

Chairman's Award - Team 2761

Team Number

2761

Team Name, Corporate/University Sponsors

Teichert Foundation/Excelsior Metals Inc./Valley Iron, Inc. /Olson Steel/Solidworks/The Tan Family/Sierra Marina/Sunrise Medical & Family/Community

Briefly describe the impact of the *FIRST* program on team participants with special emphasis on the 2016/2017 year and the preceding two to five years

IronHorse Robotics (IHR) has seen steady growth. 97% of members have pursued STEM-based careers with 100% of 59 alumni attending college. Female involvement has grown to 46% with 57% in leadership positions. As a community team, we reach out to students to offer free CAD, programming, structure & mechanics, and robotics classes. Our diversity is our strength as 58% of our students are first generation Americans with roots in 11 countries, which inspired outreach in India, Indonesia and Mexico.

Describe the impact of the *FIRST* program on your community with special emphasis on the 2016/2017 year and the preceding two to five years

In the past two years, IHR has spread the message of FIRST to over 250,000 people and volunteered more than 22,000 hours over the course of 65+ events. IHR hosted the first annual Valley Women's STEM Conference, for girls in the community and other robotics teams to network, work on a STEM project, and discuss how to create an environment that fosters female growth in the field. We also host the Collaboration Conference where teams can troubleshoot, share resources, and connect with sponsors.

Team's innovative or creative method to spread the *FIRST* message

In the past two years, IHR was featured in 16 different media outlets. The FIRST website wrote an article about us, "Growing the Next Generation of Philanthropeens" in response to our recognition from the California State Assembly. IHR worked with the fundraising platform, Edco, we raised over \$6,000. We are on the Edco website in an article and video from ABC30 about our success raising money. Business Weekly magazine also contacted us for an interview on how to fundraise in the modern era.

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

Last year, build lead Alex Tacescu used his technical skills to create an omnidirectional wheelchair featured on The Jimmy Fallon Show and was awarded second place at the Intel Science Fair. Team Captain, Nick Rodriguez, was invited to attend Comic Con as a VIP guest of Hasbro because of an Iron Man suit that was largely developed and 3D printed in our shop. He makes appearances in his suit during our volunteer events at FLL competitions, Valley Children's Hospital and parades.

Describe the team's initiatives to help start or form other FRC teams

IHR founded Illusion Robotics, FRC Team 5852, whose head mentor is a former IHR captain. We donated a starter kit, mechanical components, electrical systems, metal fabrication, batteries, and a battery cart. IHR has become a staple for local rookie teams, for Team 6305 we helped with programming, robot parts spreadsheet and where to buy them, our 80 page team manual which covers how to run a team, full tool chest, shop tools, 16 ft trailer, two of our alumni as mentors and grant money.

Describe the team's initiatives to help start or form other *FIRST* teams (including Jr.FLL, FLL, & FTC)

IHR has started 2 FLL Jr., 20 FLL and 2 FRC teams. The team holds seasonal workshops, covering topics such as programming, design, and project. Because of the high density of FRC teams in the Valley, our team has shifted to sustaining existing teams and international endeavours. Team members have traveled to Indonesia, India, and Mexico to start and support FLL teams. In India, team members also worked with FIRST India to launch initiatives to create robotics programs throughout the country.

Describe the team's initiatives on assisting other *FIRST* teams (including Jr.FLL, FLL, FTC, & FRC) with progressing through the *FIRST* program

We are sister teams with FRC Team 3495 and Team 3970, sharing ideas and resources. We inspired a major sponsor to work with our mentors and students to create a non-profit, Valley Robotics Initiative (VRI). Our non-profit has quarterly sustainability grants and raised over \$30,000 at our auction dinner last year for 5 local FRC teams. We provided lunch for two of our valley teams at the Orange County Regional. In St. Louis we provided 4 other teams from the valley lunch and dinner for 3 days.

Describe how your team works with other *FIRST* teams to serve as mentors to younger or less experienced *FIRST* teams (includes Jr.FLL, FLL, FTC, & FRC teams)

We have mentored three FLL Jr. teams, over 70 FLL teams, and 2 FRC teams. We have held nine FLL workshops and an annual FLL Trick-or-Tournament Scrimmage. Aside from donating to and mentoring our rookie teams, FRC Teams 5852 and 6305, we donated over \$4,000 in parts to Visalia Vanquishers, FRC Team 5529. For two years we have coordinated and volunteered to run a water station for Two Cities Marathon and invited FRC Team 3495 Mindcraft Robotics to join us in this community service endeavour.

Describe your Corporate/University Sponsors

Through a partnership with Fresno State, VRI secured \$650,000 in scholarship money. For the next 6 years, VRI will fund 4 full-ride scholarships to the Lyles College of Engineering, available to students with robotics experience. VRI also opened a Robotics Education and Collaboration Center (REC Center) which IHR now works out of. It is in this REC Center that we meet and collaborate with fellow FRC teams and hold after-school robotics classes or workshops for K-8 students.

