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ID-052

Team Name: The WorBots

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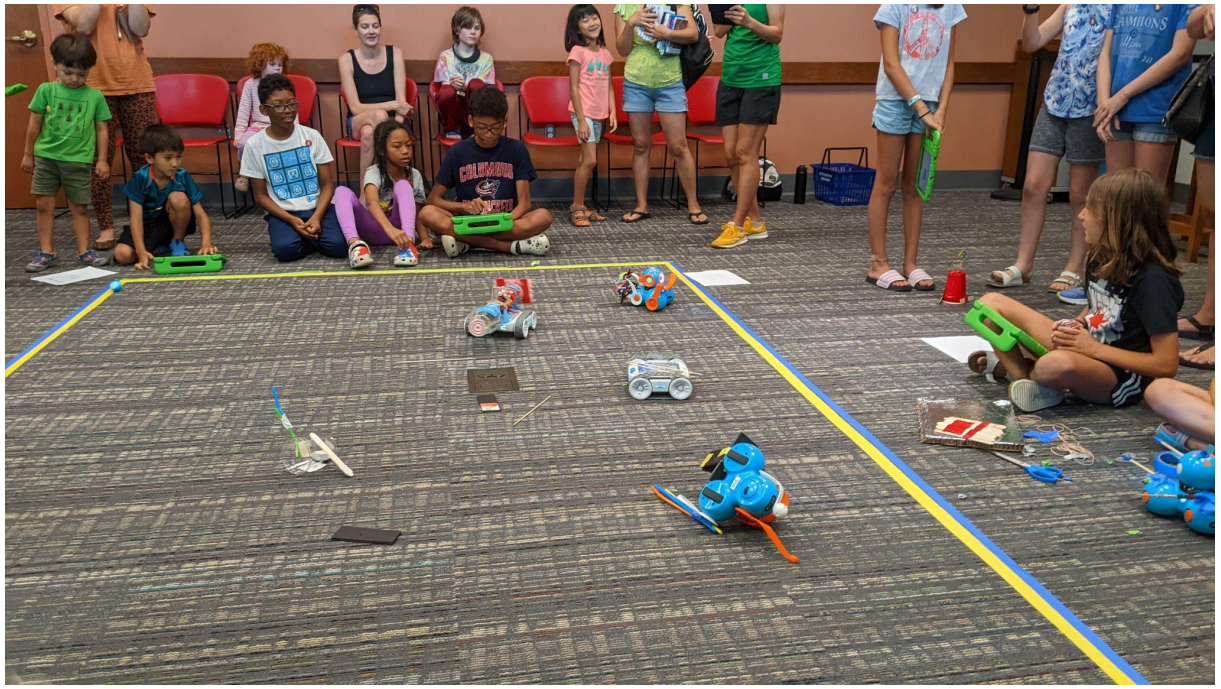
Team Name: The WorBots

Team Number: 4145

ID-054



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Team Number: 4145

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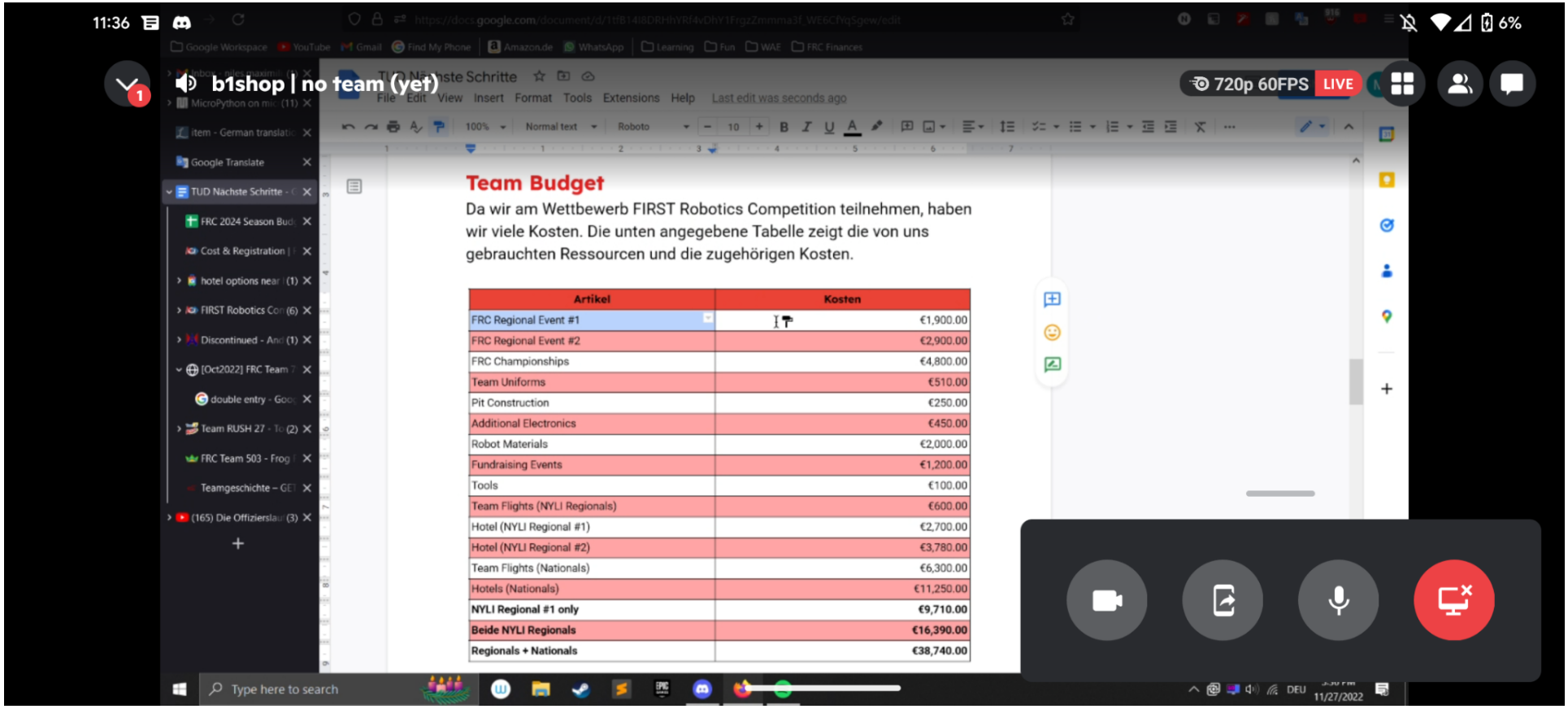

