

## Chairman's Award - Team 1678

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2020 - Team 1678

### Team Number

1678

### Team Name, Corporate/University Sponsors

DJUSD/UC Davis/Hill Engineering/Lockheed Martin/UC Davis College of Agricultural and Environmental Sciences/Castellucci & Associates, CPA/UC Davis College of Engineering/Walmart/Bayer/Boeing/Recology/Intuitive Surgical/Claire and Nicole (Goodhome Group)/West Coast Products/Comcast/M.CUBED/UCD College of Letters and Science/UCD College of Global Affairs/American Council of Engineering Companies/Da Vinci Boosters/Frontier Energy/Wehner Accounting & Tax, INC/Moore and Moore Attorneys/In Memory of Grant Coon/Innovation FIRST International/GitHub/Aerometals&Davis Senior High School

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

Since 2014, our team has grown from 47 to 95 students. Our Peer-to-Peer teaching structure encourages experienced students to teach new students, creating a sustainable knowledge cycle. Our students spend 4000+ hrs/yr mentoring Davis Youth Robotics (DYR) teams, improving their own communication skills while educating others. 87% of our alumni attended college with 85% of those attending majoring in STEM. All alumni who didn't go to college went directly to a STEM-related career.

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

Over 4 years, we've grown from 2 sessions of RoboCamps (2016) to 8 (2019), impacting 496 campers. We've provided scholarships to 28 DYR participants. 48 girls attended 2 Girl-Powered weeks run entirely by female counselors (2018-19). We've hosted 5 Girl-Powered events at our local library with 150+ total attendees. We trained 95 police officers, hospital personnel, and shelter volunteers to use our Shelter Finder website, finding over 100 available beds in local shelters since 2018.

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

The Compass Alliance (TCA) is a collection of team resources, with 34 of 68 documents created by 1678. FIRST endorsed TCA for its accessibility (4 available languages) and effectiveness, guiding teams from rookie to self-sustaining. Weekly for 8 years, our Farmer's Market booth has reached out to our community using a DYR robot to spread awareness of FIRST. We brought FIRST values to our high school's curriculum with 3 robotics courses that have provided CTE credit to 485 high school students.

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

8 dedicated students from Citrus Service (CS) have provided 242 teams with mechanical support, bumper construction, and programming help at 12 competitions. 20 students traveled to Hangzhou, China over the past 2 summers to participate in 3-day workshops, teaching 10 novice Chinese teams FRC practices. 3 1678 students have won Dean's List: Megan Y, Maya B, and Katie S. 2 1678 members were invited to appear in a FIRST-Lucasfilm collaboration video promoting #ForceForChange with 9445 views.

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

We started and continue to mentor 3 local FRC teams: 5458 Digital Minds (2015), 6174 Kaprekar's Constants (2016), and 7229 Electronic Eagles (2018). Using our manuals, resources, and structure, we helped 5458 and 6174 start their own sustainable RoboCamps in 2018. With our financial support, 5458 traveled to the 2015 and 2017 Champs. Every weekend of 2018, members of our team mentored 7229 in our shop, which led them to Sacramento Regional Highest Rookie Seed (2018).

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

Our DYR program grew from 1 team (2013) to 47 teams (2019) with over 400 students. All 3 League & 2 Schools competitions held every year since 2017 are fully staffed by 1678 students. An average of 42 teams attended each tournament this year, the most yet. Proceeds from DYR RoboCamps circle back to benefit DYR, enabling us to give 81 kits to 7 DYR League teams, 5 elementary schools, and 3 middle schools. 47 1678 students are regular mentors to DYR teams.

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

1678 has helped 3 FRC teams in our area (2073, 5458, 6174) start youth robotics programs. Our students hold video calls with teams across the world (2168, 4590, 6896), helping them improve their team. For the last 5 years we have co-hosted an off-season event with 2073 and 3859 where we held 20+ Fall Workshops that reached 60,000+ viewers through recordings in addition to 856 attendees. CS is expanding globally with Service Stations to allow teams to create their own program that emulates CS.

**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 assisted Team 4590 in starting the first Vietnamese FIRST team, 6520. Our team works with FRC teams worldwide: 2 mentors attended Team 3132's Mentors Without Borders conference in Australia every year from 2016-19 and a third visited Hawaii to assist Team 3880 in setting up a CNC mill in 2019. Last year, our team traveled to Wuping, China with 3132 to teach English and FLL robotics with LEGO EV3 kits. In addition, we mentor 4 FRC teams in California.

**Describe your Corporate/University Sponsors**

UC Davis (UCD), a core sponsor since 2011, supports us in developing Shelter Finder, starting STEM programs in Argentina, and hosting RoboCamps for international students. We help plan the Sacramento Regional, hosted by UCD, and tour sponsors around the event and around our shop every year. 3 of our mentors are UCD students or alumni. From 2016-18, NVIDIA allowed us to test and give feedback on their Jetson TX1 code technology.

