

***FIRST* Impact Award - Team 5653**

2023 - Team 5653
Team Number
5653
Team Nickname
Iron Mosquitos
Team Location
Babbitt, MN - USA
Describe the impact of the <i>FIRST</i> 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 <i>FIRST</i> programs as mentors/sponsors.
100% of graduates pursued postsecondary education, 80% of which are pursuing a STEM degree. 40% are working towards an engineering degree. 5653 has inspired Alumni to assist 2 FLL teams, as well as volunteer at conference and week 0 events and even become a lead mentor for FLL team 32640. Over \$43,000 in scholarships were received based on FIRST activities including 2 Alworth scholarships.
Describe your community along with how your team addresses its unique opportunities and circumstances.
5653 hail from small communities with a hub town population of 1500. Our local industry is primarily mining and tourism. The K-12 school has a total of 200 students. Our team recruits from 4 schools; Northeast Range, Northwoods, Mesabi East and Ely High Schools. Collaborating over 1,000,000 acres is overcome by preseason training, multiple sites on weekdays and Saturday practices together. We participate in 5 unique community summer parades with robots to raise awareness over the area.
Describe the team's methods, with emphasis on the past 3 years, for spreading the <i>FIRST</i> message in ways that are effective, scalable, sustainable, and creative. How does your team measure results?
Our American Indian Science and Engineering National Conference robotics showcase reached 2,700 attendees, a record-breaking number for AISES. 5653 also showcased FIRST on full field at the MN School Board Association conference. We retrofitted a t-shirt cannon robot to deliver groceries during the pandemic. 5653 carves robot inspired snow sculptures at Ely Winter Festival to inspire connection to the art in STEAM and donates scrap aluminum to Vermillion Community College for casting.
Please provide specific examples of how your team members act as role models within the <i>FIRST</i> community with emphasis on the past 3 years.
5653's Grocery Robot pandemic response was featured on the 2020 FIRST Virtual Showcase and Dean Kamen mentions the project on the Disney+ documentary "More Than Robots". Students started and mentor FLL team 49192. We assisted by building a field map frame, arranging a permanent practice

room, donating bags of legos and purchasing a new base kit for 2022. 5653 won the 2020 Lake Superior Regional Gracious Professionalism Award.

Describe your team's initiatives to Assist, Mentor, and/or Start other *FIRST* teams with emphasis on activities within the past 3 years.

We restarted team 7864 in 2023 with 2 new mentors and 1 shared mentor we recruited. We build jointly on Saturdays so the restarted team has use of materials, experience and equipment for their build. We hosted a preseason training day for our new members, and teams 8836 and 7864. Verbal commitments were obtained from Mesabi East and Mountain Iron school personnel to start an FRC team in the near future. We co-hosted the NMRC programming camp at Bemidji State University with 13 teams attending.

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?

5653 presents annually at the Range Engineering Council STEM showcase. Over 1000 area 6th graders and the general public attend. We were featured on a live radio interview as well as a regional television broadcast. Trips were made to a Tesla facility, Cleveland Cliffs mine and processing plant, Inspire Conference at U of M, Itasca Community College, Bemidji College, and UMD. Completed interviews on R&J Broadcasting weekly regional robotics show during the 2023 season leading to 700+ views.

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

We hosted a practice field with the Arrowhead Robotics Coalition and co-hosted and ran the Northern MN Robotics Conference programming camp. 5653 partnered with the Bois Forte Tribal Council and Apple to advocate at the 2022 AISES National Conference. We registered as an AISES affiliate school, started a Native Financial Cents program and shared video footage of robotics camps requested by AISES. Working with NMRC teams led to secured land for a permanent field with the Beltrami Ag Association.

Describe your team's efforts in the past 3 years to promote equity, diversity, and inclusion within your team, *FIRST*, and your communities.

STEM camps over winter break at Nett Lake and Vermillion Reservations Boys and Girls Clubs were made possible by a First Upper Midwest grant. Over 24 youth benefitted from authentic student STEM leadership. Our team shows our support for the LGBTQ+ community by designing special buttons, resulting in many conversations about the community in FIRST. We facilitated a school field trip to Women in the Workforce event at Minnesota North Vermillion Campus. Over 35% of eligible females attended.

Explain how you ensure your team and the initiatives you have created will continue to run effectively for the foreseeable future

Contacts were made for future summer Boys and Girls Club camps enabling higher attendance and more in depth sessions. We presented to the Tribal Council on the season, AISES trip and outreach. We recruit at local schools without a FIRST team and invite potential mentors to build sessions and regional events. Efforts led to recruitment of a school board member to mentor team 7864. We will host the 2023 NMRC championship event to showcase robotics locally. 24 teams will attend the 2 day event.