Describe the strength of your partnership with your sponsors with special emphasis on the 2016/2017 year and the preceding two to five years

IHR is from a predominantly agricultural community, so most of our sponsorship comes from local businesses and medical offices. IHR maintains partnerships with sponsors such as Excelsior Metal, Sunrise Medical, Valley Iron and The Patton Group who provide us with in-kind donations like metal cutting, fabrication, and powder-coating. We created a low cost 3D printed prosthetic hand and our sponsors have given us feedback on improving the prototype to make it more effective for the user.

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

FIRST is a revolutionary organization that inspires students to develop an interest in STEM. It provides a hand-on experience where innovators are given the freedom to develop engineering, business, and leadership skills. FIRST has taken us to places we never thought we'd go - three different city councils, a half-time STEM presentation at a college football game, the California State Assembly, and even around the world with our STEM Cells outreach program. FIRST is, truly, more than robots.

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

Our team was invited to attend Dr. Michio Kaku's theoretical physics symposium as recognition for our work to push STEM education and celebrate its growth. To display the real world applications of STEM in the workplace for our team, IHR organized tours of the Tesla Factory and the International Guard's 144th Fighter Wing. In the spirit of making the shop more like a workplace, IHR enforces safety through CPR certification classes for our members.

Team Captain/Student Representative that has double-checked this submission.

Hannah Miller

Essay

Engineering firms do not rely on a single person to complete a project. They rely on group effort. IronHorse Robotics (IHR) works to implement this real life application in our team structure. We approach every situation with the mentality of collaborative effort; members plan, design and build together, sitting at connected computers and white boards so that everyone can contribute. We are constantly iterating to create a better product and implement an effective plan of action. This has worked well for us. The shift in approach has been the cause of our most successful seasons to date, and has caught the attention of our sponsors.

We inspired our major sponsor to work with our mentors and students to create a non-profit, targeting and strengthening STEM in our locale. The Central Valley is predominantly agricultural. Our work identified a need to support and expand STEM opportunities. We also identified the fact that local alumni continue to pursue STEM opportunities beyond the Central Valley. Up until this year, IHR struggled with having alumni return to mentor, most of whom left the valley for college. Determined to present students with more options to pursue STEM-related careers, IHR mentors collaborated with Fresno State and our sponsors to create Valley Robotics Initiative (VRI), a non-profit that provides grants and

funding for robotics programs around the Central Valley. Each year, VRI hosts an auction dinner to raise funds for local robotics teams, paying for the costs of the events so it is 100% profitable for participating teams. This past year, VRI raised over \$30,000 in profits for five teams. On a quarterly basis, VRI provides grants, ensuring program sustainability for teams across the valley. IHR and VRI also partnered with Fresno State to create a scholarship program for Lyles College of Engineering, securing \$650,000 in scholarship money, which guarantees four full-ride scholarships per year until 2025 available to Central Valley FIRST alumni.

IHR's close partnership with Fresno State has resulted in many opportunities for our team. We were asked to coordinate a STEM celebration at Fresno State's opening football game. After receiving special permission from the NCAA to avoid violating recruitment regulations, Fresno State gave us 800 tickets (valued at over \$40,000) to invite sponsors, 5 neighboring FRC teams, and Janet McKinley, FIRST Regional Director of Northern California. Before the game, attending team's robots were displayed at the official tailgating event. For the main demonstration on the field at half-time, IHR invited FRC Team 3495 to present their T-shirt cannon alongside ours. President of Fresno State, Dr. Joseph Castro, met with students and observed our projects. In addition, Fresno State filmed our team and produced a commercial promoting robotics that was aired during half-time. This collaboration was a first in the Central Valley. Our next scheduled project will be a robot demonstration during the halftime show with Fresno State Basketball.

For the 2015-2016 school year, we worked with Clovis Unified to bring AP Computer Science and Principles of Engineering and Robotics to the curriculum at Clovis North High School. Dean's List Finalist Angelina Galvan and another team member created the SWE Next Club at the school, and one in our community. We reached over 70 FLL teams in the school district and inducted FLL Jr. into the Central Valley. Running monthly FLL/FLL Jr. workshops, we were able to help local teams focus on project, build and programming. In addition, IHR ran the Stable Stomp Qualifier and FLL Jr. Expo at the high school for seven years. IHR began 20 FLL teams, 2 FLL Jr. teams, and FRC team 5852. IHR also holds an annual Trick-or-Tournament Scrimmage to ensure all local FLL teams have the tools to succeed during competition.