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ID-056

Team Name: The WorBots

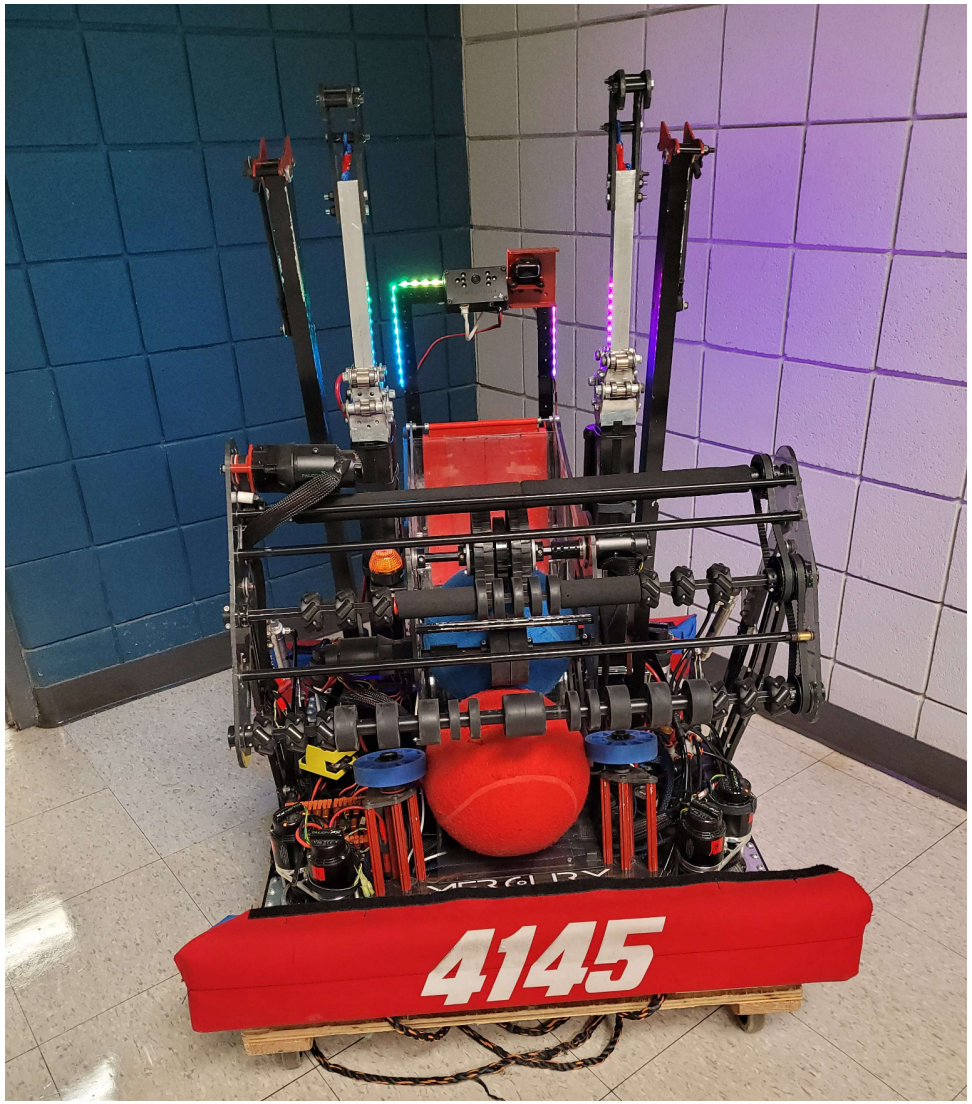
Team Number: 4145

ID-057

Team Name: The WorBots

Team Number: 4145

ID-058



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Team Number: 4145

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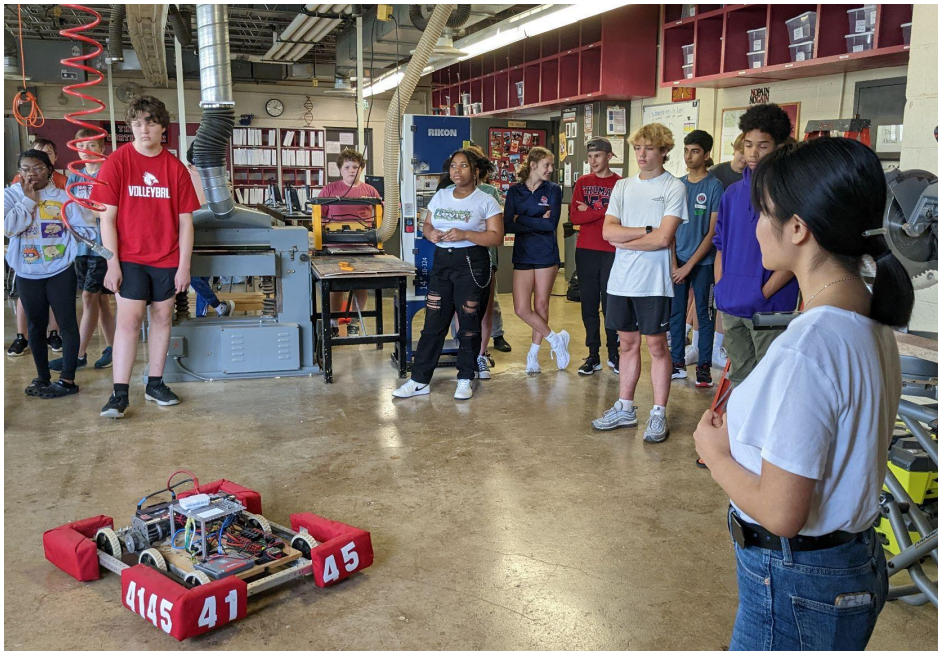


Team Name: The WorBots

Team Number: 4145

ID-060

Team Name: The WorBots

Team Number: 4145

ID-061

The Worthington Robotics Team

Students from Thomas and Worthington Kilbourne High School join together as the Worthington Robotics Team to compete in the *FIRST®* Robotics Competition. Best described as a *sport for the mind*, this international competition is not for the faint of heart. Each season, over the course of six weeks, students design, build, and program a life-sized robot to compete on a massive field with their team alliance.

Each team has its own structure, with a subset of members working on tasks such as public relations, business, programming, fabrication, pneumatics, electrical, and more! Teams travel with their robot to local competitions throughout the U.S. to qualify for Worlds, the championship event often held in Detroit, Michigan.

