

Chairman's Award - Team 1678

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2022 - Team 1678

Team Number

1678

Team Nickname

Citrus Circuits

Team Location

Davis, California - USA

Describe the impact of the *FIRST* program on team participants within the last 3 years. This can include but is not limited to percentages of those graduating high school, attending college, in STEM careers, and in *FIRST* programs as mentors/sponsors.

Team 1678 fosters a spirit of growth + innovation by: engaging 86 current students through the Peer-to-Peer (P2P) education and industry-standard technical experience; providing 30 company internships (e.g. SunPower, NovaSource, Advanced Farms). 97% of alumni attend college, 89% in STEM fields. Alumni hired by Apple, Tesla, Citadel, SpaceX, Uber, Google, Facebook, many are FIRST volunteers/mentors. 71% of 1678 student leadership identify as female/non-binary. 11/12 team captains were female.

Describe your community along with how your team addresses its unique opportunities and circumstances.

A driving force in our college town, we spread FIRST with an informational booth at Davis Farmer's Market, 1000+ attendees a day pre-COVID. Collaborated with UC Davis (UCD) on: hosting the Sacramento Regional (44% of 2019 volunteers were 1678 students); organizing international RoboCamps; implementing Shelter Finder (since 2017), a 1678 student-developed web app which aids first-responders in connecting our homeless population to open beds in shelters.

Describe the team's methods, with emphasis on the past 3 years, for spreading the FIRST message in ways that are effective, scalable, sustainable, and creative. How does your team measure results?

Integrated free robotics education into our schools for all 4-12th graders resulting in a dedicated robotics facility. Created a career-technical pathway; grew from 1 class to 4 (Introduction to Advanced Honors). Impacted 436 students since 2017. Recognized as a UC-approved Honors course (2019). Invited to Hangzhou, China for Citrus Service to assist rookie FRC teams in building sustainability (2018&19). Traveled to Wuping, China with Team 3132 to teach FLL robotics with LEGO EV3 kits (2019).

Please provide specific examples of how your team members act as role models within the FIRST community with emphasis on the past 3 years.

Chosen by FIRST HQ to inspire other FRC teams, official Star Wars Force for Change video shown at kickoff (2020), FIRST to Register FRC 2021 season, FIRST Build the Future (2022). Run annual Fall Workshops to globally share technical guidance (moved to virtual platform, 30 Workshops+29 teams presented in 2020, 60% given by 1678 students and mentors). Attended 15 conferences since 2020 (e.g. 3132's 24 hours of STEM, 694's Stuy Splash, FRC Shanghai Global Dialogue)

Describe your team's initiatives to Assist, Mentor, and/or Start other *FIRST* teams with emphasis on activities within the past 3 years.

Started and mentored 4 FRC teams in local underserved communities: 5458, 6174, 7229, and 8048. Created Citrus Service (CS) to provide technical support to over 275 teams at 11 FRC competitions. Created Service Stations to bring CS worldwide; trained 7 teams to emulate CS at 4 competitions (2020). Hosted local Kickoff since 2020. Create yearly FRC rules test since 2016, 2,500+ uses since 2018. Released resources: robot code, scouting whitepapers, mechanical training standards and 10 robot CAD.

Beyond starting teams, what initiatives have you done to help inspire young people to be science and technology leaders and innovators? What results have you seen from your efforts in the past 3 years?

Created Davis Youth Robotics (DYR) in 2013. 29 League teams, 10 Schools teams, 8 weeks of summer RoboCamps in 2021. Impacted 440 students this year. 1678 students mentor DYR. Integrated free robotics into our elementary schools through Schools program. Received 18 scholarships for Robocamps from DJUSD to provide camps to disadvantaged students in 2021. Students feed into FRC, 48% of 1678 came from DYR. Hosted Girl Scout troops at Girl Powered events and DYR tournaments.

Describe the partnerships you've created with other organizations (teams, sponsors, educational institutions, philanthropic entities, etc.) and what you have accomplished together with emphasis on the past 3 years

Co-founded and led The Compass Alliance (TCA) with 9 FRC teams since 2017 to provide FIRST-endorsed resources for FRC teams. Created 16 resource pathways in 4 languages, virtual mentor exchange, and 24/7 season call center (1678 covers 8 shifts, 30+ hours/week) for technical support. Created 23 worksheets on diverse topics to put into the Kit of Parts for the 2023 season in collaboration with FIRST HQ. Co-host yearly offseason competition Capital City Classic with 2073 and 3859 since 2014.

Describe your team's efforts in the past 3 years to promote equity, diversity, and inclusion within your team, *FIRST*, and your communities.

Our motto, Educate, Empower, Excel, drives us to promote equity. Through DiSTEM, hosted 21 Girl Powered events since Dec 2018, reaching 373 girls grades 3-8. Two WiSTEMinars in 2021 educated students on issues facing women in STEM. Donated Maker Space to local elementary school (2019). Granted 67 (\$18,000+) Robocamps and League scholarships since 2016. Ran STEM activities for underserved students at La Casitas (Yolo Community Housing, 2019). Donate lathes, materials, and resources to FRC teams.

