Chairman's Award - Team 4253

Print Close

2018 - Team 4253

Team Number

4253

Team Name, Corporate/University Sponsors

Taipei American School

Briefly describe the impact of the *FIRST* program on team participants with special emphasis on the 2017/2018 year and the preceding two to five years

FIRST has opened many doors for our team members. Many of our FRC alumni have found their place at some of the most prestigious STEM universities and colleges in the world such as MIT, Stanford, and Cornell, as well as careers in major technology companies such as NASA, SpaceX, Microsoft, and Google. Past team members continue to involve themselves in the success of our team while blazing their own paths in their new homes. Current team members are second to none in their passion for robotics.

Describe the impact of the *FIRST* program on your community with special emphasis on the 2017/2018 year and the preceding two to five years

In our community, FIRST has brought together students, faculty, alumni, and parents to elevate STEM education's importance in Taiwan. Invested in our team and its mission, our school has changed its graduation requirements to include Robotics credits as well as invest in a new 5-story robotics building. Beyond our own school, we have pushed Taiwan's Ministry of Education to enact STEM initiatives in public schools. This has resulted in the formulation of 8 FRC teams, with many more to come.

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

Team 4253's outreach efforts utilize a plethora of mediums to spread the FIRST message. For example, one of our more innovative methods at generating interest in FIRST was to create Virtual Reality demos for over 1400 students to experience. By giving them a riveting experience with the power of technology, we have inspired many of them to attend our various coding workshops. VR works as a way for us to generate interest as well as introduce fledgling engineers to technology.

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

Our team acts as role models both in the workshop and out, inspiring other FIRST team members to use their STEM learning to create an impact on their own community. Together with the Taipei School of Special Education, we invented two devices that improve the lives of disabled students. The first is a sub-50 dollar "sip-and-puff" wheelchair controller one tenth the price of other controllers. The second is a sonar necklace for the visually impaired that vibrates when close objects are detected.

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

Team 4253 has cold-called more than 60 Taiwanese schools to start new teams. Two schools, one in distant Chiayi and the other Taipei First Girls' High School, agreed to start new FRC teams. Furthermore, we held a successful Robotics Exhibition in September of 2016. As testament to our success, the Taiwan Ministry of Education is looking to integrate robotics programs in all of Taiwan's schools as well as expand beyond the current 8 teams in Taiwan into hosting a full regional in the next year.

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

In the past year, we have convinced the dean of our school to add additional Middle and Lower school robotics programs involving LEGO MINDSTORM robotics. We also work with the National Yushan Robotics Alliance to promote FTC teams across Taiwan, reaching out through emails, phone calls, and face to face meetings. During our off-season, we also visit FTC teams in Taiwan to help them brainstorm and build, gradually encouraging them to participate in larger scale robotics competitions like FRC.

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 and traveling abroad are daunting challenges to deal with. As such, we translated the competition rules and went over the logistics of signing up for and traveling to the competition with the numerous teams we have helped start. We also invited them to our lab where we held several workshops on proper use of machines, team organization, programming, and CAD.

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 a driving force for FIRST in Taiwan and Southeast Asia, Team 4253 values the sustainable relationship it has with teams in the region. Being the "experienced" team in the region, we are always actively mentoring other FIRST teams. For example, we went to robotics promotion centers to give FLL teams advice based on our own experiences, and invited schools with FTC teams to visit our lab to learn from our building and programming techniques. Our members also advise TAS's middle school FLL team.

Describe your Corporate/University Sponsors

Due to school guidelines, we are unable to receive external sponsorship, even when large companies such as Ford offer it. The Taipei American School (TAS), and Friends of TAS, however, offer us all the support we need. Frequent donations by alumni, parents, and faculty members through the Friends of TAS have allowed us to develop our robotics program to include artificial intelligence software and high-tech fabrication machines.

