Ohio Senate Finance Committee

June 2, 2021

FY2022-2023 State Budget – House Bill 110

Testimony by Nishant Chittari, Keith Moody, Aditya Chittari, Evan Garner, and Dana Stan

Good afternoon Chairman Dolan, Vice Chair Gavarone, Ranking Member Sykes, and honorable members of the Senate Finance Committee, thank you for the opportunity to provide testimony on House Bill 110.

My name is Nishant Chittari, President of Full STEAM Ahead, a non-profit organization promoting STEM and robotics growth across Ohio. With me, I have Keith Moody, treasurer of Full STEAM Ahead, Aditya Chittari, team captain of The Antidote Robotics team, and Evan Garner and Dana Stan from The Antidote.

I'd like to start off talking about STEM. STEM stands for Science, Technology, Engineering, and Math. In a quickly advancing and changing 21st century, the education of STEM to our young students is more important now than ever. Since the early 2000s, STEM classes have been integrated within K-12 schools across the state. After twenty years, one would assume that enrichment opportunities for students to engage in would be equally distributed across all four disciplines, like the diagram on the left. However, the reality is more like the diagram on the right, where there are significantly more opportunities for students to grow in science and mathematics than in technology and engineering.

This is where the FIRST and VEX Robotics programs come in. Both these robotics programs help to bridge the gap within STEM and let students apply the science and math skills that they've learned in school to solve real-world problems, allowing students from kindergarten through twelfth grade to get hands-on technology and engineering experience.

FIRST and VEX robotics inspire young people to be science and technology leaders by engaging them in exciting programs that build science, engineering and technology skills

like mechanical, electrical, and software engineering that inspire innovation. Embracing these skills at an early age fosters well-rounded life capabilities such as self-confidence, communication, and leadership.

FIRST and VEX are more than just robots. These programs enable young people to develop valuable, transferrable, real-world skills, including creative problem solving, critical thinking, time & project management. They inspire our youth to become leaders and innovators, to compete in an increasingly connected and technologically advanced workforce. It is critical that interest in these areas be encouraged at a young age. We need challenging programs that nurture a productive and competitive Ohio. FIRST and VEX are those programs.

In a 4-year longitudinal study, kids who participated and engaged in any level of the FIRST programs showed significant gains in STEM activity, knowledge, and career interest in comparison to similar students from the same schools. Simply put, FIRST and VEX prepare students for life beyond high school, with alumni gaining skills and attitudes needed in today's workforce, ending up more confident in leadership roles and more prepared for college with 80% of alumni finding jobs in STEM fields.

For these reasons, we are testifying to gain the Committee's support in starting an "Ohio Robotics and STEM Advancement Grant". Our main goal is to support teams and participation in FIRST and VEX programs, with an emphasis on underserved populations in STEM. This grant will seek to relieve the financial burden on rookie and veteran teams. Supporting this initiative will increase the number of students demonstrating proficiency in STEM and increase the number of students who are college and career-ready upon high school graduation.

The proposed 4.3-million-dollar grant to Full STEAM Ahead would support and sustain 4,000 teams and 30,000 students across the 2022 and 2023 fiscal years. This grant would only fund up to a certain percentage of a team's budget based on the age of the team, where the rest must be self-financed through community fundraising and sponsorships.

At least eight states like Texas and Florida have successfully provided funding to offset the budget for FIRST and VEX teams, most notable of which being Michigan. In their last

fiscal year, Michigan provided 3.9 million dollars to subsidize costs for the 3,000 teams in their state.

This graph depicts the number of FIRST teams in the State of Ohio in the past ten years, and it is safe to conclude that STEM growth has been relatively stagnant.

We can compare this to the near-exponential growth in the number of FIRST teams in Michigan. It is clear that a Robotics and STEM Advancement Grant would greatly stimulate the number of STEM enrichment opportunities for students in a K-12 environment.

Full STEAM Ahead will ask for a five percent overhead fee to support the non-profit's vision and mission to motivate our community to embrace the world of STEM, while building self-confidence, knowledge, and life skills. This will cover volunteer compensation, legal and accounting fees, grants to support FIRST and VEX competitions, student scholarships, the Ohio Robotics Advocacy Conference, and other educational outreach opportunities.