In 2022, The WorBots designed an over 100 pound robot that could intake, carry, and shoot oversized tennis balls into a over 8-foot high basket, maneuver with complex code systems and target with AI vision programs, then climb and traverse 4 rungs at the finale.

Interested in the program? Students are welcome to join us at our first informational meeting on Wednesday, October 19th right after school. The meeting will be held at our workshop at WKHS in room 146. Bus 55 will be available to ferry TWHS students.

The WorBots 2022 Robot, Mercury

WorBots Competition

Team Name: The WorBots

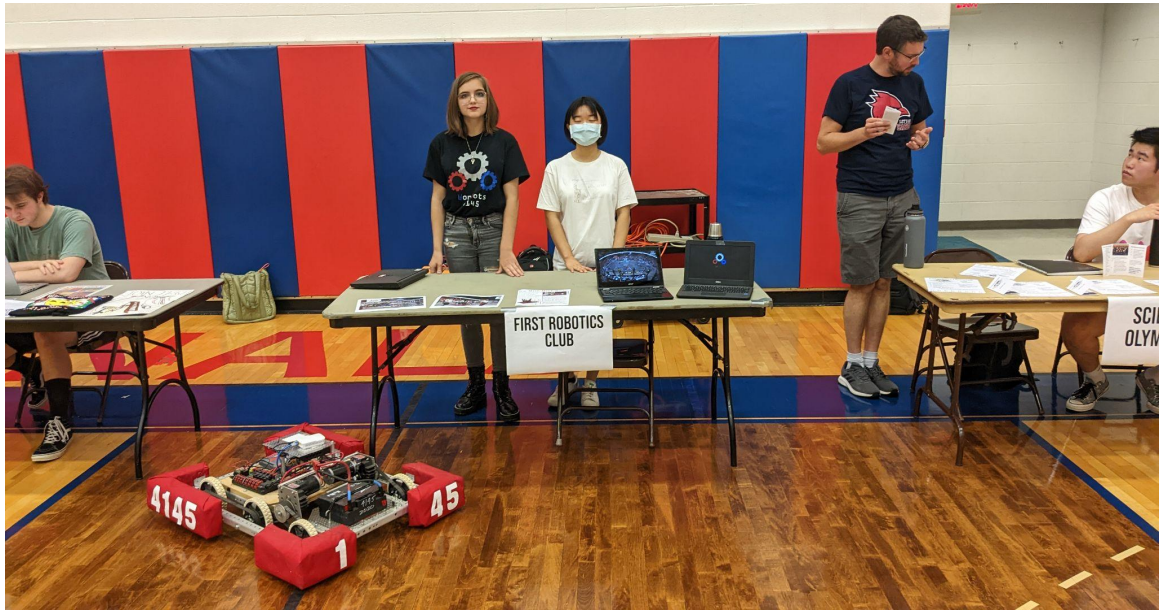
Team Number: 4145

ID-062

Team Name: The WorBots

Team Number: 4145

ID-063



Team Name: The WorBots

Team Number: 4145

ID-064

Team Name: The WorBots

Team Number: 4145

ID-065

Team Name: The WorBots

Team Number: 4145

ID-066

Team Name: The WorBots

Team Number: 4145

ID-067

Team Name: The WorBots

Team Number: 4145

ID-068

Team Name: The WorBots

Team Number: 4145

ID-069

Hsu, Yuan <yh0612@wscloud.org>
to Karrie, me

Fri, Aug 5, 11:12 AM

Hi Mrs. Mowery!