Describe the strength of your partnership with your sponsors with special emphasis on the 2017/2018 year and the preceding two to 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 a stronger 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

FIRST is the door-opener for every child; a program that is invested in the personal growth of every participant, both young and old. The duality of professional values and informal camaraderie fosters the collaborative spirit within each member. Nothing can parallel the enjoyable learning environment that FIRST creates through its hands-on approach for learning.

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

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

Jonathan Hsu

Essay

It was a bright, cool afternoon in Taipei. A group of 12 high school students trailed behind their advisor, Matt Fagen, excited as they made their way to the most illustrious of locations, the school's basement storage room. They stopped before the big metal door. Rattling it a few times, the door gave way to a dark, musty room. Team 4253's first workshop. This was the beginning of a journey, and little did they know how big of a door they had just opened.

The modest genesis of 4253 - Raid Zero was formative to our team character. With limited resources and facilities, we handcrafted our robot from a bed frame and struggled to source materials in Taiwan. Because we were the first FRC team in South East Asia, there were no established avenues for acquiring common FRC components. Nonetheless, we had a successful season with our humble bot: we won the Rookie All Star award in Hawaii and a ticket to the Championship!

Those days and nights in the dusty storage room cemented our team's values of camaraderie and passion. As those 12 students slowly handcrafted each and every piece of their bed bot, they could not help smiling. Their bed frame bot stood no chance against the robots they faced that year. But in the face of adversity, the team found strength. The first season of team 4253 defined its mission: to spread the joy of robotics and technology to as many other people we could infect it with. Or as we call it: "Objective Zero".

Raid Zero has since flourished from those humble beginnings. We have grown from 12 students to over 130 in our 7th year, with two regional wins and three trips to the championship in the last three years.

But while we were busy transforming our team, we were also transforming the culture of STEM education in our region, starting first with our own school. Our school became so energized by our FRC experience that robotics became a central feature of our school's culture. In a period of just five years, we went from 1 teacher in a basement room to having a full Computer Science and Robotics department with 7 full-time faculty and 19 different high school courses in computer science totaling 32 sections! These classes range from entry-level to high-level classes, like Data Mining and Artificial Intelligence. Currently, over 43% of Upper School students are taking robotics and computer science classes every semester, and the school has initiated robotics programs from K-12 for every student. Our school is the first in the region to make one semester of computer science mandatory for graduation!

We also rapidly outgrew our space. With support coming in from the community fueled by excitement and support for our team, we added new CNC fabrication equipment to our lab, and through the support of our community have broken ground on a brand new 5 story k-12 robotics facility!

But "Objective Zero" was just getting started.

The team identified a gender disparity and wanted to fix it. In our first year we had only 10% female enrollment. But for the past two years we are proud to have equal participation between males and female members. To achieve this, female team members began inviting middle school girls to the robotics lab in 2013; the middle schoolers were introduced to the machines and drove old FRC robots. By providing peers and role models for middle school girls interested in robotics we successfully increased female participation rate to 50% by 2016!

Team 4253 had succeeded in infecting Taipei American School with "Objective Zero". Seeing our success, we decided to be more ambitious: Let's infect all of Taiwan!

Starting off with baby steps, we helped promote female participation in STEM in our community, by visiting numerous girl high schools to encourage student participation; in one case, we taught students the basics of programming and helped them build miniature VEX robots.

We've also focused on encouraging underrepresented groups to participate in engineering. In 2012, we brought our passion to the Taipei School of Special Education and the Taipei School for the Visually Impaired. We were able to reduce the cost of developing breath controlled electric wheelchairs and built ultrasonic-sensor necklaces for the visually impaired in conjunction with their students.

Feeling impassioned with our initial successes spreading the joy of technology, we took a leap forward. Recognizing the disparate access to technology between urban and rural populations, we started a STEM camp in English at a remote elementary school. Students learned from hands-on activities such as constructing parachutes to land eggs and creating Rube Goldberg machines. The elementary school that hosts our camps earned an honorary award from the Minister of Education of Taiwan because of our camp. To our members, the wide grins on the elementary schoolers evoked a sense of nostalgia; we could not help but feel proud that we were spreading the very emotions that defined our team's FRC experience. Starting in 2016, we've begun visiting the school 4 times per year instead of 2. This allows us to teach the students more advanced topics and foster bonds within the local community, spreading "Objective Zero" to those beyond our school.