On behalf of the FIRST and VEX robotics community in the State of Ohio, thank you once again for your time and the wonderful opportunity to testify today before the Senate Finance Committee. We would love to answer any questions you may have.

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FULL STEAM AHEAD
New Albany, Ohio

FIRST TECH CHALLENGE

Presented by Full STEAM Ahead and FTC Robotics Team 14320, The Antidote

FIRST

VEX ROBOTICS

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STEM in School

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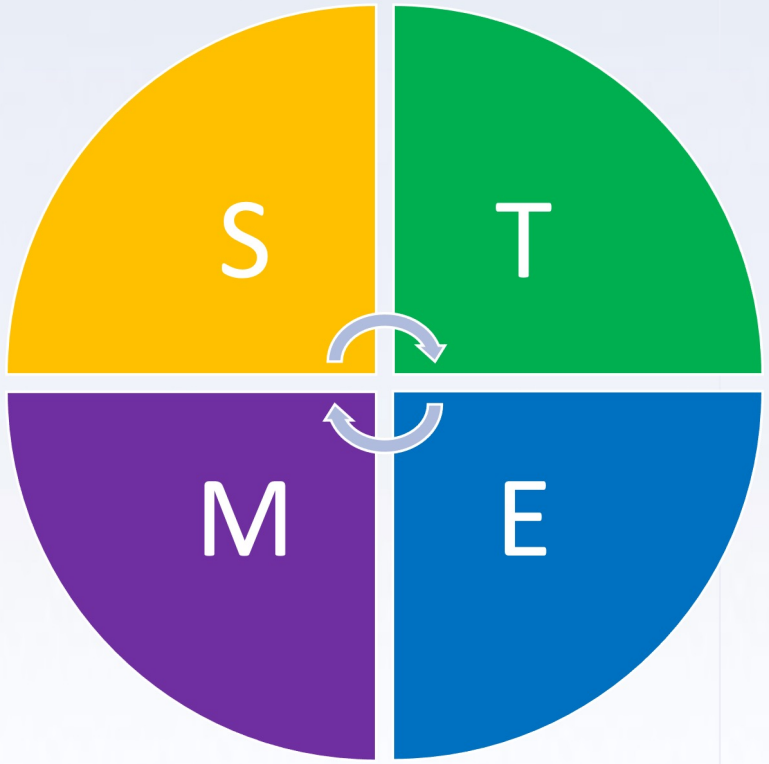
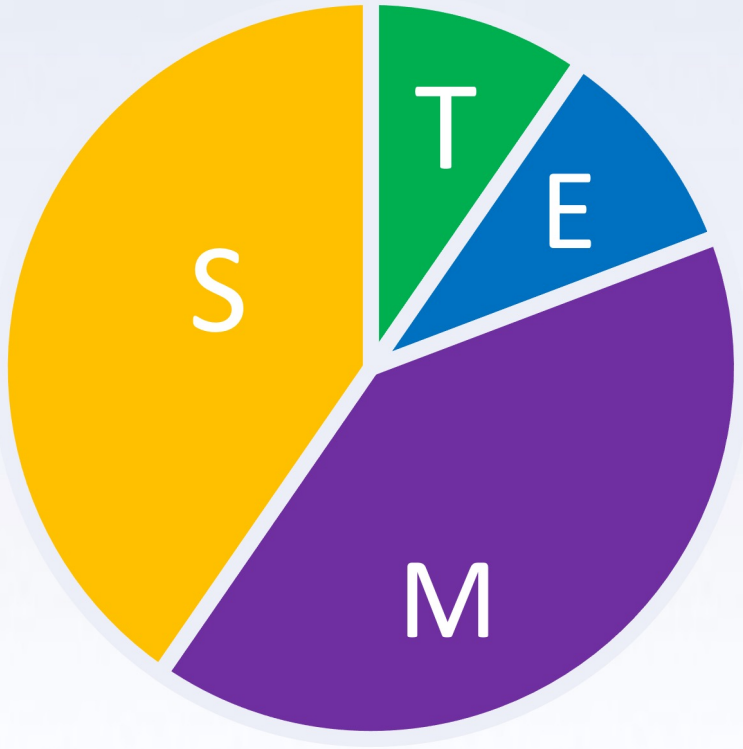
New Albany, Ohio



Expectation



Reality

I'd like to start off talking about STEM. STEM stands for Science, Technology, Engineering, and Math. In a quickly advancing and changing 21st century, the education of STEM to our young students is more important now than ever. Since the early 2000s, STEM classes have been integrated within K-12 schools across the state. After twenty years, one would assume that enrichment opportunities for students to engage in would be equally distributed across all four disciplines, like the diagram on the left. However, the reality is more like the diagram on the right, where there are significantly more opportunities for students to grow in science and mathematics than in technology and engineering.