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

We create personalized videos for major sponsors, visually showing their impact on our program. Our strong relationship with Davis Joint Unified School District (DJUSD) resulted in a STEM facility on campus, which hosts our team's build space, our RoboCamps, and 5 DYR competitions/year and has hosted 485 students in the first-ever DJUSD robotics curriculum. Starting in 2019, we are working with our sponsor Recology to revamp our team's recycling system, heading towards a goal of zero waste.

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

FIRST is a robotics program that not only teaches students technical skills for prototyping and designing robots, but also shows them the importance of Coopertition and Gracious Professionalism. Students collaborate in groups to problem solve and work together to innovate and design their robots. FIRST spans beyond the competition by inspiring teams to use their skills to spread STEM and solve real-world issues, creating a place where the leaders of tomorrow can grow.

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

In 2018, we funded the creation of the Willett Elementary School Makerspace. Invited by the NorCal Regional Director, we showcased FIRST to 8k+ people at the California Capital Airshow (2017 & 18). In 2019, we demonstrated our robot at the California State Capitol and received a certificate recognizing our "hard work, perseverance and success at the 2019 FIRST Championship". We received the Entrepreneurship Award at the 2019 Houston Champs for our entrepreneurial spirit and business plan.

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

Our team's growth has enabled us to inspire a wide audience in previously unavailable ways. We provide FRC-specific resources to teams across the world: a yearly Kickoff rules test used by 980 unique teams, our annual robot CAD with 2704 downloads, and scouting whitepapers with 8,300+ downloads. Our team has supported FIRST growth efforts in Vietnam, China, Australia, Honduras, and Argentina. We appeared in 8 FRC community shows, 4 television programs, 3 radio shows, and 200 newspaper articles.

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

Livy Taylor

## Essay

Team 1678 Citrus Circuits is built on three core values: educate, empower, and excel. Our mission to promote these values through FIRST starts in our local community and extends to thousands across the globe. Our sustainable programs and community visibility make our team a force for change, building a new future through STEM.

### OUR TEAM

Our team structure is the foundation for what makes us a role-model team. Through our Peer to Peer (P2P) model, veteran students teach new students the skills they need to be effective contributors during build season and beyond, fostering leadership and collaboration. We've grown from 10 students in 2004 to 95 students across 6 student-run subteams. This season's leadership team is 40% female, matching our full team's female-to-male ratio—a 50% increase from 2015.

Participation in 1678 gives members access to new opportunities. 94% of our alumni chose to move on to college, and 87% of those who did majored in STEM subjects. Some, such as Wesley, who works at Google, go straight into STEM careers after high school using the skills they learned from FIRST. Others remain involved in FIRST: our alumna Kelly now mentors Team 125 in Boston and maintained field systems for the recent FIRST Global event in Dubai.

Our team's community visibility showcases STEM through strategic partnerships with sponsors. Our resources support their programs, helping Davis Joint Unified School District (DJUSD) develop a new makerspace at Willett Elementary School, integrating UC Davis's (UCD) Medical Center into our Shelter Finder project, or beta testing CTRE's new Falcon 500 motors. Each year at Sponsor Open House, we invite sponsors to tour our shop and see the tangible effects of their support. Our visibility lays the foundation for our team's success: we demonstrated our robot at the California State Capitol in 2019 and were invited by FIRST to star in a promotional Lucasfilm video to support #ForceForChange.

### DAVIS YOUTH ROBOTICS (DYR)

DYR introduces children to FIRST values at a young age through our League, Robocamps, and Schools programs.

DYR League allows students in grades 4-8 to experience robotics outside of school. The program has grown from 21 teams and 150 children to over 250 students on 36 teams. Each team is offered a 1678 student mentor who is trained to use the skills they've learned in FIRST to foster teamwork, critical thinking, and problem-solving. League follows an FRC-like competition structure, so participants can easily transition to FRC once they reach high school.

Each summer, every DYR RoboCamps week is staffed by 1678 student counselors who guide campers in developing a passion for STEM. We've expanded from two sessions (2016) to eight sessions (2019). All RoboCamps profits are reinvested in DYR, allowing us to provide scholarships to 28 students over 4 years. Our RoboCamps Guide, outlining our camp structure and procedures, is available for FRC teams to use to start their own sustainable RoboCamps.

DYR Schools makes robotics available to all students regardless of income through a collaboration between our 501c(3) non-profit organization, the Davis Robotics Foundation (DRF), and our sponsor DJUSD that allows us to fully fund programs at 11 elementary and junior high schools. Through DYR Schools, students learn to collaborate and solve problems creatively during the school day. Our 3 high school robotics engineering classes, one of which will be recognized as an Honors class in 2020, made FIRST a recognized part of the California Career Tech Education pathway, enrolling 485 students since 2014.

### DIVERSITY IN STEM

We encourage gender diversity in STEM through our Girl Powered events and partnerships with local Girl Scout troops. Since December 2018, we've run 5 Girl Powered events where, with an array of hands-on activities, we've empowered over 110 young girls through STEM. We have also partnered with 2 local Girl Scout troops to host similar activities, helping girls earn STEM badges.