Glad you got the information! Early September sounds like a good time to start. I am not sure on the details about availability for our high school members, but I will be meeting with some team members next week, so I will add that to our agenda. I already have a couple people in mind. As for myself, I can come in 2 times a week any day after 4:00pm. (I will try to find another mentor who can drive so I can get there earlier!)

Thanks for updating us on the kits and laptops. When would you like the high school team to send over the check for $450?

So excited that we have 3 potential coaches!! I will be looking forward to meeting them :) Hopefully by then I will have a couple high schoolers confirmed to mentor the team so we can all meet in-person.

I might have mentioned this in a previous email, but Mr. Karns said we will need at least one teacher to act as a connection between Wilson Hill and the FLL teams. I was wondering if you could do that Mrs. Mowery? You have already been great at communicating with everyone and setting up meetings! You will not have to be at practices very often; it will mainly be the communication piece.

Thanks!

Braylee

***

*** This Email has Been Sent from a High School Student Account ***

Team Name: The WorBots

Team Number: 4145

ID-070

Team Name: The WorBots

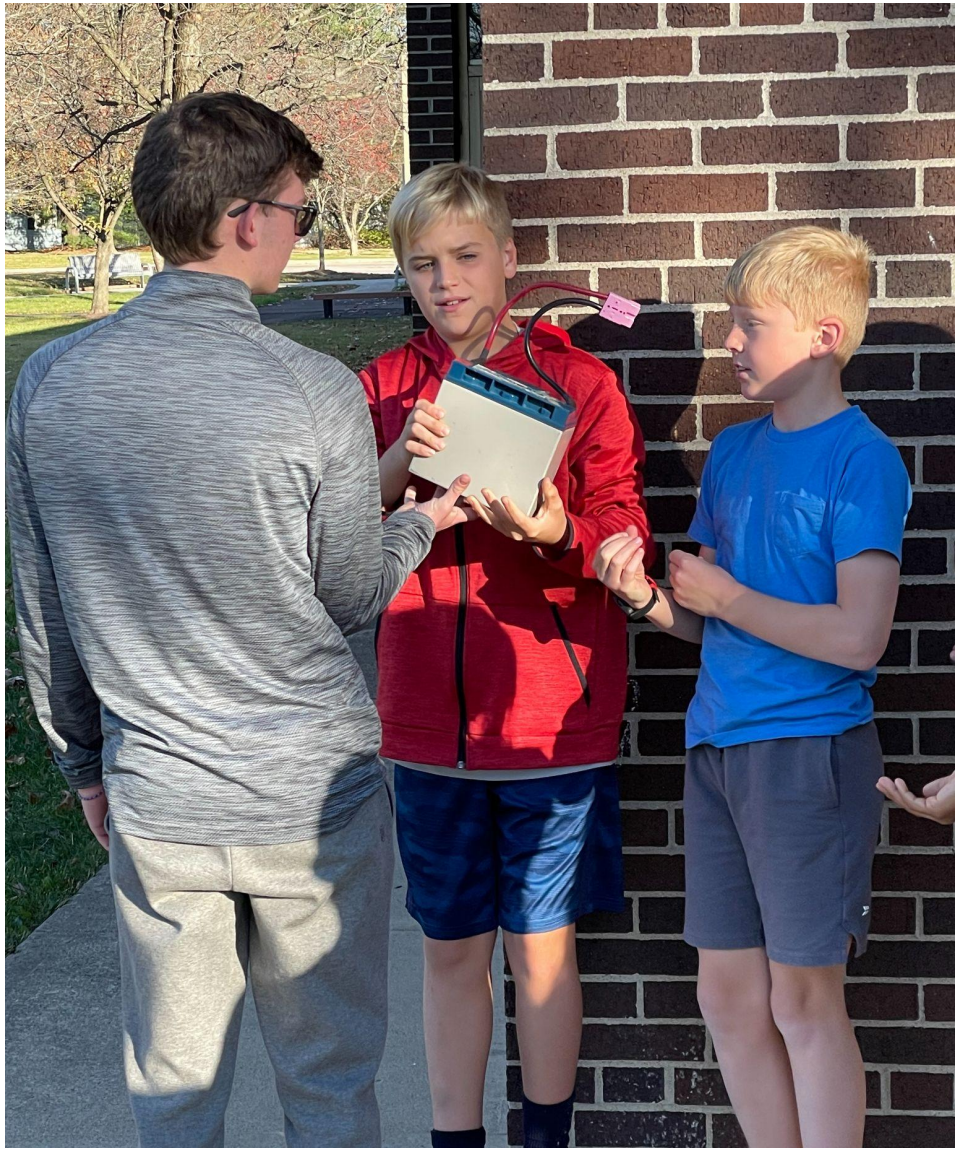
Team Number: 4145

ID-071

Team Name: The WorBots

Team Number: 4145

ID-072



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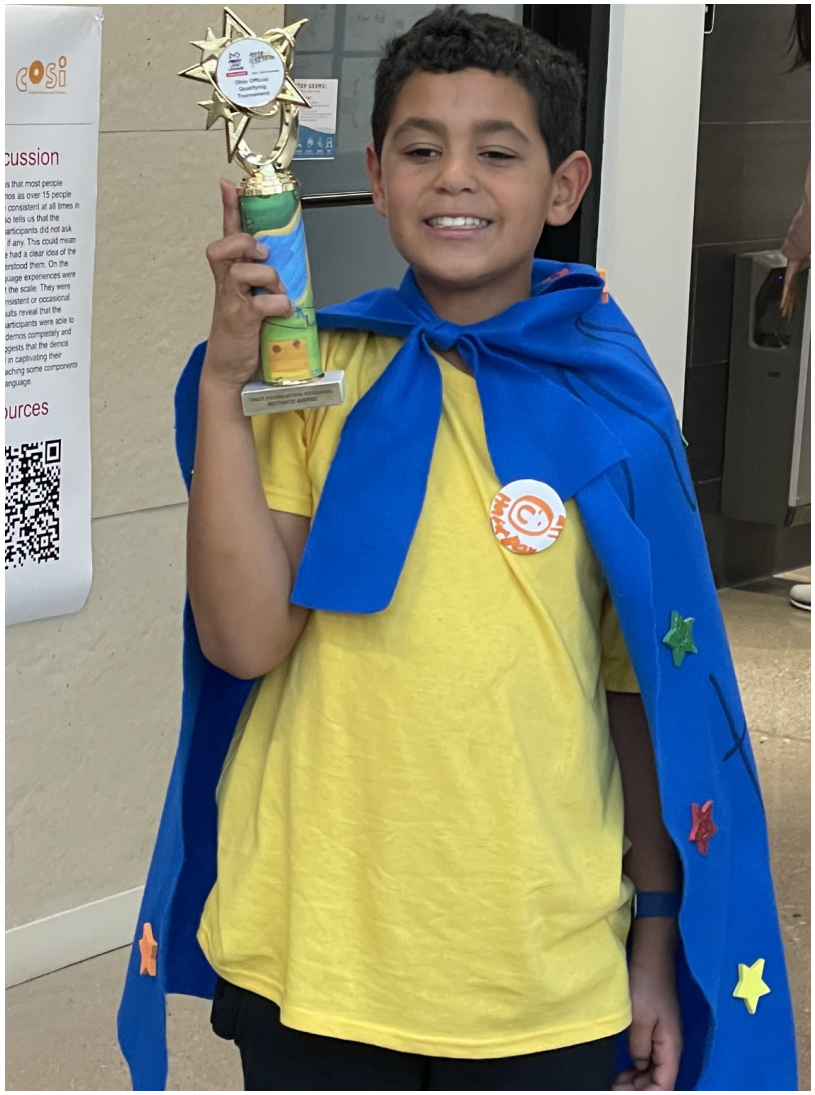

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ID-074

Team Name: The WorBots

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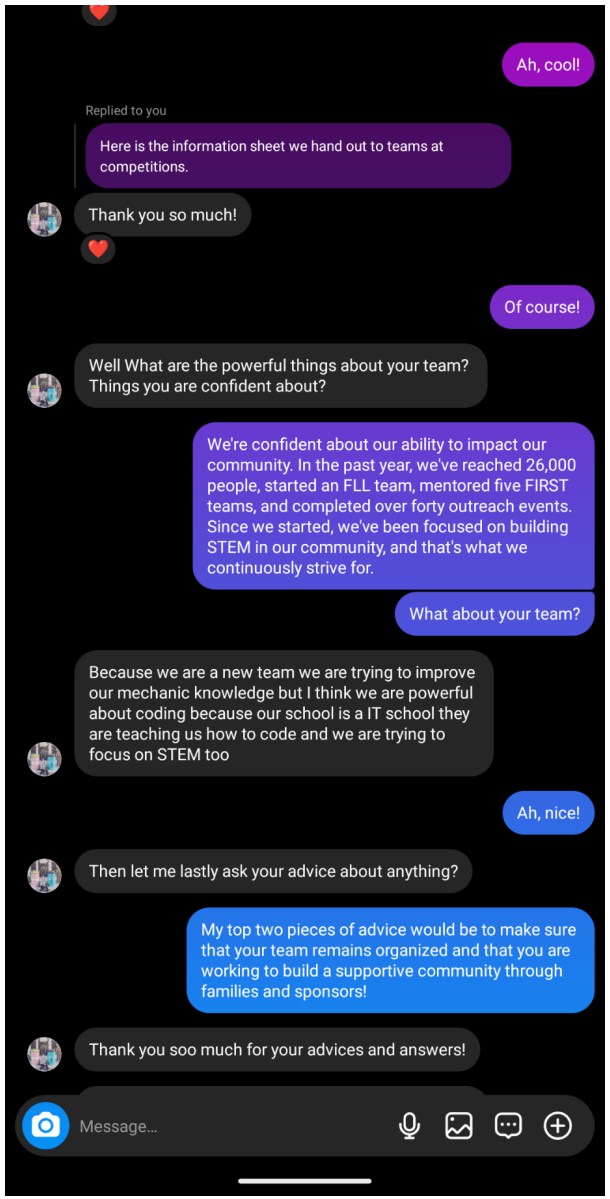