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K-12 STEM Programs

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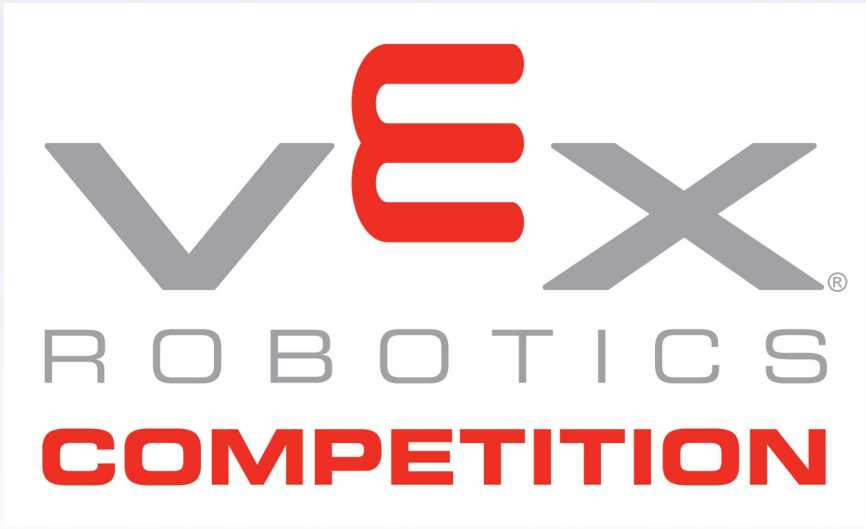
New Albany, Ohio

FIRST Robotics



VEX Robotics

This is where the FIRST and VEX Robotics programs come in. Both these robotics programs help to bridge the gap within STEM and let students apply the science and math skills that they've learned in school to solve real-world problems, allowing students from kindergarten through twelfth grade to get hands-on technology and engineering experience.

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STEM Skills

FULL STEAM AHEAD
New Albany, Ohio

FIRST and VEX robotics inspire young people to be science and technology leaders by engaging them in exciting programs that build science, engineering and technology skills
like mechanical, electrical, and software engineering that inspire innovation. Embracing these skills at an early age fosters well-rounded life capabilities such as self-confidence, communication, and leadership.

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MORE THAN ROBOTS

FULL STEAM AHEAD
New Albany, Ohio

- ***STEM Awareness, Skills and Intent***
  - Increase the number of students who pursue post-secondary education and careers in STEM-related fields and industries
- ***Innovation and Entrepreneurship***
  - Inspire youth to become leaders and innovators in their field and society
- ***21st Century Work-Life Skills***
  - Enable young people to develop valuable, transferrable, real-world skills, including: teamwork, leadership, creative problem solving, critical thinking, time & project management, and communication/presentation skills

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FIRST and VEX are more than just robots. These programs enable young people to develop valuable, transferrable, real-world skills, including creative problem solving, critical thinking, time & project management. They inspire our youth to become leaders and innovators, to compete in an increasingly connected and technologically advanced workforce. It is critical that interest in these areas be encouraged at a young age. We need challenging programs that nurture a productive and competitive Ohio. FIRST and VEX are those programs.

FIRST® Longitudinal Study

48-month Results of Brandeis University-led Study

FIRST participants are significantly more likely to show gains on each STEM-related measure in the study than the comparison group.

Note: Impacts are relative to comparable subgroups in the comparison population with similar backgrounds and achievement in high-school math and science.

In a 4-year longitudinal study, kids who participated and engaged in any level of the FIRST programs showed significant gains in STEM activity, knowledge, and career interest in comparison to similar students from the same schools. Simply put, FIRST and VEX prepare students for life beyond high school, with alumni gaining skills and attitudes needed in today's workforce, ending up more confident in leadership roles and more prepared for college with 80% of alumni finding jobs in STEM fields.

