

Chairman's Award - Team 2438

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2019 - Team 2438

Team Number

2438

Team Name, Corporate/University Sponsors

BAE SYSTEMS/DATAHOUSE & IOLANI SCHOOL

Briefly describe the impact of the *FIRST* program on team participants with special emphasis on the 2018/2019 year and the preceding two to five years

The reach of FIRST spans all grade levels at Iolani. FRC members develop leadership skills as they mentor younger FTC members and execute STEM pop-up workshops to target students in grades K-6. Participants also cultivate philanthropic practices through the Ignite Outreach Program, specializing in bringing STEM opportunities to developing organizations and uniting global communities. In the past five years, all Iolani robotics graduates entered STEM-related fields in their post-secondary studies.

Describe the impact of the *FIRST* program on your community with special emphasis on the 2018/2019 year and the preceding two to five years

We extend to the community via three different programs. To facilitate the SumoBot program, which teaches students grades 4-6 engineering skills, we donated over \$6000 in computers to the Boys & Girls Club of Honolulu (B&GC) in 2017. In 2018, we trained B&G adults to become program leaders. Also, student-led workshops guided schools through the usage of sensor monitoring systems to restore the health of watersheds. Lastly, the global distribution of our eBooks make education free and accessible.

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

This year our team focused on the sustainability and span of our outreach. Our instructional eBooks in schools in the US, Spain, Korea, and the Philippines allow us to maximize our impact. The Iolani Robotics YouTube channel provides practical STEM projects and skills through tutorials. Additionally, mentors at B&GC will be trained to ensure the longevity of the SumoBot program. Our goal is to empower individuals to be STEM leaders and mentors in their own communities through sustainable programs.

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

Our members consistently engage in leadership positions, providing mentorship internally and externally to Iolani Robotics. FRC members mentor four FTC teams and lead all community outreach initiatives; STEM workshops open to local schools and communities empower middle school students to take an active role in the preservation of their ecosystem and goodwill involvement. With organizations such as the Make-A-Wish Foundation, this illustrates what can be accomplished when people work together.

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

In 2017, we hosted a learning seminar at `Iolani for Moanalua High School. Topics ranged from pneumatics to proper prototyping and programming basics. We are excited to welcome Moanalua as a rookie team this year. To target FRC team creation on a larger scale, a guide to implement STEM curriculum and create an FRC team was provided to Taki Academy in Japan in order to promote STEM and guide them towards a creation of their future FRC team. Topics included budgeting, FRC basics, and helpful tips.

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

Our initiative to start and guide upcoming students is embedded in our robotics program. This year, we held quarterly pop-up shops for grades K-6 with unique activities per session. This encourages lower school students to continue to the next step in their STEM careers: FTC. We formed four competitive FTC teams, one being a rookie team in the Fall of 2018. We host FTC league meets at the start of the season and scrimmages to promote communication among school teams within our community.

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

Our strategy to provide assistance to other teams is two-fold: first, to make our digital assets (code/CAD files) open source via GitHub/OnShape; secondly, to help other teams implement new technology (assisting Team 2090 with their newly purchased water jet). Our fabrication lab is available to other teams during competition season so skills and techniques can be freely shared with teams that do not have access to the same resources (FTC team 7548 is using our "tabbing" method on their bot).

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 four FTC teams and provided guidance to FRC Teams 5701, 2090, and 6909. On Oahu, `Iolani (Team 2438) is one of four schools that owns and operates their own waterjet machine. We work with Team 2090 to make our waterjet and fabrication facilities available to other teams. This collaboration focuses our efforts to make resources available to everyone. When less experienced teams join us in our workspace, we can provide mentorship and strengthen our *FIRST* community overall.

Describe your Corporate/University Sponsors

'Iobotics continues to be primarily funded by 'Iolani School. We are grateful our school supports our efforts and endeavors and has faith in our mission and work. In order to show gratitude and practice gracious professionalism, 'Iobotics deeply invests in the experience of students in our school community. Igniting passion and increasing participation in STEM programs is at the heart of all that we do - it is a way for us to say "Mahalo," and to give back to everyone who has given to us.