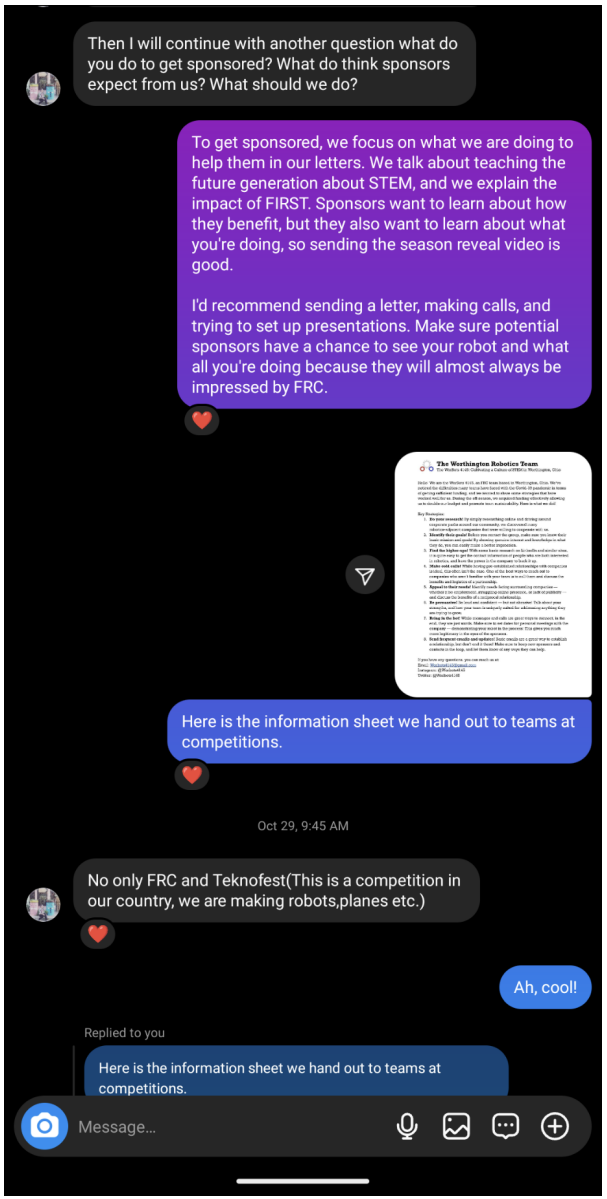

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Team Number: 4145

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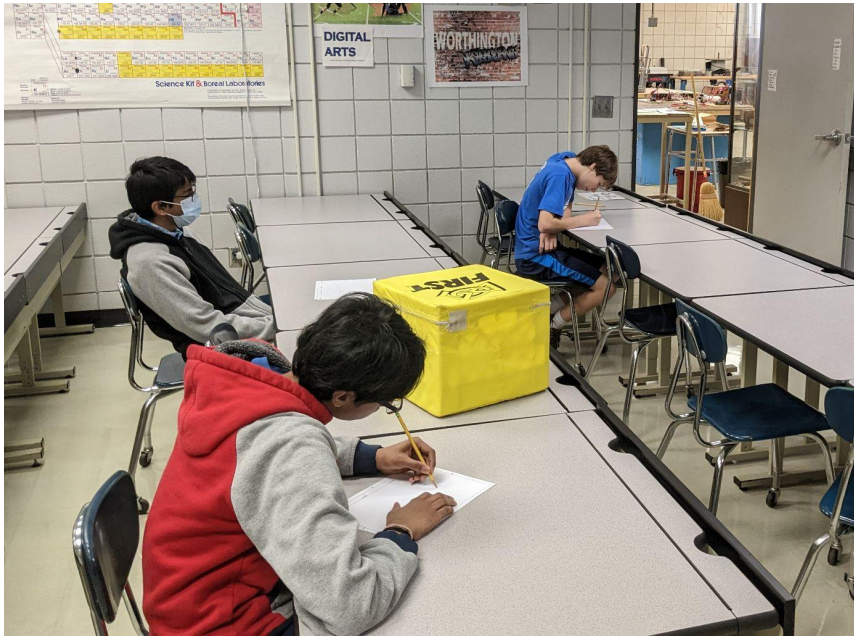

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Team Number: 4145

ID-077

Team Name: The WorBots

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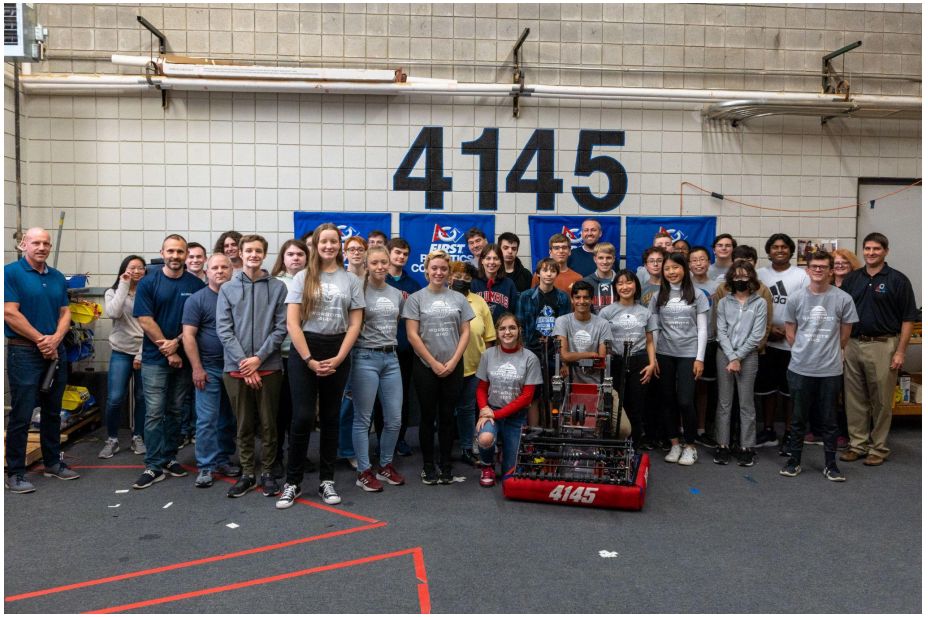