Advocacy

- **Our Goal**: Make government funds available to teams and support participation in robotics programs, with an emphasis under-represented and under-served populations in STEM
- Increase the number of pupils demonstrating proficiency in STEM and increase the number of pupils who are college- and career-ready upon high school graduation.

For these reasons, we are testifying to gain the Committee's support in starting an "Ohio Robotics and STEM Advancement Grant". Our main goal is to support teams and participation in FIRST and VEX programs, with an emphasis on underserved populations in STEM. This grant will seek to relieve the financial burden on rookie and veteran teams. Supporting this initiative will increase the number of students demonstrating proficiency in STEM and increase the number of students who are college and career-ready upon high school graduation.

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Grant Amounts

FULL STEAM AHEAD
New Albany, Ohio

2021 - 2022				2022 - 2023		
	Num of Teams	Grant Total			Num of Teams	Grant Total
FRC	94	$387,200		FRC	115	$476,000
FTC	124	$189,900		FTC	149	$228,150
FLL	590	$374,500		FLL	708	$449,400
FLL Explore	260	$91,000		FLL Explore	312	$109,200
VRC	528	$651,240		VRC	634	$781,920
VIQ	226	$114,100		VIQ	272	$137,400
FRC Worlds	5	$10,000		FRC Worlds	5	$10,000
FTC Worlds	6	$30,000		FTC Worlds	6	$30,000
VRC Worlds	15	$14,625		VRC Worlds	15	$14,625
VIQ Worlds	8	$7,800		VIQ Worlds	8	$7,800
2021 Total		$1,870,365		**2022 Total**		$2,244,495
	5% FSA Fee	$205,743.00		**Grand Total**	**$4,320,603**	

4,000 Teams **30,000 Students**

The proposed 4.3-million-dollar grant to Full STEAM Ahead would support and sustain 4,000 teams and 30,000 students across the 2022 and 2023 fiscal years. This grant would only fund up to a certain percentage of a team's budget based on the age of the team, where the rest must be self-financed through community fundraising and sponsorships.

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State-Level Examples

FULL STEAM AHEAD
New Albany, Ohio

- A growing number of state governments provide support to schools for *FIRST* teams:
  - Michigan: $2.5m (avg.) per year for past 3 years
  - Texas Workforce Commission: $1m per year for 7 years
  - Iowa Scale-Up Grants: Average of ~$275k per year for 5 years
  - Washington: Grew from $150k/year in 2011 to $700k/year in 2015
  - Oregon: $320k/year, up from $150k in 2011
  - Florida: $200k, new funding in 2016; increased to $500k in 2017
  - Wisconsin: $250k, new grant signed at 2016 FRC Regional event
  - New Hampshire: $375k toward *FIRST* in every school

Wisconsin Governor Scott Walker signed Assembly Bill 665 into law at the Opening Ceremonies of the 2016 *FIRST* Robotics Wisconsin Regional Competition

At least eight states like Texas and Florida have successfully provided funding to offset the budget for FIRST and VEX teams, most notable of which being Michigan. In their last fiscal year, Michigan provided 3.9 million dollars to subsidize costs for the 3,000 teams in their state.

