Chairman's Award - Team 4253

Print Close

2020 - Team 4253

Team Number

4253

Team Name, Corporate/University Sponsors

Taipei American School

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

FIRST has opened many doors for our team. Our FIRST alumni have enrolled in some of the most prestigious STEM institutions in the world such as MIT, Stanford, and Cornell, while others joined major technology companies like NASA, SpaceX, Microsoft, and Google. Current members find a home in FIRST where they fuel their passion for robotics, hone critical interpersonal skills like teamwork and communication, and develop relationships that will last a lifetime.

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

Team 4253 has led an explosive STEM revolution in Taiwan. Our school's Tech Cube provides all FIRST students in and out of our school university-level facilities for pursuing robotics, engineering, and computer science. The Taiwanese government, in addition, has acquired a full-time staff for FIRST in Taiwan that generously supports 28 FRC teams and holds FIRST workshops in a newly renovated $10M robotics facility, which will host the first-ever Science Park Taichung Regional this March.

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

STEM initiatives such as Hour of Code with 180 aboriginal students inspire the underrepresented communities around us at a grass-roots level. Translating game manuals into Chinese, our team's work impacts Asia as a whole, while collaboration with the government in running training camps and off-season regionals spreads FIRST, alongside its values, like wildfire. Furthermore, scrimmages and workshops we hold for rookie teams spread our FIRST experience in a personal and interconnected manner.

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

With a gender-balanced team in collaboration with Girls in STEM, we inspire all to become future STEM leaders. Online and at networking events, our veterans assist teams with any issues they face during the build season, acting as leaders in Taiwan's FIRST community. Selflessly donating thousands of dollars to new teams and volunteering countless hours to run off-season events, we show that giving is more important than receiving, inspiring others to follow our altruistic footsteps.

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

In 2016, we introduced 60+ schools in Taiwan to FIRST and started 2 FRC teams: Teams 6083 and 6191. In 2017, our team assisted an FRC workshop for over 20 schools to kickstart new teams. In 2018, we ran a 2-day intensive FRC camp, teaching 22 teams the basics of robotics. In 2019, we staffed the Taichung Offseason Regional for 19 teams volunteering as referees, inspectors, and judges. Throughout the year, we hosted training sessions and friendly scrimmages for all 28 FRC teams in Taiwan.

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

Aside from supporting all 28 Taiwanese FRC teams, we also visited robotics promotion centers to advise local FLL teams and invited FTC teams to our lab to learn advanced programming and engineering techniques. In school, we mentor elementary school FLL and FLL Jr. teams through our high school Robotics Mentoring course. Last August, 11 schools from all around Taiwan visited our school to learn about K-12 STEM curriculum development and extracurricular opportunities in FIRST.

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

For many teams in Taiwan, English communication and traveling abroad are daunting challenges. As such, we translate competition rules and guide teams through the logistics of international travel. We also run customized workshops based on each rookie team's needs. For example, teams requested training in pneumatic systems and advanced CAD, so we hosted a full-day training camp for 6 rookie teams (60 students) to CAD and prototype pneumatic intake systems for various FRC game pieces.

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)

As the oldest team in Taiwan, we consistently provide assistance for new teams by attending FIRST Q&A events and inviting teams to our lab to brainstorm robot designs, use machinery/tools, and develop game strategies. In addition, we host scrimmages and training workshops, allowing rookie teams to gain driving experience and expertise in engineering techniques. We also manage a Facebook group for all FRC teams in Taiwan through which teams can reach out to us in times of need.

Describe your Corporate/University Sponsors

Raid Zero is financed completely by the Friends of TAS, an organization established by the school and supported by our community. Parents, faculty, alumni, and more come together to support us in a STEM-centric environment, with many of our sponsors coming from technological backgrounds whether they be engineers or tech business owners. In return, tours of our program and facilities directly impact the fundraising efforts of Friends of TAS and display our STEM endeavors to our sponsors.

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

Our partnership with our sponsors is truly unique. Each and every sponsor, whether they be alumni, faculty, or parent, holds a personal stake in the success of our program. FRC has brought an immense focus on STEM at TAS, evident from the investment in high-tech equipment as well as an expanded Robotics & Computer Science curriculum. This, in turn, has equipped our members and the larger school community to become the next generation of innovators and leaders.

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

Beyond the traditional classroom setting, the unique learning environment of FIRST fosters collaboration between each member. Exposure to STEM from an early age blossoms into six specialized divisions - Mechanical, Design, Programming, Electrical, Statistics and Logistics - that fosters growth in creativity, innovation, and leadership. Through cooperation and teamwork, the FIRST community builds unbreakable bonds and offers unparalleled opportunities for pursuing STEM education.

