

**Team Number**

1391

**Team Name/Nickname**

Metal Moose

**Briefly describe the impact of the *FIRST* program on team participants within the last five years**

The team has grown from a cohort of 15 students who mostly identified as “science people” to 40 students (37% women and 60% students of color) who come from a diverse student body, including student-athletes. Beyond the training in design engineering, our business, social media, strategic planning and access and equity teams have developed into a student driven team who pursue entrepreneurship for social good. College majors are science/technology (72%), and business and social action (28%).

**Describe the impact of the *FIRST* program on your community within the last five years**

Our growing team has heightened interest of our core values (science, technology, entrepreneurship and social impact) across the school. Our program has brought together students with a variety of backgrounds and social images. Students discover the thrill of confronting challenges and working collaboratively to create solutions. We are now one of the largest varsity teams at Westtown, and we are working to change the narrative with regard to robotics as driving force for development and leadership.

**Describe the team’s methods for spreading the *FIRST* message in ways that are effective, scalable, sustainable, and creative**

The message we fundamentally promote is that young people who do hard work with collaborative commitment can change the world. *FIRST* is the lens through which we create that narrative and exhibit achievement. We spread the message through our newsletter, robot demonstrations and teach-ins, social media and PR outreach to local print and TV media, and in creating networked partnerships with underserved communities of students outside our school.

**Describe examples of how your team members act as role models and inspire other *FIRST* team members to emulate**

We emulate cross-disciplinary excellence, resilience and joy in the pursuit of achievement. Rubi, who came to Westtown as a freshman scholarship student and is now a senior, worked for two years as an important part of our engineering team. Seeing the need for an energized cohort on our non-technical side, she worked tirelessly to create a business

team of committed students, and has promoted and guided a 200% growth over the past two years.

**Team's initiatives to help start or form other *FIRST* Robotics Competition teams**

The nature of Westtown's guidelines and requirements for students is such that we intentionally do not seek to help form new FRC teams – we simply do not have the time-resources required to do it well. Students are encouraged to participate in a wide range of extracurriculars each year, which diminishes student ability to focus on such a challenge. Our head coach, T. Steve, though, is a member of the FMA board of directors, and plays a role in helping to promote team growth in the district.

**Describe the team's initiatives to help start or form other *FIRST* teams (including *FIRST* LEGO League Jr., *FIRST* LEGO League, & *FIRST* Tech Challenge)**

The Metal Moose has begun a strong partnership with the Kennett Garage Youth Center, which serves marginalized families in the region. Through that partnership, we have created an initiative to train teachers and middle schoolers in the technology, spirit and ethic of the *FIRST* FLL program, and we are fundraising now to support FLL growth in the partnership. We will start up to eight FLL teams with Kennett Garage Youth and intend to have them competing in the region in next year's FLL season.

**Describe the team's initiatives on assisting other *FIRST* teams (including *FIRST* LEGO League Jr., *FIRST* LEGO League, & *FIRST* Tech Challenge) with progressing through the *FIRST* program**

Metal Moose and Westtown School have committed to supporting the region's FLL program by hosting an annual competition. The members of the Metal Moose help out with the organization, setup, concessions and volunteering, and clean-up. We commit resources of time and money (over \$2500 this year) and are honored to play a part in supporting the path for younger *FIRST* students to strive and achieve. We look forward to continuing to support the *FIRST* community by hosting this event for years to come.

**Describe how your team works with other *FIRST* teams to serve as mentors to younger or less experienced *FIRST* teams (including *FIRST* LEGO League Jr., *FIRST* LEGO League, & *FIRST* Tech Challenge)**

We currently work only with our school's FLL students, but once we have completed our fundraising and materials donations efforts, we will work the Kennett Garage Youth Center to develop the expertise (in both teachers and middle school students) and passion to launch up to eight new FLL teams next fall.

### **Describe your Corporate/University Sponsors**

Our sponsors come from a range of fields of business, from textiles printers to air defense contractors. Whether large or small, our donors provide the basis for a sustainable program over years. Current donors are Adaptive Textiles, Arnold Investment Group, Bentley Systems, Boeing, PetRad Veterinary Imaging, Superior Technology, TE Connectivity and Westtown School

### **Describe the strength of your partnership with your sponsors within the last five years**

Our corporate sponsors have sustained their commitment to the team over the past five years, demonstrating their support of and appreciation for what the Metal Moose is achieving. Our newest sponsor, TE Connectivity, came on board after the team participated in a demo day and volunteer signup at TE headquarters. Beyond corporate sponsorship, over the past five years we have averaged 127 individual donors per year that generate a funding pool of \$8K-\$11K yearly.