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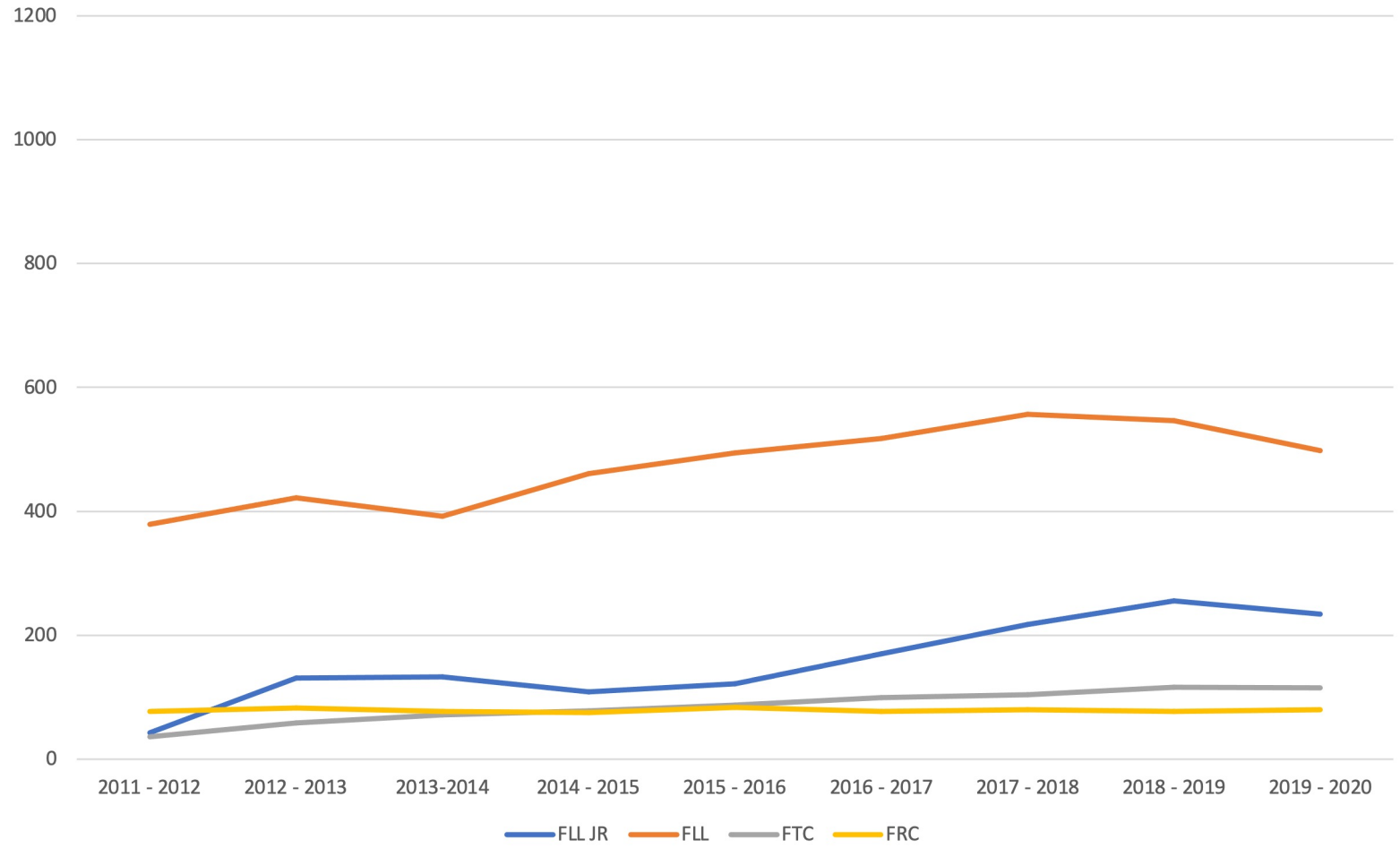
Growth in Ohio

FULL STEAM AHEAD
New Albany, Ohio



This graph depicts the number of FIRST teams in the State of Ohio in the past ten years, and it is safe to conclude that STEM growth has been relatively stagnant.