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

4253 is a team composed of unique members each coming from various strengths and backgrounds. Setting aside our origins of music, sports, debate, dance, and more, we come together for the recognition and celebration of STEM in our community. Working together, we aspire to fortify our foundations of STEM through the opportunities that FIRST provides as we realize we will grow to become the leaders of the next generation in the ever-developing world.

For FRC teams older than 5 years, briefly describe your team's broader impact from its inception.

4253 has been integral to FIRST in Taiwan: sharing our FIRST experiences with 300 students from over 20 schools who had little to no exposure to robotics, creating and running a government-funded FRC camp for 22 new teams to train 200 students from the ground up, and advising and staffing the trial run of Taiwan's first Science Park Taichung Regional. As a token to our extensive contributions, former FIRST President Don Bossi even visited our team last year to witness our explosive progress.

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

Emily Hsu

Essay

OBJECTIVE ZERO

As the first FRC team in Southeast Asia, Team 4253 "Raid Zero" shook the foundations of education in the East. Overturning traditional norms of standardized testing, we are leading a STEM revolution that values hands-on, collaborative learning. Thus, our Objective Zero is two-tier: (1) inspire communities with STEM education and (2) build a sustainable ecosystem for FIRST to thrive.

OUR TEAM

Our modest genesis is formative to our mission. In 2012, 12 students and our mentor, Matt Fagen, gathered in the school's basement storage room and created a robot out of a metal bed frame. We went on to win the Rookie All-Star Award at the Hawaii Regional, unknowingly sparking a movement that has since produced 28 FRC teams and a new Science Park Taichung Regional in Taiwan! In a mere 8 years, our team grew from 12 students to over 150, winning our 7th blue banner last year and punching our ticket to World Championships for the 5th consecutive time.

These humble beginnings paved the way for sustainability in all aspects of our work, starting from our own team. Divided into six subdivisions - mechanical, design, electrical, programming, statistics, and logistics - we maximize efficiency while ensuring generational retention of knowledge through preseason training sessions led by veterans. Concurrently, our team has a 50-50 gender split from rookies up to the leadership team, derived from years of active outreach in collaboration with Girls in STEM. Inviting Middle School (MS) girls to the lab and introducing them to the machines and competition robots, we break gender norms of STEM as a traditionally male-dominated field.

SCHOOL INITIATIVES

Energized by our passion for robotics, our school's Robotics & Computer Science (CS) department grew from 2 to 9 members including 2 shop-techs, an administrative assistant, and several faculty members with PhDs in their respective fields that teach 18 courses totaling 24 different sections! From a dilapidated basement room, our school community raised $10M to create a six-story robotics facility: the Tech Cube. Unveiled last year, this building provides 4,380 square meters of facilities including an amphitheater with "tinker and maker" spaces on the Elementary School (ES) floor; a VEX arena and robotics design lab on the MS floor; and a high-performance computer lab, a fabrication shop with state-of-the-art equipment, and a full-sized FRC field on the High School (HS) floors!

Our ES and MS students are exposed to STEM at a young age with course offerings ranging from Digital Literacy to Physical Computing. They work with introductory coding programs like Scratch and Tynker as well as educational devices like BeeBots, Hummingbird Microcontrollers, Ozobots, and Lego WeDo 2.0 and EV3s to develop the basics of quantitative problem-solving.

Meanwhile, our HS students have access to college-level courses where they learn artificial intelligence, quantum computing, and virtual reality (VR). In 2013, our school became the first in the region to introduce a Robotics & CS graduation requirement. As a result, over 42% of HS students are taking either a Robotics or CS class every semester. This year, we launched a new Robotics Mentoring course for HS students to mentor ES FLL and FLL Jr. teams, linking our common love for STEM across the school.

The Mayor of Taipei has even sent teachers and principals to study our robotics program as a model for STEM education in Taiwan. Last August, 11 schools, potential rookie teams for the 2020 FRC season, visited our lab to learn about STEM curriculum development as well as extracurricular activities like FIRST and VEX Robotics.

LOCAL OUTREACH

Our journey in FRC motivated us to share the wonders of STEM with underrepresented communities. In 2012, we brought our passion to the Taipei School of Special Education, designing mechanisms from breath-controlled electric wheelchairs to ultrasonic sensor necklaces for the visually impaired. In the process, we introduced local students to real-life applications of STEM.