Describe your team's innovative strategies to recruit, retain, and engage your sponsors within the past 3 years

Responding to AISES surveys on Native American participation connected us with Apple and a commitment to advocate at the 2022 national conference in a 20 x 80 ft. Apple booth promoting FIRST. 5653 invited Apple programmers to attend, virtually or in person, the NMRC programming camp. We collaborate with Zup's grocery store to fundraise through area meat sales. We distribute holiday cards to sponsors highlighting results of their input over the past year.

Highlight one area in which your team needs to improve and describe the steps actively being taken to make those improvements.

Our 1,000,000 acre geographic area is a challenge. We secured space at an alternate school, purchased supplies, computers and found local mentors. This led to team 7864 restarting. Future advocacy prioritizes Nett Lake students that have shown interest at recruiting sessions, but transportation was a barrier. Steps are to include team 7864 in outreach sessions at Nett Lake Boys and Girls club, and helping the Indian Education Coordinator set up vans for after school build season practices.

Describe your team's goals to fulfill the mission of *FIRST* and the progress you have made towards those goals.

We are hoping to be able to start/restart and mentor more teams in the area, leading to an Iron Range Robotics Coalition. 5653 is recruiting more students from other schools in hopes they can start new teams. We seek a community on the Iron Range where we can seek major regional sponsorship, share, collaborate, and grow together as separate but linked parts. We restarted 1 team January 2023, and have identified 2 verbally committed coaches. 25% of our current team are from alternate schools.

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.

FIRST at Northeast Range School is the only consistent winter sport. Students know the robotics team is strong, competing with teams from all size schools across the state. 15% of our school is on the robotics team. The FIRST program has driven upgrades of industrial tools including a CNC, 3-d printers, tube benders, welding equipment and mills. Robotics students push the learning on equipment with a desire to create.

Essay

Mosquitos are resilient while inactive in winter, waiting for warm weather to return. Iron is resilient when its atoms change shape to withstand extreme pressure. Engineers are resilient because they continue to

work towards their goals despite failures. We, the Iron Mosquitos, thrived during the COVID-19 pandemic, regardless of the obstacles that we faced. We are small but mighty! The Iron Mosquitos are resilient despite challenges as we work to spread STEM across our communities. Resiliency is being strong and continuing to work towards a goal despite the pressures and barriers that try to stop you. Coming from small Iron Range communities, we represent the challenges of our region. Some of these obstacles include distance to cities, lack of resources, economic challenges, and reservation and community poverty. The schools that our team members come from cover roughly 1,000,000 acres and students travel up to 1.5 hours one way to reach our home base. Our local economic activity includes small family businesses and larger industries including iron mining and logging. Mining has experienced a significant reduction in employment opportunities and is in the middle of another shutdown. The COVID-19 pandemic increased the economic pain of local small businesses and the Casino. Some local businesses have not reopened and many jobs were lost at the Casino, a key economic driver for the Reservation. Native Americans are underrepresented in STEM and have historically faced hardships, which inevitably led to current educational and workforce disparities. Taking these challenges head on by using the resources we have, overcoming a pandemic, and recruiting in underrepresented communities demonstrates our resilience. Yearly, in a small town elementary school of roughly 60 students, everyone gathers together in the gym and watches as a robot takes action. The small community lost its high school over a decade ago. The school is a high poverty Title 1 school, and majority Native American. Among the students sit future Iron Mosquitos. Several years ago, Owen, a current senior on the team, was inspired as he watched the robot climb a rope tied to the basketball hoop and heard the team members share what robotics entails. "I want to be a part of that," he thought. Owen was determined to join the robotics team once he entered high school. Owen saw that even though someone comes from a small town or a small school, they can still accomplish big things. With his rookie year over, he had gained the knowledge he needed to significantly contribute to the Iron Mosquitos. Then 2020 threatened to end our program. In fact, it ended two nearby teams, but the Iron Mosquitos proved to be resilient. While having a melancholy team meeting the morning our school doors were being shut, the team proposed an idea to provide contact-free grocery service to help the community. The hope of making an impact during the pandemic led us to repurpose our working parade robot and create the "Grocery Bot." The pandemic threatened to tear down Owen's dream. However, the resilience of the team turned the crisis into inspiration. The pandemic forced social distancing which made it risky to go out and buy groceries. Over 7.2% of community members during a 6-week period at the start of the lockdown made phone, internet, and paper order requests to students, who collected items, completed transactions, and delivered the groceries out to their cars via robot. Different students operated the robot service in Ely, Tower and Babbitt. The media took notice of the efforts the students were making to better their community. Local newspapers published articles highlighting the grocery bot and the students' actions. Soon, regional TV stations WDIO and KBJR picked up the story and highlighted it on the evening news, and it quickly hit statewide media in an article published by Minnesota Public Radio. Eventually, the story started going viral and was picked up by Forbes Magazine, appeared in the 2020 FIRST Showcase and later in a short segment in the Disney+ documentary More than Robots. Dean Kamen mentions the Iron Mosquitos and their resilient efforts to reduce exposure to COVID-19. During the time the grocery bot was in action, there were multiple barriers to overcome on the nearby Vermillion Bois Forte Reservation. The entire reservation was deemed "locals only" during the pandemic and the COVID-19 vaccine was required to work. The community took on the vital task of keeping their elders and fluent speakers healthy and safe to protect the Ojibwe culture through the systemic risks the pandemic brought. Owen, being a part of the Ojibwe community, sat on the sidelines for this project after helping the rapid robot build. He watched a team of strong, resilient high schoolers come together to help their community while he was helping protect his. The team was resilient and prevailed against the threat of having to shut