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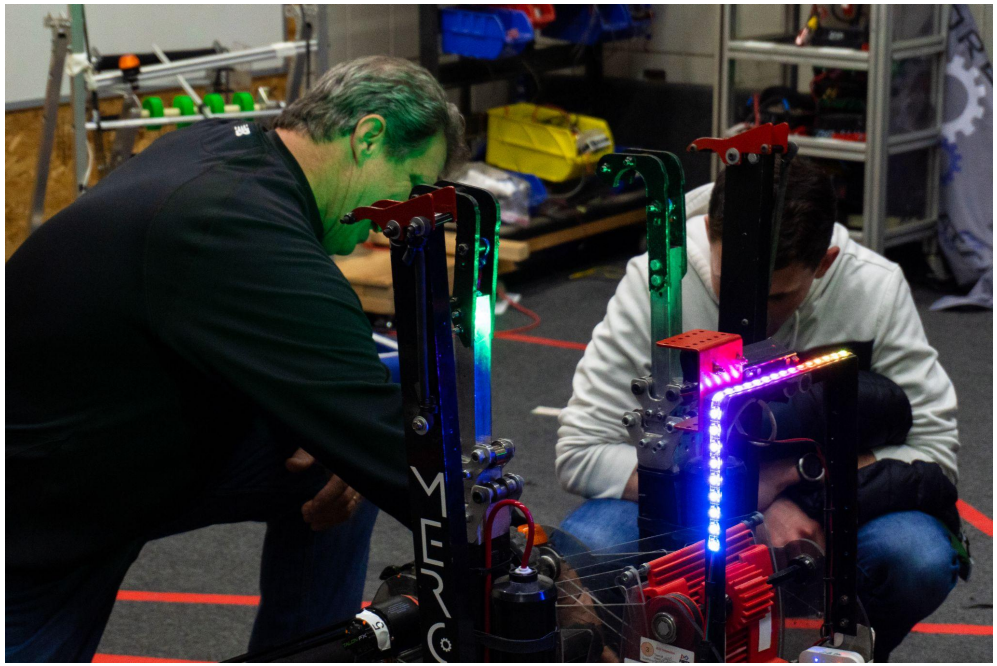

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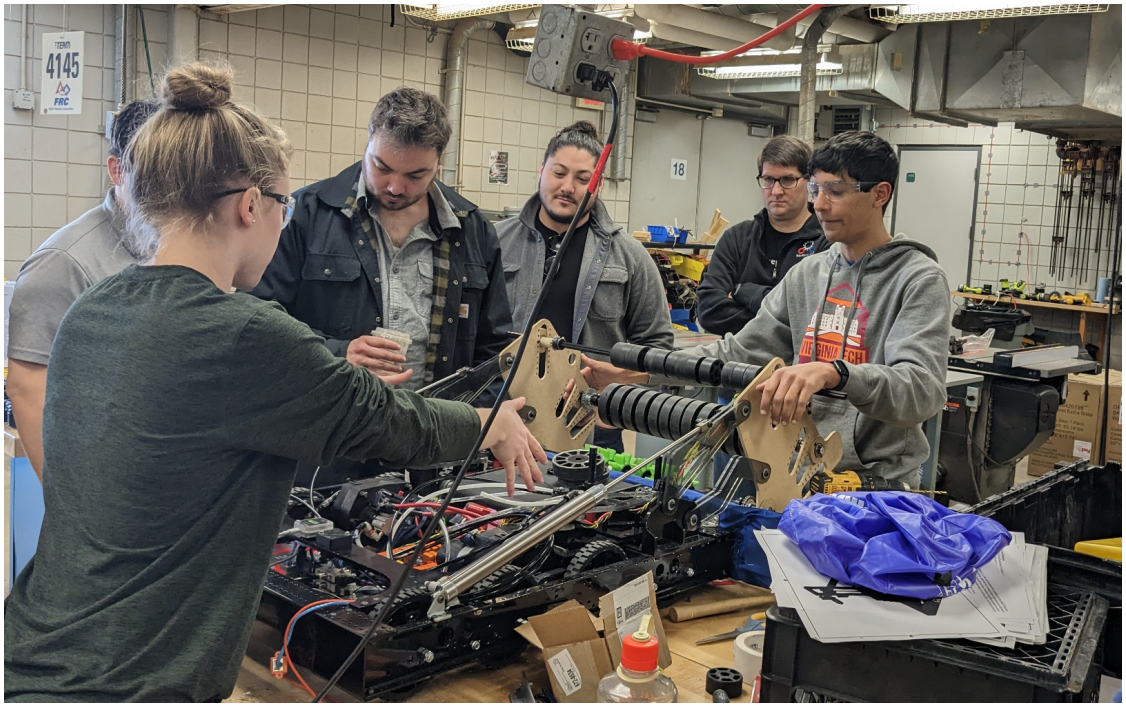