Describe the strength of your partnership with your sponsors with special emphasis on the 2018/2019 year and the preceding two to five years

It is an amazing opportunity to be part of a school that fully supports the interests of their robotics team. We are able to work directly with `Iolani to build imaginative experiences for our student body. Working with our school provides our team with an infinite number of ways to give back. In big ways— through the tours we lead, demonstrations we hold, and volunteering we do —and small ways, the smiles, laughs, and high-fives, we are able to show thanks to the school that gives us so much.

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

FIRST is an organization, composed of multi-level robotics programs, that provides opportunities for students to apply STEM skills to real-world problem-solving. Although FIRST may be best known for robotics competitions and STEM education, the driving themes behind these tech initiatives are student-to-student mentorship, leadership development, and global perspective. The FIRST program equips students with vision and the skills they need to make real changes in their world.

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

`Iolani has implemented a student-driven robotics curriculum in both classrooms and team environments. Real-world projects are identified, organized, and executed by students. With guidance from both teachers and peers, students are able to create meaningful solutions for problems that impact their communities. Projects run the gamut from simple tasks such as candy sorting to advanced environmental initiatives like autonomous water sampling.

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

Emily Osurman

Essay

'Ilobotics FRC Team 2438 from 'Iolani School in Honolulu, Hawaii lets students expand their identity in a holistic way: blending science and creativity, friendship and discovery, and technology and community. We are more than just a place, a club, or a program; 'Ilobotics is an amalgam that melds technological advancement with empathetic investments that results in programs that positively affect our community. We believe that with good intentions and consistent effort, our mana'o (knowledge) will spread beyond our humble island chain, formulate real-life solutions for environmental challenges, and spread the liberating power of STEM. We believe in the endless possibilities of STEM and the ever-increasing potential of the people who use it.

From Past To Present

Jeff Malins, an 'Iolani Alumni, founded 'Ilobotics in 2008 with the belief that when you teach students the skills they need to create, they have the power to shape their world. By the grace of our generous school, we have grown from humble beginnings in a storage room to where we are now. We have found a home in the Sullivan Center for Innovation and Leadership (SCIL), where we continue to foster our founder's hope for STEM education and opportunities for all. Our accomplishments in and outside of FIRST have shown that we are aligned with the SCIL's mission of self-discovery and innovation. The roots of 'Ilobotics can be seen through the way members in different specialties form family-like bonds and come together as one 'ohana, one family, and "One Team."

Accessible Opportunities

Our intention as 'Ilobotics has always been to spread STEM education to other communities, but in this year in particular, we began to focus on how to do that effectively. Our theme for the year is "accessible opportunities." We recognize that the universe equally distributes talent, but not necessarily opportunities. Our goal this season was three-fold: to create self-sustaining STEM programs, to put STEM education assets into the hands of local community leaders, and to globally distribute self-authored, open-source STEM resources. We aim to impact education at a systemic level in order to reach more students, and through the use of digital curriculum, we've been able to freely distribute STEM curriculum to teachers.

Lower School Pop Up Shop

Part of our sustainable STEM program includes our lower school STEM pop-ups. 'Ilobotics, along with other STEM clubs, meets with 'Iolani lower school (LS) students (grades K-6) once a quarter. The program curriculum is based on STEM-related activities in order to introduce our burgeoning creators to innovation and critical thinking. We've created circuits for light-up Christmas cards and flown mini drones. This program creates a wide range of opportunities for young students to learn about robotics and STEM in a friendly and open atmosphere. Developing a strong relationship with our LS counterparts ensures a skilled and sustainable pool of future members in the STEM community.

Boys & Girls Club STEM Partnership

The SumoBot STEM program for the B&GC is in its second year. This six-week long program immerses students in the engineering field and requires that students build, CAD, and control their bot under the guidance of an 'Ilobotics member. 'Iolani School and 'Ilobotics donated over \$6000 of computer equipment to ensure the longevity and sustainability of the SumoBot program, which is based on access to free cloud platforms like Onshape. This is an open-source introduction to STEM learning with the robot platform and electronics available for less than \$10 a student. Future plans include a training for B&GC administrators to equip them with the technological skills to execute the SumoBot program without the assistance of 'Ilobotics. This will put community members in positions of STEM leadership, which further advances the current mission of 'Ilobotics and FIRST.