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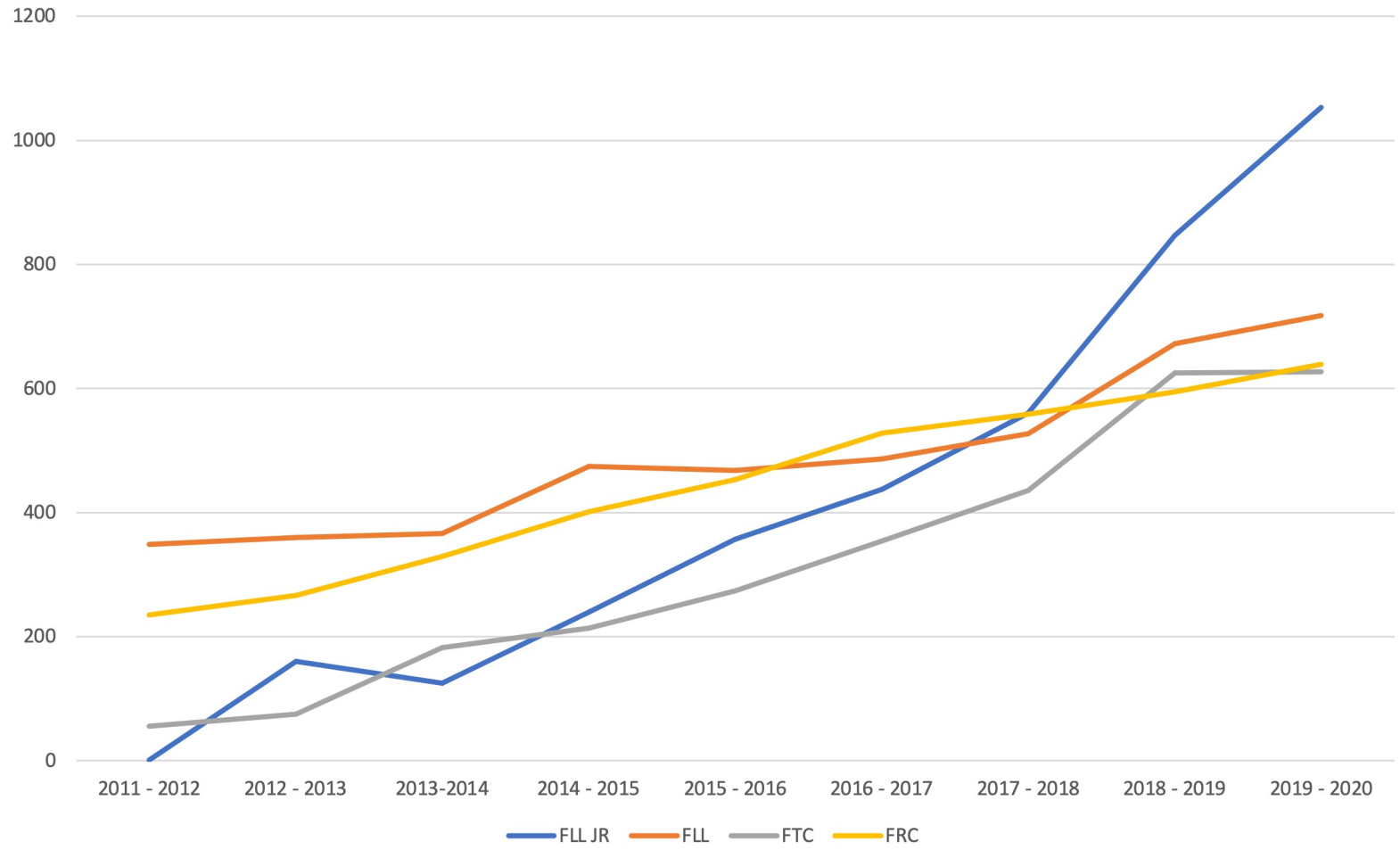
Growth in Michigan



We can compare this to the near-exponential growth in the number of FIRST teams in Michigan. It is clear that a Robotics and STEM Advancement Grant would greatly stimulate the number of STEM enrichment opportunities for students in a K-12 environment.

Overhead Fee

Full STEAM Ahead will ask for a 5% overhead fee based on the total grant amount going to teams. This fee will cover

- Volunteer Compensation
  - Processing 2000 applications in 30 days' time
  - Overall and financial consulting for all teams, with an emphasis on helping under-served and underprivileged teams
- Legal and Accounting Fees
- Grants to support struggling FIRST and VEX tournaments
- Student scholarship opportunities
- Ohio Robotics Advocacy Conference
- Other educational outreach opportunities

Full STEAM Ahead will ask for a five percent overhead fee to support the non-profit's vision and mission to motivate our community to embrace the world of STEM, while building self-confidence, knowledge, and life skills. This will cover volunteer compensation, legal and accounting fees, grants to support FIRST and VEX competitions, student scholarships, the Ohio Robotics Advocacy Conference, and other educational outreach opportunities.

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FULL STEAM AHEAD
New Albany, Ohio

Thank You

On behalf of the FIRST and VEX robotics community in the State of Ohio, thank you once again for your time and the wonderful opportunity to testify today before the Senate Finance Committee. We would love to answer any questions you may have.

FIRST

VEX ROBOTICS

The Ohio Robotics and STEM Advancement Grant Memorandum June 2nd, 2021

To The Ohio Senate Finance Committee

Short: To introduce a proposal of "The Ohio Robotics and STEM Advancement Grant" in pursuit of supporting engaging robotics and STEM educational programs for students of every background in the State of Ohio.