down shop. They turned tragedy to triumph with the grocery bot, proudly serving hundreds of people in 3 different communities. Coming out of the COVID-19 pandemic, the Iron Mosquitoes were ready to get back to supporting other local robotics programs and growing participation in neighboring schools. The pandemic had cost Ely and North Woods their robotics programs. It was time to rebuild and remake connections with area teams that we helped start. Our outreach efforts focused on three schools that would not have access to robotics programs. North Woods, Ely, and Mesabi East partnered with us coming out of the pandemic, providing students the opportunity to share their passions and participate on our robotics team. Excitement at Northwoods was high enough where we connected them with sponsorship to support their own program with the help of our mentorship. Growing robotics in the surrounding communities is a primary goal, including building interest in local elementary schools. The Iron Mosquitos team structure has shown over 200% increase in mentors and a doubling in the number of students prior to Northwoods being restarted. What started as two mentors and a few students doing a bit of everything has turned into a structured organization. With increased mentors, we have subteams of build, awards, scouting and code. Mentors' backgrounds include professional industries such as diesel mechanics, welding, and software as well as subject area knowledge in technical education, math, english, and social studies. Veteran team members take on lead positions such as build or code, and assist in other roles as needed to make up for our small team. Rookies shadow veterans in a variety of roles and learn bits of everything to help them discover areas of interest. To ensure future rookies, 5653 started an FLL team who they continue to mentor. In 2022, team members spent 40 hours mentoring the FLL team in Babbitt. Several of those elementary students have stated they will join 5653. Beyond the students on the FLL team, 5653 continues to try to inspire students of many backgrounds to join the team. One opportunity is to reach out to Native American communities. 5653 brought robotics to local Boys and Girls clubs on the Lake Vermilion and Nett Lake reservations. 100% of the students attending over holiday break drove the competition robot, wrote code, customized buttons, wired motors and built small toothbrush robots. Beyond joining our team, the Iron Mosquitos focus on reaching outside our region. One opportunity involved our team's Native American students showcasing FIRST at the 2022 American Indian Science and Engineering Society (AISES) National Conference in Palm Springs, California through a sponsorship by Apple, AISES and the Bois Forte community. The students reached 2700 attendees including K-12 & College students, Professionals, Advisors, and Elders. The experience impacted our team as well. Owen reflected, "The convention had a lot of major companies, such as Tesla or Amazon, and a plethora of tech schools reaching out to me about engineering opportunities. Before attending the convention, I had been on the fence of what I wanted to do for college and this event cemented that I wanted to go into an engineering field." 5653 also presents annually at the Range Engineering Council STEM showcase. Over 1000 area 6th graders attend and others in an open to the public session. FIRST impacts students in many ways and we shared that message at the 2022 Minnesota School Board Association meeting as well. Partnering with 6 teams from across the state, team members reached school administrators and board members by inviting them to drive our robot on a competition field. This sparked conversations, examination of the giant statewide teams map and many commitments to bring FIRST programs into schools. One of the pins on the state map shows our team, a journey that started in 2015 on the Iron Range of Minnesota. The Iron Mosquitos are true to our region, resilient in the face of distance, resources, economic challenge and reservation and community poverty as we work to spread STEM across our communities. We are determined to continue our outreach through the Boys and Girls clubs, AISES Conferences, school board presentations, and rural communities and schools. We hope to connect, problem-solve and make an impact by creating a community of collaborative teams. Collaborating creates resilient teams and gives more opportunities to small towns and schools like ours. Our resiliency is what helps us make local impacts, which is the beginning steps of being great enough to change the world. Owen stated, "Robotics has changed my

life.” With the help of FIRST Robotics and the passion for spreading STEM across Minnesota, we, the Iron Mosquitos, are ready to make a difference and an even bigger impact on this world. We are small but mighty! We are the Iron Mosquitos! ;