FRC Transition & Preparedness

In the spirit of sustainability and cooperation, our senior members taught incoming members about the basics of FRC. We invited Moanalua High School's robotics team (2348) and coaches to join our new members for seminars during our first weeks of the off-season. Training during the seminars covered basics of mechanical design, computer-aided design (CAD), electronics, and programming. Veteran members introduce new FRC members to the 'Ilobotics team by working together to design and create small robotics projects. Projects such as a dedicated programming bot with a catapult and robot drivetrain builds teamwork and camaraderie. Through these projects, new members gain mastery in 3D modeling, fabrication, electronics, and programming. These skills prepare them for their first season in FRC.

Open Source Projects

Ten years since our creation, 'Ilobotics is still committed to the same goals: making STEM education and opportunities accessible for all. Sharing our projects along with developing programs and curriculum for other communities is a foremost priority. We showcase our robots and projects at numerous venues, such as the Schools of the Future conference, EdTech Conference, the Mini Makers Faire, and the annual 'Iolani Fair. We are able to share about real-world projects that our members have been working on via public forums and share the accompanying curriculum that our team develops.

Environmental Monitoring

Essay - page 2

This year, we took a real-world environmental project — an aquaponic monitoring sensor that was transformed into a monitor for a local waterway — and focused on how to make it replicable for other communities. We developed a handheld monitoring system to read temperature, track data transmission location, and collect data on sediment conductivity. We collaborated with nearby schools in the creation and installation of a waterway monitoring system. The system transmits data to a website for online access, and is recorded in a public Google spreadsheet on our 'lobotics website. By the end of the project, we'll have multiple monitoring stations along the water system providing real-time data. Over several weeks, students and teachers from Robert Louis Stevenson Middle School visited 'Iolani and learned how to code and solder. On the program's last day, we hiked with Stevenson students into M?noa Stream — a waterway that leads into the Ala Wai — to install the sensor. Monitoring these factors provides critical data about our native ecosystem. With the sensor system in place, we have the quantitative support needed to back a qualitative observation: the heat in our streams is preventing native fish from swimming up the Ala Wai and into the ocean to give birth. With this information, students can make informed decisions regarding the development of Honolulu to protect our native species and island. This project teaches students how to think like a scientist and inspires hope for future STEM endeavors as they see technologies that can shape their world in many ways.

Ala Wai Catamaran: C²

This year, a group of 'lobotics members worked with teachers and other students to create a new and improved version of the Ala Wai Catamaran, a previous project made by 'Iolani students and faculty. C² is designed to ensure high standards of data collection, required by the scientific community. Our goal is to implement a system that allows for real-time data collection and processing, as well as cloud based storage. C² utilizes machine vision, cloud-based data logging, and modular design. This would allow anyone from scientists to local students to monitor the Ala Wai Canal; only internet access is required.

Global Reach: eBooks

In order to extend the reach of our team beyond our island state, we have created and published educational eBooks complete with tutorials and graphics. These books have been made available to schools across the world, including but not limited to: Future School in South Korea, El Colegio La Loma Maestro Cristóbal Chanfreut in Dos Hermanas, Spain, American International School in Hong Kong, and the Philippines through Barstow High School, located in California. By providing easy-to-follow curriculum for teachers who are less knowledgeable in STEM, we are providing more STEM learning opportunities to their students. Future endeavors include translating the eBooks with the help of our international boarding students into Korean, Japanese, Mandarin, Vietnamese, and arguably most importantly, into 'Olelo Hawai'i (Hawaiian language), the language of the indigenous people of Hawai'i.

With the generous support from our school, the motivation and inspiration from our community, and a goal to ignite passion in others through STEM and the spirit of FIRST, 'lobotics will continue to give back to our community. We firmly stand by our conviction that robotics and the FIRST mission has a place in every field of study: in the arts, humanities, environmental endeavors, science, and technology. Our focus is to create sustainable STEM programs in burgeoning communities that did not already have STEM curriculum. It is a great thing when we can partner with organizations to mentor and support STEM learning, but it is even greater when we can empower someone from that community to become a STEM leader. Our local focus in the future will be to assist our current partners in maintaining their momentum. Internationally, we intend to continue to author and distribute our digital STEM resources. Growing with and alongside our fellow FIRST members is one of the greatest benefits of our community. We have extended ourselves in a way that we never have before; and though it was not easy by any means, it was fruitful indeed. We give because we have been given; we serve because we have been served; and we help because we have been helped. It will always be part of the 'lobotics mission to lend, mentor, and serve in the education of others. We are especially grateful to FIRST for providing us with a way to find our purpose in humble service to others.