We have expanded the reach of FIRST within local underserved communities by starting and mentoring Teams 5458 Digital Minds (2015), 6174 Kaprekar's Constants (2016), and 7229 Electronic Eagles (2018). We share our resources and facilities and work with these teams throughout the year, providing continual support and offering fiscal hosting through our non-profit, DRF. In offseason 2019, 1678 began mentoring rookie Team 8048 EPA Robotics in East Palo Alto. This year, we hosted Kickoff for 22 local FRC teams, including the three we started.

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The popularity of our RoboCamps has allowed us to expand the program to reach more students from diverse backgrounds. This year we hosted the first session of camps for international students in partnership with our sponsor UCD, with 10 Chinese students attending and plans for more next year. We've also engaged 48 girls in STEM across two all-girl weeks since 2018. Our RoboLoans program will begin in the summer of 2020, lending kits and supplies to local teams running camps until they generate enough revenue to purchase their own. By ensuring that camps are self-sustaining and reach a diverse group of children, we are maximizing the reach of RoboCamps.

Recently, our team's efforts to spread STEM through FIRST values have expanded globally. In summer 2019, we traveled with HOF Team 3132 to rural Wuping, China and taught 71 underprivileged children English through FLL robotics. Since March 2019, we've supported a high-school robotics program in Honduras: we sent them 12 laptops and 15 robotics kits, and video call with them to develop their program. We have invited the students to visit our shop in August 2020 for a week of RoboCamps-inspired workshops. In collaboration with our sponsor UCD, we hosted 2 groups of 10-11 Argentinian students at our shop in 2018 and 2019, showing them our facilities and teaching them to drive our robot. This year, the group visited Capital City Classic and completed a prototyping challenge with 1678 students. Our aim is to inspire future international leaders to pursue STEM when they may not otherwise have had the chance to do so.

### IMPROVING THE FIRST EXPERIENCE

Since 2014, our team has co-hosted the Capital City Classic (CCC) offseason event with FRC Teams 2073 and 3859. In 2019, 45 teams competed and attended our signature Fall Workshops (FW), which we have held since 2014, totaling 96 so far. This year, 856 attendees at 25 workshops (13 of which were hosted by 1678 students) learned about topics such as Website Design, Student Leadership, and System Modeling in an FRC context. Since 2018, FW has been live-streamed, sharing this information with those who could not attend. Other FRC teams, such as Team 1339, have created their own workshops series modeled on FW's sustainable educational structure.

For the past two years, we have been one of ten international teams invited to attend the Qianjiang International Robotics Invitational (QIRI) in Hangzhou, China. During QIRI, we spent 30 hours over 3 days helping 11 novice Chinese FRC teams build, wire, and program their robots. In addition, team members gave 5 Fall Workshops-style presentations on a variety of FRC topics. At the competition's end we were proud to receive an International Ambassador banner recognizing our spirit of Gracious Professionalism when interacting with all other teams.

Committed to promoting excellence, we support other teams throughout the year. At every FRC competition, eight students dedicate their time to assisting teams with robot issues as part of Citrus Service (CS), which aims to raise the level of competition for everyone at events. In 2018, the CA Regional Director invited CS members to Silicon Valley Regional, where we were not competing, in recognition of the value of this program. In 2019, CS assisted 86 teams at 4 competitions, reaching a total of 242 teams since 2017. Building from the success of CS, we are creating Service Stations to expand beyond the reach of our own students: 7 FRC teams will run CS-inspired programs at 29 events across the world in 2020, 16% of all events this year.

We are a founding member and on the leadership team of The Compass Alliance (TCA), a worldwide collaboration with Teams 125 in Boston, 3132 in Australia, 1241 in Canada, and many more. TCA consists of written and videotaped resources, virtual mentor-matching, and a chat center available to every FRC team. Our team wrote and revamped 34 of the 68 documents on TCA's website repository and organizes translation into Spanish, Turkish, and Mandarin. TCA collaborates with FIRST HQ, which hosts TCA resources on the HQ website and promotes their valuable information in blog posts. By making quality resources available to FRC teams all over the world, TCA enables them to reach new levels of competition and sustainability.

### USING FIRST TO GO FURTHER

We use skills from FIRST to help people in our region with the Shelter Finder application, a student-developed web app that tracks open beds at local homeless shelters. This effort grew from Davis to surrounding cities of Sacramento and Woodland and has found over 100 beds for those in need. Our students have collaborated with the Davis Police Department, local emergency rooms, and local shelters to lead trainings for 95 first responders and volunteers in the past 3 years. Each time the app is used, an individual is able to spend a night off the streets and in a shelter.

Our team's commitment to education, empowerment, and excellence pushes us to promote FIRST and its values worldwide. Our ability to engage our town's youth in robotics, promote diversity in STEM, and improve the competitive experience of FRC teams worldwide comes from our dedication to these ideals and drives us to push further, using FIRST to change the world.