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ID-083

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Team Number: 4145

ID-084

Team Name: The WorBots

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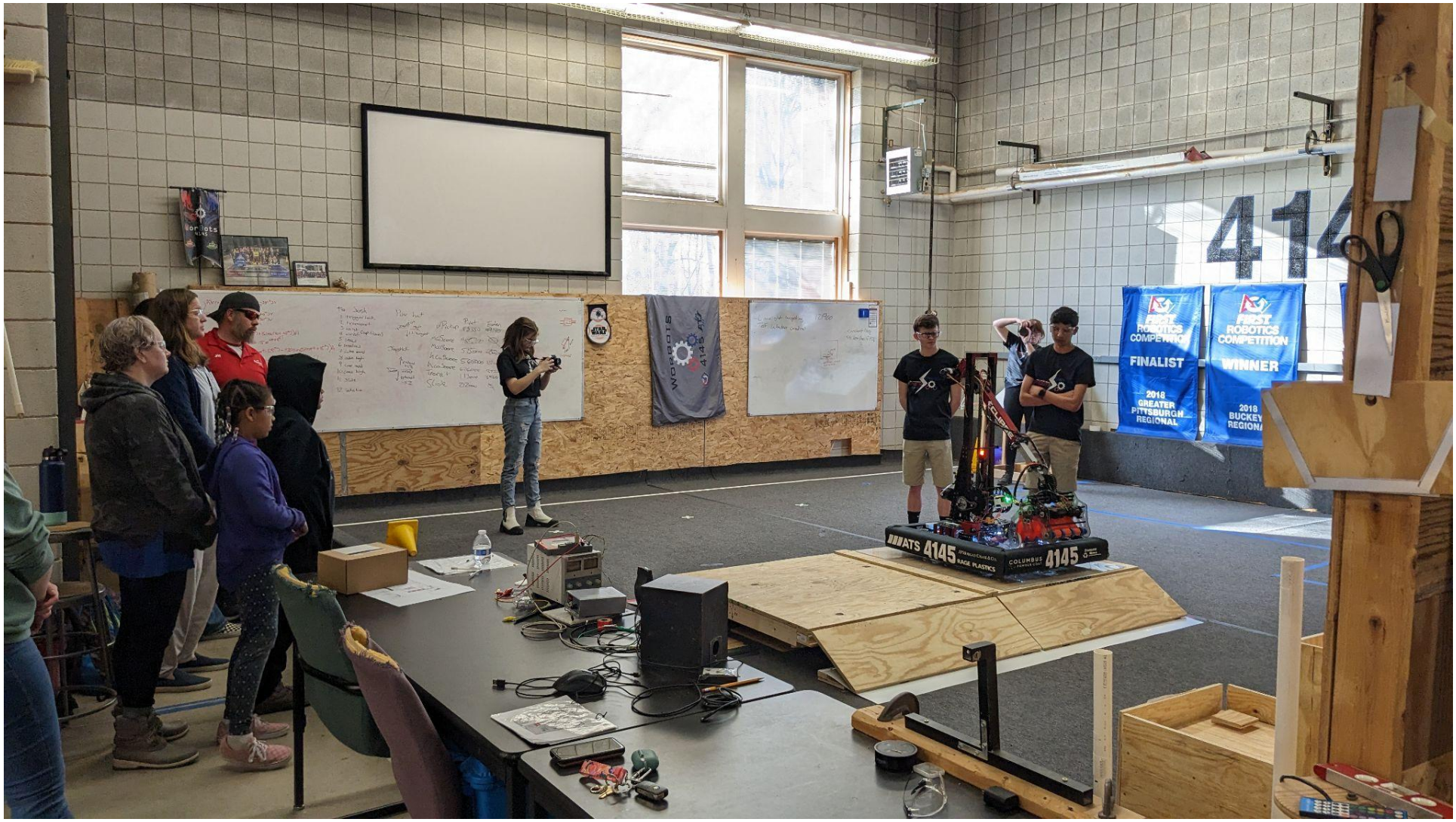
Team Number: 4145

ID-086



Team Name: The WorBots

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ID-087

Team Name: The WorBots

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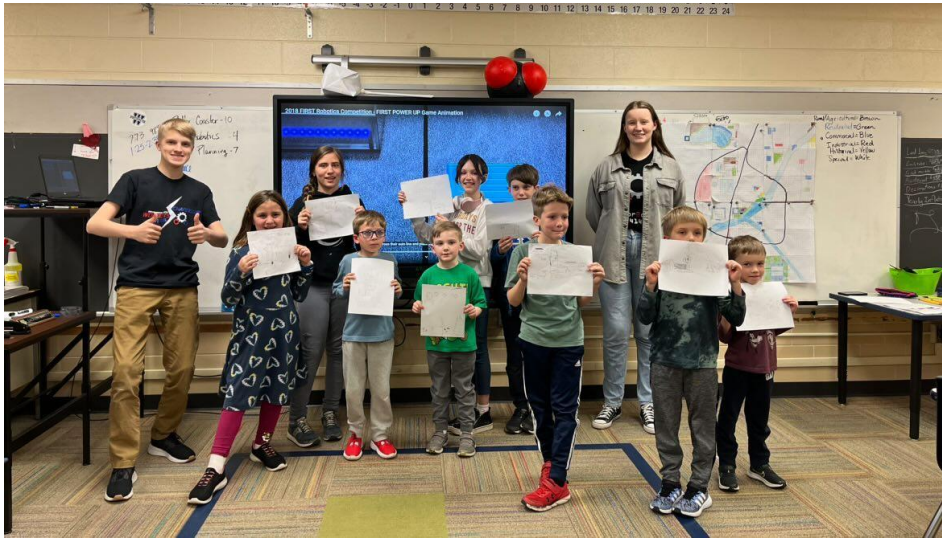
ID-088

Team Name: The WorBots

Team Number: 4145

ID-089



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