

Woven through rolling hills and cascading valleys of West Virginia (WV) is a culture that inspired generations – one that embraces grit, hard work, and innovation. Mountaineer Culture laid the groundwork for breakthroughs ranging from steamboats to pepperoni rolls. While this culture provides a sturdy framework for success, it is not perfect. The Mountain State has the nation's fourth highest poverty rate and is known for its hostility towards members of the LGBTQ+ community, despite having the highest per capita rate of transgender youth in the nation. Further, much of WV remains stagnant in job growth and only 52.4% of its high school students pursue post-secondary education, illustrating a substantial loss of opportunity. Mountaineer Area RoboticS (MARS) strives to be the inspiration embodied by the best of Mountaineer Culture, by expanding social, economic, and geographic opportunities in STEM through implementing hybrid outreach, rebuilding FIRST programs, and enabling team growth.

EXPANDING OPPORTUNITY WITHIN OUR COMMUNITIES

Statewide impact begins in our communities. Since the pandemic, we have encouraged interest in STEM through traditional and socially distanced methods of outreach. By utilizing digital resources developed during the pandemic to address economic and geographic barriers, we are reaching a new audience with STEM education. One of our primary outreach initiatives involves engaging activities called STEMcrafts that demonstrate basic technical skills, such as circuitry and motor mechanics. This initiative includes mailing STEMcraft kits across the state with links to their instructional videos. These videos explain each STEMcraft and the science behind them. Using this Hybrid Model of Outreach, MARS distributed 2,291 STEMcrafts and impacted a total of 18,944 individuals between 2020-2023. We also expanded our use of STEMcrafts to be more accessible to individuals with disabilities. Via partnerships with organizations such as Therapy Services, STEMcrafts are being used to refine patients' motor skills while exposing a more diverse audience to STEM.

Also, we are restructuring our digital presence on social media platforms by offering free, online STEM education—anytime, anywhere. Our digital arsenal consists of LabView programming tutorials, promotional materials, and a read-aloud of a MARS storybook, *Marvin's Mighty Mission*. MARS has donated copies of *Marvin's Mighty Mission* to more than 10 organizations ranging from schools to children's hospitals. Inspired by this success, MARS is currently producing a comic book geared toward middle school students. This new comic book instills FIRST Core Values and includes a nonbinary main character, representing a broader effort toward inclusion. By integrating STEM in our local community and throughout the state, along with focusing on groups that have traditionally been left out of STEM, we continue to pioneer STEM opportunities in WV with a record-breaking 58 outreach events in 2022.

EXPANDING OPPORTUNITY WITHIN FIRST

We are using our visibility and connection to FIRST to lay the groundwork for life-changing STEM opportunities. With 45% of MARS students being FIRST LEGO League alumni, we are aware of the obstacles that exist when starting a new team. To combat these challenges, we funded 5 FIRST LEGO League Challenge (FLL-C) teams in the past 2 years, raising \$800 per

team to cover registration, robot kits, and more. Lifting the financial burden is just the beginning of our work with these teams. MARS students and adult mentors act as coaches for local FLL-C teams. MARS also holds FLL mentoring sessions and scrimmages and provides assistance and judging for the FLL-C and FLL Explore (FLL-E) state tournament. Additionally, this fall we transformed our storage and practice facility into the MARS Innovation Building. Since then, we have hosted 20 outreach events, 4 FLL-C mentoring sessions, and an FLL-E scrimmage in that space. The building is currently used for weekly FLL-C practices for 4 teams, a weekly MARS drone team practice, and a FIRST Robotics Competition (FRC) practice field that we invite other FRC teams to utilize. In less than a year, we have logged more than 200 hours of STEM education in the building and offered FIRST teams and coaches more continuity and stability.

To further support the FIRST community, we utilize our Tucker Teams initiative. Named after our late founding mentor, Phil Tucker, Tucker Teams is undertaken at our FRC events where we offer other teams technical assistance, extra materials, and new perspectives. During the pandemic, we created the Tucker Teams Digital Help Desk where teams could go to our website to submit any questions they have or schedule a virtual meeting with our students and mentors. With the hybrid implementation of Tucker Teams, we aided more than 135 teams in 2022, ranging from assisting a Brazilian team with their writing strategies over Zoom to helping a New York team with robot construction at a regional competition.