We went on to tackle the technological gap between urban and rural populations. At a remote elementary school in Taoyuan, we led hands-on activities such as constructing parachutes to land eggs and designing Rube Goldberg machines. Because of our camp, this school earned an honorary award from Taiwan's Ministry of Education! We also ran the Science division of the Huatung English Camp, teaching over 180 aboriginal students in Taitung through interactive activities like Hour of Code. Seeing the wide grins on the students as they engaged with these challenges evoked a sense of nostalgia that defined our own FIRST experience.

Essay - page 2

Moving beyond schools, our team members worked with local coding and robotics companies to harness VR technology for 21st-century education. We brought VR demos to schools and reached over 1400 students across Southeast Asia through local news channels. Our many endeavors continue to fuel enthusiasm towards the endless possibilities of technology within our community.

IMPACT IN FIRST

As the forerunners of FIRST in Taiwan, we planted the seeds of an entire FIRST ecosystem in the nation. In 2016, we cold-called over 60 high schools to generate interest in FIRST and successfully started two FRC teams: Team 6083 in Chiayi and Team 6191 at Taipei First Girls' High School.

To support new teams, we invite them to our lab to brainstorm designs, provide materials for their first robot, translate manuals, and teach them how to find sponsors, a crucial aspect for long-term success. For example, we supplied $2000 worth of components including a kit base to a newly formed Vietnam team this year who had import difficulties at Kick-Off.

With our new FRC field, we invite local teams over for friendly scrimmages with our team serving as scorekeepers, referees, and robot repair staff. As competition opportunities are rare, these scrimmages dramatically improve driver skills and strategy development. Throughout the year, we teach teams from all around Taiwan about team management, time allocation, and parallel prototyping, and design customized workshops based on each team's needs. For instance, in December, we invited 6 rookie teams to our lab for an entire day where our veterans led workshops on rapid prototyping for intake mechanisms, an introduction to pneumatics, advanced CAD and programming techniques, and the basics of FRC electrical systems.

Last year, we partnered with the Compass Alliance to provide free published resources for FIRST teams around the world. Alongside Team 3132, our members translated the FRC game manual among other guides into Chinese. This year, we are working with the Chinese Honors Society to create a full Chinese translation of the game manual within the first week of the build season each year, tearing down the daunting language barrier that impedes many Asian teams from joining FIRST.

We continue to spread FIRST across the nation by reaching out to Taiwan's Ministry of Education and government bureaus. As a result of our relentless advocacy, the Taiwan government has acquired a full-time staff for FIRST in Taiwan and set aside a generous budget to support schools in their pursuit of FIRST Robotics. With our strong partnership, government bureaus like Central Taiwan Science Park (CTSP) frequently contact our team for advice on FIRST, from constructing fields to initiating new programs in the country.

In August 2017, we assisted an FRC workshop in Tainan hosted by the Southern Taiwan Science Park for 144 participants from 20 schools. Our veterans guided the students as they built and competed with FRC kit bases in a Steamworks Mini-Game. In October 2017, we were invited by CTSP to demonstrate our competition robot for education ministers, robotics association executives, school principals, and 300 students from over 20 schools. Through these eye-opening events, students discovered a world where their imaginations can run wild, inspiring school administrators to initiate FIRST programs at their respective schools.

In August 2018, our veterans traveled to Taichung to run a two-day intensive FRC training camp for 22 new government-sponsored teams. We designed a general-purpose FRC robot (the Da Jia Bot) made with accessible parts from Taiwan, organized lists of tools and materials needed from our government sponsors, and guided each team through the entire build, assemble, wire, program, and drive process. In two days, we successfully built 22 robots and welcomed over 200 students into the world of FIRST!

In February 2018, we attended the Power Up Off-season Regional in Taichung along with 7 other teams. Returning to the same venue in August 2019, we staffed the Taichung Off-season Regional for 19 teams with our mentors and alumni filling critical roles like Head Referee, Lead Robot Inspector, and Judge. Our veterans volunteered as control system advisors, robot inspectors, and mentors interspersed throughout the teams to guide them through robot repairs.

In 8 years, we have gone from being the only FRC team in Taiwan to one of 28. Due to the rapid spread of FIRST in Taiwan, this year marks the first year of Taiwan's very own Science Park Taichung Regional! Former FIRST President Don Bossi himself visited our school last year to witness the extensive contributions we made to FIRST Robotics and to attend the commitment ceremony for this new regional, held in a $10M FRC facility funded by the government. This unprecedented facility serves as a beacon for Taiwan's FIRST community, a symbol of a changing educational culture in Asia.

In a region where educational institutions and academic pressure stifle creativity and reinforce learning by rote memorization, Team 4253 has overturned age-old cultural attitudes towards STEM education. Chiseling at the system, we will continue to etch a future where generations of students can engage in the unparalleled experiences of FIRST Robotics.