### **For *FIRST* Robotics Competition teams older than 5 years, briefly describe your team's broader impact from its inception,**

Metal Moose has played a critical role in increasing interest and diversity of STEM at Westtown School. This year the team is 37% women, 60% people of color, and 35% international students. Our community impact is through our outreach presentations (Alumni Weekend, Lower School Space Day, STEAM Day KOP Mall demo competitions, etc.) and in our Good Robot Challenge, which has provided opportunities for marginalized people across a wide range of partnerships, both regionally and internationally.

### **Describe how your team would explain what *FIRST* is to someone who has never heard of it.**

*FIRST* opens up a real-world experience to young, innovative, and inspired students who want to make a difference in the world. Not only does *FIRST* help improve technological ability, but it is also a family space where students can obtain the life-long friendships with students and mentors. With support from local and national sponsors, students on teams in *FIRST* are growing into future innovators who can, and will, make a difference for good in the world.

### **Briefly describe other matters of interest to the *FIRST* Judges, if any**

Over the past four years, our annual Good Robot Challenge has collected backpacks of school supplies that allowed 158 children in Batey Libertad (Dominican Republic) attend school for the first time. We paid a full year's university tuition in the DR for a student from the Batey, we've raised funds and awareness to support Pagus: Africa in their work

for clean water, and we are supporting the development of FLL programs for local youth with the Kennett Garage.

**Outline the team's growth and accomplishment over time.**

The robotics team was begun in 2004 with six students, and has grown steadily over the past 15 years. At forty students, nearly 12% of Westtown's student body participates in the robotics program. As the team has developed, we have sought to engage and welcome a diversity of students.

In the past 15 years, the robotics team has won 25 awards for robot performance, technical sophistication, programming, industrial design and competition achievement. The team has qualified and competed at the FIRST World Championship eight times, and most notably 5 of the last 6 years. Recently the team has won "culture" awards (Engineering Inspiration and Chairman's Award) that honors teams the FIRST organization considers to be leaders in all facets of their work and worthy of emulation by other teams.

## **ESSAY**

Since 2002, the Metal Moose has prided itself in being a team that values collaboration, innovation, and critical thinking, and has been committed to inspire others by science and technology. To us, *FIRST* is obviously more than just robots, as it also embodies and promotes teamwork, education, and community. These are all of the things that our team takes into account when considering how we can leave an impact on others in the world.

Our outreach efforts can be summarized by saying, we are trying to “transform the culture” surrounding science and technology, and more specifically, trying to change the culture around *FIRST* Robotics. Although not 100% of our outreach initiatives are focused on *FIRST* programs, there are still many other ways we are trying to spread the ideals of *FIRST* and promote STEM to a wider community.

## **HOSTING EVENTS**

Annually, we run an FLL event for local teams to compete in as well as a *FIRST* Mid-Atlantic District FRC event. Each year, both events together bring in thousands of people. Our team members are instrumental in setting up everything for the events—like FLL practice tables, laying down masonite, carpets, and fields, and organizing concession stands. Many of our team members also will serve as volunteers at the events, contributing to all of the necessary functions of an event (primarily the FLL event since we compete in the FRC event). Regarding the FLL event, we are proud to be contributing to the future of younger students, and we also work to encourage them to value the robotics community and become great members of FRC teams. Running these events provides the

chance for our team members to embody the spirit of collaboration and effective communication, and also allows us the opportunity to give back to *FIRST*.

## **OUTREACH**

This year, we established a new subgroup, called Access & Equity, as part of the business branch of our team. This subgroup was created to bring a new level of organization to the team's outreach, and to ensure we can sustain what we have been doing in the past, and to expand and rethink for the future. The mission of the Access & Equity subgroup is to spread STEM to local students, especially to those who are part of underprivileged communities. The members of the Metal Moose realize that we all live with some degree of privilege, among which is the very real fact that we understand the power of learning, have access to great educational opportunities like *FIRST* Robotics, and through good education we have the power to create our futures. This is what empowers us to use the resources we are so grateful to have to provide what we see as the beauty of STEM and education to those who are underserved.