But this wasn't enough. We took a look at what we were doing as a team, and the big take away was that we were predominantly benefitting the students of Clovis North. In the summer of 2016, we decided to separate from the school to become a community team. This allows us to offer our program and engineering classes/certification programs to any student within our service area. Currently, our team represents eight different home, private, charter and high school programs. IHR partnered with an independent STEM learning facility to develop free CAD, programming, structure & mechanics, and robotics classes. To prepare a younger audience for transition into FRC, IHR created two middle school robotics programs, completely mentored by IHR members.

Coming from the collaborative environment that IHR fosters, our alumni emerge civic-minded leaders. 100% of our alumni have gone on to a higher education, with 97% of them going on to pursue a STEM career. Former IHR captain, Lexi Garcia, felt inspired to start her own FRC team, Illusion Robotics Team 5852, and former IHR captain and Dean's List Finalist, Christopher Azali, and another IHR alumni mentor Stable Circuits, FRC Team 6305. With both of these teams, IHR provided equipment, consultations, and support. Our team has built a reputation of always being ready to help. We cut our scouting team at a moment's notice to step in and volunteer as student Ambassadors at the FIRST World Championship two years in a row and the Orange County Regional. We've taken over queueing and assisted scorekeeping at the first Ventura Regional. This all stems from the mindset we promote on our team.

For the past three years we worked with the Fresno County Office of Education to run a STEM camp for the children of seasonal migrant workers; Our members volunteered over 200 hours each year for the past three years. We organized a field trip to NASA Ames Research Center for students of the camp. We also secured the first ever educational tour of the Tesla Factory in Fremont for the camp. We recognize that exposure to different careers reinforces the link to higher education.

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To strengthen the importance of STEM across the valley, IHR students worked alongside the City Councils of Fresno, Clovis, and Madera to declare Robot Day. We received recognition by the the Office of the 23rd District Assembly celebrating our work within the community and our Dean's List Finalist/Chairman's wins in Orange County. During the summer of 2016, our team collaborated with local assemblyman, Jim Patterson, to declare Robotics Technology Day for the State of California. We were invited to the State Capital to give a demonstration on the Assembly Floor. The Assembly voted unanimously in favor of Robotics Technology Day. FIRST PR caught wind of this and wrote the article "Growing the Next Generation of Philanthropeens" highlighting our efforts.

As part of our outreach efforts at home, known as Einstein&Co. Engineering, we developed low cost, 3D printed prosthetic hands for the Veterans and Children's hospitals. We used the same procedures that we teach our FLL teams, first creating a member driven prototype, then meeting with our sponsors Sunrise Medical, Advanced Prosthetics, and Sierra Pacific Orthopedic Center (SPOC) for consultations to refine the design and advice on how to make it more effective for the user. This will be an ongoing project for our team as both a tool to teach advanced CAD techniques and work with businesses to make these widely available.

In the past two years, IHR has been featured in 16 different media outlets and volunteered at 65+ events. We host robot demonstrations at Mexican Consulate events, farmer's markets, county and elementary school fairs, and televised parades. IHR holds food drives, and demonstrations at Valley Children's Hospital and Brookside Memory Care Center.

To support our former teacher advisor, whose husband was diagnosed with Alzheimer's, IHR volunteers annually at the Walk to End Alzheimer's.

Within the last three years, IHR has seen a significant increase in female participation, with 46% of our team comprised of young women. In 2014, IHR started Glitter Gears, an initiative that has exposed over 300 girls grades K-8 to STEM by hosting robotics/physics themed camps in a supportive environment where they can build self efficacy.

58% of our members are first generation Americans. Inspired by this diversity, we created STEM Cells, our international outreach program which targets building up rural communities. We recognize that not everyone has the same opportunities and this is our way of making a positive contribution. As a part of this initiative, Dean's List finalist Christopher Azali traveled to Indonesia to start FLL teams and incorporate robotics into school curriculum. During the summer of 2016, IHR collaborated with North Fresno Rotary to make low-cost Solar Cookers and Water Pasteurization Indicators (WAPIs). Three of our members traveled to India to introduce the Solar Cookers and WAPIs in underdeveloped villages of Punjab. 100 WAPIs and 10 Solar Cookers were donated, and classes on how to make/use the devices were taught. IHR members met with Pooja Sharma, the Program Manager of FIRST India, to discuss initiatives to expand the program. We also introduced FLL to a K12 school that will compete in the 2017-2018 season. A presentation was given at the Guru Nanak Girls College on the importance of female STEM involvement. Because of our work with them, the college students went into the community to teach about the solar cooker/WAPI technology in a nearby village. IHR has also expanded to Australia after meeting FTC Team 12413 at FIRST Championships in 2016, securing them a VRI Program Growth grant. STEM Cells is also working with the Mexican Consulate in Fresno and elementary schools of rural Sinaloa, Aguascalientes & Zacatecas, Mexico, providing them with FLL Jr. kits and specially developed LEGO math curriculum.

Just when we think we're doing all that we can as a team, we hold a collaborative meeting and find that we can always do more. So much more.