We are also creating excitement about FIRST through expanding accessibility. In 2020, MARS adapted our famed 26-hour and 14-minute offseason event, West Virginia Robotics eXtreme (WVRoX), to the digital World Wide West Virginia Robotics eXtreme, an overnight celebration of FIRST at a time when positivity was desperately needed. Partnering with FIRST Updates Now and other FRC teams, we held hour-long segments including Minecraft building competitions, Solidworks tutorials, and brownie bake-offs. Two years later, WVRoX came back full force, in person, with MARS hosting 22 teams at the world's only robotics endurance event. To prioritize an inclusive environment, 2022's WVRoX featured designated quiet rooms for participants to escape overstimulation while still enjoying the excitement via Twitch streaming and gender-neutral bathrooms throughout the venue, ensuring participants felt as comfortable as possible. Further, this year we became FIRST Menstrual Equity Ambassadors and will provide period products at our 2023 regional competitions. By being active members in the FIRST community we are building a bridge between STEM interest and FIRST involvement.

EXPANDING OPPORTUNITY WITHIN MARS

By addressing economic injustice, social inequity, and geographic barriers, we are using the values of FIRST to maximize the potential of our members. In order to remove individual financial concerns, MARS is free to join for all. This opens the door for students to advance their concrete skills in important technical and nontechnical areas. Further, with an understanding that one thrives in an environment where one feels comfortable, we established a Diversity Committee to ensure that we are promoting equality within MARS. Our Diversity Committee is charged with annually reviewing our newly drafted Equity Action Plan which identifies goals and initiatives designed to make MARS a safe space where everyone can confidently pursue their

interests. Moreover, we strive to promote an inclusive environment within the family culture of MARS. Through long practices, group meals, and countless non-FIRST related get-togethers MARS becomes a support system for many members. In addition, to maximize the reach of personal development opportunities present at MARS, we admit students from 5 counties, which provides a wide diversity of thought and background when approaching problems.

These ideals are further fostered by our major team initiatives, such as the MARS Innovation Process (MIP). MIP is a new build season principle that places an emphasis on student-led projects. After the initial design of the robot is agreed upon and built, students can model, prototype, and test new iterations of the robot's subsystems. Once students have created new designs, they must prove why they are better than what is currently on our robot. This culminates in a presentation to the Student Leadership Council, MIP Student Lead, and Lead Technical Mentor who then decide if the iteration gets integrated. MIP encourages skill refinement providing experiences that translate throughout students' lives.

Along with giving MARS students the tools they need to succeed, we also instill a duty of service within them, with 100% of MARS students volunteering at outreach events. This sense of duty invigorates students to care for their communities and strive to improve them.

EXPANDING OPPORTUNITY FOR ALL

Focusing our efforts on various communities, all of our projects, programs, and initiatives are part of the 5-step MARS Plan. First, we ENGAGE with our communities by expanding our visibility and establishing ourselves as active members within them. Through integrating STEMcrafts in classrooms and youth programs across North-Central WV and hosting large community events such as WVRoX, we successfully instill excitement for STEM education throughout WV. To facilitate bridging the gap from STEM interest to FIRST participation, we INSPIRE by directly seeding and coaching FIRST teams. We publicize the availability of our workspaces and the Tucker Teams Help Desk Initiative to SUSTAIN the impacts of Engage and Inspire. As students age, we promote the PROGRESSION OF PROGRAMS through combined FLL-E and FLL-C scrimmages. We also emphasize the use of our workspaces to house FLL-E, FLL-C, and FRC events and equipment, to give students a taste of what is in store for them in the next level of FIRST. As students reach MARS, we strive to CREATE LEADERS AND INNOVATORS by providing an accepting environment filled with opportunities to hone concrete and abstract skills. This has provided key opportunities to our students, evident in the fact that 97% of MARS alumni have pursued post-secondary education. President John F. Kennedy once said, "The sun doesn't always shine in West Virginia, but the people do." We are inspired to be the light that illuminates Mountaineer Culture, revolutionizes the state of WV, and impacts our communities and beyond.