The student-run Access & Equity group dove right into their ventures with the start of the season, and the result is the development of a partnership between the Metal Moose and the Garage Youth Center of Kennett Square, Pennsylvania. The Garage is an organization that provides a structured after-school environment for middle and high school students who are primarily from low-income families. Over the past months, members of our team have been meeting with representatives from The Garage to develop a Metal Moose-sponsored after school program that will encompass *FIRST* programs, as well as tutoring in STEM subjects. On a weekly basis, a select group of Metal Moose members meet with students at The Garage to not only tutor them in STEM, but also introduce them to LEGO Mindstorm Robotics. Along with this, our team recently donated 20 Surface Laptop/Tablets to The Garage, and will be launching a *FIRST* Lego League program and competition teams in the coming months.

Over the past four years, alongside running our *FIRST* Mid-Atlantic Regional FRC event that attracts more than 3,000 competitors and spectators, we have pioneered our **Good Robot Challenge**, which seeks to leverage the power of numbers to collaboratively create social good. In our first three **Good Robot Challenges**, the Metal Moose and teams across the district supplied 158 backpacks filled with school supplies to elementary school children living in Batey Libertad in the Dominican Republic, paid university tuition for a Batey Libertad student, and supported Pagus:Africa in their work providing fresh water and learning opportunities in Ghana. This year's **Good Robot Challenge** will be similarly supporting The Garage Youth Center, and we hope to outfit the students there with necessary school supplies, financial donations, and the full set of Lego Mindstorms (and

registration fees) for up to eight new FLL teams next Fall. Our annual 'Good Robot Challenge' media blast has been reprinted in 73 online news spaces in 17 countries over the past four years.

### **FIRST/STEM ADVOCACY**

In 2014, The Metal Moose was a vital advocate for the creation of a new science facility at Westtown School. As part of the consideration of constructing the new building, members of the Metal Moose gave a presentation to the Westtown Board of Trustees board of trustees about all of the work that our team participated in, and how valued STEM is as a part of *FIRST* programs. Our team's presentation served as an inspiration to the Board and was one of the deciding factors for them to approve the project. In their fundraising narrative, and subsequently in our curriculum, the *FIRST* model of learning based on authentic, challenging and cross-disciplinary collaboration emerged as a central organizing focus. As a result we have a beautiful building on campus that has greatly expanded our science resources and compels many students to become more engaged with STEM, or even join our *FIRST* Robotics program.

After our final competition, we do not put our robot into storage until the next year's build season. In many of our off-seasons, we utilize that year's robot for demonstrations at open houses, Alumni Day, and to inspire our youngest elementary school students. Last year, members of our team took our robot to be part of the elementary school's space day, a day of exploration for young students to learn about the greater world of science. We have presented to corporate sponsors, participated in the Philadelphia Science Fair, and our team has developed projects outside *FIRST* realm. For three years we have worked in the development of a myoelectric prosthetic hand for a student in our middle school, we have designed and supplied a mechanical prosthetic hand to a different student in the region, and teams of independent study students are working on soft robotics, autonomous lake monitoring robots, and empathy kits that teach people what children endure when suffering from Limb Girdle Muscular Dystrophy. All of these events and efforts not only allow us to spread the message of what *FIRST* teaches about teamwork, resilience, and management of resources, but also allows us to inspire many others about the possibilities that are encompassed in the world of STEM.

Over the years, we been developing ways to enforce a positive culture surrounding *FIRST* Robotics, and one of these methods is our periodic newsletter, dubbed "Moose News". The purpose of this newsletter is to give a wider community insight on what we as a team accomplish, and also to dispel some of the myths and stereotypes about a *FIRST* Robotics team. Oftentimes, non-team members see us as a typical clique of robot nerds, and that description does not personify us as a team. With our newsletter, we hope to

show that *FIRST IS* more than just robots, by highlighting the work of our business groups, our community outreach, as well as the work of our traditional engineering team. Additionally, we have begun work on a series of inspirational videos that shines light on the many pathways to STEM careers for women, students of color, and all people who wish to make a difference in the world. Our first video, currently in production, is an interview with Corryne Dech, a young Westtown alumna, who talks about her life in high school and college, and her trajectory to now working with Google in Silicon Valley. As we develop our series further, we'll post on our YouTube channel and as a podcast, and trust this work will be another resource to inspire young minds across the world.

### **DIVERSITY**

The Metal Moose is proud that we are a diverse team and that we are able to represent many people around the world. As we say in our concluding statement of our Chairman's video, "We know that the next generation of engineers and scientists must work together to tackle a host of important challenges, despite coming from vastly different backgrounds, and speaking many languages. We've decided to make sure this amazing, diverse future is successful, starting today.