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Furthering our initial foray, members of 4253 joined an organization starting in 2013, Heart-to-Heart, that runs summer camps for 180 impoverished aboriginal students in a southern Taiwanese village. Our team members took leadership of the science section and taught students engineering, computer science, and basic science concepts through hands-on activities, including Hour of Code. Every summer, students from the program leave with smiles and a newfound passion for the powers of STEM and teamwork.

After spreading STEM education in elementary and middle schools, we realized the importance of providing high school students with the same opportunities; riding our wave of success, we decided to promote FIRST, specifically FRC, to other high schools in Taiwan. In this mission, we were faced with our most difficult challenge yet. We were not just taking on educational policy or lack of resources; we were taking on a culture. Taiwan's educational culture places heavy emphasis on test scores, with little to no emphasis on hands-on STEM learning. To help change this, we cold-called more than 60 high schools to generate interest in STEM and FRC. In 2016 were successful in starting 2 new FRC teams in Taiwan! One team (6083) at a remote high school in Chiayi, and the other (6191) at Taipei First Girls high school in Taipei. As of today, there are 8 teams in Taiwan! And the Taiwanese Ministries of Technology and Education are fully committed to hosting a Taiwan regional in the next year!

To get new teams off the ground, we invite them to TAS to help them brainstorm robot designs, and provided the materials necessary for their first robot. We also advise them on how to find sponsors to support their robotics program in the future, a crucial aspect to their long-term success.

Moving beyond traditional visits to schools, our members began to serve as consultants to an educational coding and robotics company, where they contribute to a challenge-based, student-driven curriculum aiming to teach computational thinking. We took it a step further and harnessed VR technology to create immersive educational experiences that are fitting to the 21st Century learning styles. Demos were brought to schools and over 1400 young students across Southeast Asia have now been introduced to VR. This virtual experience was featured on local Taiwanese news channels, sparking more interest in STEM and the endless possibilities of technology in our community.

Eventually, after our tireless efforts in creating grassroots change in Taiwan's STEM culture, Raid Zero was given the opportunity for a disruptive policy change. Working together with our new Taiwan teams 4253 help develop the "High School Participation in Robotics and FIRST Seminar" alongside with the Taiwan Ministry of Education. The main purpose was to combine the power of industry and government to enable Taiwanese high school students to partake in FIRST competitions, gain skills of innovative thinking and teamwork, and experience different cultures. We set out to change the culture of STEM education in Taiwan and convince local schools to invest in robotics programs and harness their students' talent, and we succeeded!

Our work has inspired other teams to join our mission in cultivating Taiwan's STEM culture. Working with teams 6191 and 6083 has yielded public interest in STEM education. To give Taiwan's fledgling FIRST community a strong backbone, the Taiwanese Ministry of Education has created a new facility at the Central Taiwan Science Park dedicated to FIRST Robotics. This facility symbolizes the uprooting of the traditional education system in Taiwan. Backed by government support from the district up to the executive level, this unprecedented facility is meant to serve as a beacon for all other Taiwanese schools to follow. A symbol of a changing STEM and educational culture.

Every member and alumna/alumnus of Team 4253 strives to achieve Objective Zero, whether they are still at TAS or have moved on to prestigious universities such as MIT, Stanford, and Cornell. Some of our oldest alumni, many of whom were a part of our first season, continue to carry out the ideals of "Objective Zero" at major companies such as Microsoft, SpaceX, Google, and NASA.

The day the big metal door to Taipei American School's storage room was opened, a movement had begun. From one team to 8 teams to an entire country, "Objective Zero", a manifestation of FIRST's goals, has spread beyond what we first imagined was possible. But our mission has not ended. Our journey is endless; an ideal that we can continually strive to achieve and improve, "Objective Zero": to spread the joy of robotics to all.