As we continue to return to our traditional learning environments, it is critical for students to have access to hands-on enriching curriculum and activities, particularly focusing on STEM. The job economy within Ohio and America continues to heavily shift towards skills learned in STEM environments. Greater access to programs that seek to develop and hone these skills will give students an edge in a competitive 21st-century workforce.

With programs such as FIRST Robotics and VEX Robotics, students are provided the opportunity to apply function-specific skills and expand their knowledge in robotics competition programs that build science, engineering, and technology skills to inspire innovation, and foster well-rounded life capabilities including self-confidence, communication, teamwork, and leadership.

FIRST and VEX Robotics also build community strength and good business principles by establishing real-world interactions with public and private entities as they strive to self-fund their robot and initiate STEM growth in their community and beyond. These programs instill pride and unity within teams, as many members, both new and old, come together from a variety of family backgrounds to achieve success.

The Importance of STEM, FIRST, and VEX

Robotics is more than just an after-school hobby for students to play with costly equipment. FIRST and VEX provide great opportunities for students to take an interest in STEM and apply it to real-life. This has proven to encourage students to pursue careers in STEM-related fields, inspire them to become innovators, and enhance their 21st-century workforce skills. Educating students in STEM fields will foster the next generation of leaders who are capable of designing and implementing solutions to many of the world's problems. For example, at the local and international level, young people with STEM degrees are working to develop treatments for diseases as well as generating ideas for sources of energy. Ultimately, their work will help to improve our lives. It is critical that interest in these areas be encouraged at a young age. We need challenging programs that nurture problem-solving and creative thinking. Robotics is one of those programs.

Criteria

Below are some of the minimum criteria a team must meet in order to be eligible for grant consideration:

- The team must register for at least one Ohio event.
- The team must fill out a comprehensive application form.
- The team must provide a final report at the end of the season detailing how state funds were utilized.

2021 - 2022			2022 - 2023		
	Num of Teams	Grant Total		Num of Teams	Grant Total
FRC	94	$387,200	FRC	115	$476,000
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The Ohio Robotics and STEM Advancement Grant

The "**Ohio Robotics and STEM Advancement Grant"** will appropriate funds to FIRST and VEX robotics teams based in the State of Ohio. Grants funded are intended to increase the number of pupils demonstrating proficiency in STEM skills who will be college and career-ready upon high school graduation.

The Team Grant will be used by teams to potentially cover the costs of competition registration, tools, materials, food, and other expenses needed to support the team.

The Coach Stipend will be distributed amongst the coaches of the robotics team as a "thank you" for their dedicated time to the program. Coaches may decide to waive the Stipend, and the corresponding amount will be added to the Team Grant.

Funds will be routed through Full STEAM Ahead, a 501(c)(3) non-profit organization founded in 2018, with the express purpose to support and fund robotics teams throughout Ohio. Full STEAM Ahead will have a direct and constant relationship with and report back to the State.

Robotics teams must undergo a comprehensive application process to be considered for grant money. The application will open each season on September 1st and close on November 1st, with results releasing on December 1st and funding distributed thereafter.

Each robotics team receiving a grant must register and compete in at least one Ohio tournament that season. Each robotics team must provide a final report describing how funding has made a difference for their team, and an itemized spending bill describing the usage of their Team Grant by June 1st following the completion of the team's season, or one month after the end of the team's competition season, whichever is earlier.

Each program will be allotted an adjustable budget in an "up-to" approach to be divided based on the age of the robotics team. If the number of teams applying for a competition grant exceeds the program's allotted budget, any unused funds from other programs will be redirected to fulfill the deficit. If this is not possible, the program's Team Grant and Coach Stipend amounts will be reduced to meet the deficit.

Teams that are determined to be under-served or underprivileged will be guaranteed the full Team Grant and Coach Stipend amounts. Full STEAM Ahead will commit to providing these teams with overall and financial consulting to ensure the team's success and comprehensive growth.

Full STEAM Ahead will ask for a five percent (5%) overhead fee to support the non-profit's vision and mission to motivate our community to embrace the world of science, technology, engineering, arts, and math, while building self-confidence, knowledge, and life skills. The overhead fee will cover volunteer compensation, legal and accounting fees, grants to support FIRST and VEX competitions, student scholarships, the Ohio Robotics Advocacy Conference, and other educational outreach opportunities.

Contact Information

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