Explain how you ensure your team and the initiatives you have created will continue to run effectively for the foreseeable future

1678 focuses on sustainability. 72% of current outreach programs have been running for at least 4 years due to our peer-to-peer model, where veteran students train new members. Our 17 designated student leads oversee the success of each program and take steps towards growth and self-sustainability. By students teaching other students, we have created a sustainable cycle of leadership and knowledge to ensure the longevity of each program.

Describe your team's innovative strategies to recruit, retain, and engage your sponsors within the past 3 years

We recruit new sponsors via parent connections, local Farmer's Market, networking through mentors, and UCD. Our Sponsor Retention Program focuses on direct student-to-sponsor communication to maintain mutually beneficial partnerships. We work with our sponsors hands-on: beta tested Swerve Drive Specialties modules and products for West Coast Products. Collaborate with UCD on local and international outreach. Annually invite sponsors to the Sacramento Regional and our Sponsor Open House.

Highlight one area in which your team needs to improve and describe the steps actively being taken to make those improvements.

Ensuring engagement amongst all members has become a challenge as our team grows. We started our first four-day New Member Orientation in Summer 2021 to acclimate students to 1678 and allow them to find the subteam they feel most passionate about. Our P2P team structure creates bonds and builds confidence. We have also established a confidential Student Advocate and biannual climate survey to make sure students feel represented by reaching out anonymously with concerns and suggestions.

Describe your team's goals to fulfill the mission of *FIRST* and the progress you have made towards those goals.

1678 shapes the future of STEM innovation and excellence. We expand local youth robotics (e.g. 1 League team in 2013 to 29 now), drive STEM education accessibility, share our resources to uplift the FRC community (e.g. TCA, CS, FW, Chief Delphi, ties to FIRST HQ), support local and global underserved communities (e.g. DiSTEM), and empower future leaders as evidenced by our alumni. We bring FIRST's potential to the world we live in, and we're not done yet (e.g. Service Stations, KoP worksheets).

Briefly describe other matters of interest to the *FIRST* Judges, including items that may not fit into the above topics. The judges are interested in learning about aspects of your team that may be unique or particularly noteworthy.

Donated 12 laptops+15 robotics kits to robotics program in rural Honduras. Designed and sold special-edition Citrus for

Change shirts, donated \$2800 profits over 2 years to local charities (Sac NAACP, Sac Youth LGBT Center, NAMI Yolo, Asian Americans Advancing Justice, NorCal ACLU). Made 800+ PPE face shields for 10 medical facilities in 2020. 5 Deans List finalists, 2 WFFA recipients. 2021 Game Design Challenge winners, hosted CADathon based on game. Over 5,500 volunteer hours in 2021.

Essay

Educate. Empower. Excel. These are the core values of 1678 Citrus Circuits that work together to drive our whole team. The dedication of our students and mentors has built a yearlong program that reaches beyond FIRST to create new opportunities for all.

We are "student led, mentor driven." Our Peer-to-Peer structure allows students to train each other in leading every aspect of our team, ensuring the sustainability of our programs. Even amidst the challenging circumstances presented by the pandemic, our outreach programs continue to flourish as they support FIRST's mission.

FOSTERING THE FUTURE OF FIRST

1678 provides equal access to robotics education for every kid in our community. We begin with the 3 branches of Davis Youth Robotics (DYR) □ Schools, League, and RoboCamps. Each program fosters FIRST values such as Coopertition and problem-solving through hands-on robotics.

DYR Schools, initiated in 2015 in collaboration with our school district, is a free enrichment program for students grades 4-8. This unique partnership fully funds 10 elementary and junior high school programs, educating 170 students yearly. This is made feasible by the technical guidance from 1678 student mentors who support each site teacher, ensuring its sustainability. "1678 was instrumental to the success of our program and not just over 1 year □ but over the 5 that I was the teacher of DYR Schools" (Cathy Scarr, Davis School for Independent Study). By bringing robotics directly to Davis schools, DYR guarantees equal access to a STEM experience and reaches across socioeconomic divides.

1678 founded the first youth robotics program in Davis, DYR League. Since 2013, this competition-based program has grown from one team to 29, educating 150 students this year alone. League's success results from 1678 student mentors who work closely with each DYR team weekly. Since 2016, we have run 3 DYR competitions yearly. In December 2021 alone, we attracted 44 teams from all over Northern California. To ensure equal access to DYR, 67 scholarships worth over \$18,000 have been awarded to date.

RoboCamps began with two weeks in 2016 and expanded to eight weeks in 2021, educating 702 kids in total. They are staffed by trained 1678 student counselors. Addressing the diverse needs of our community, we annually award scholarships, 25 in 2021 alone. In addition, we offer specialty camps such as Girl Powered and Advanced Programming. During COVID, RoboCamps went virtual. Each student built their robot at home to complete challenges, and connected with their counselor and other campers through breakout rooms. 100% of proceeds from the camps are reinvested into DYR to fund scholarships and provide materials for DYR Schools.

Youth robotics would not exist in Davis without 1678's DYR program which has provided equal access to STEM education to over 2,000 students thus far. We have integrated robotics into our schools and have built a robust robotics pipeline in our community □ 48% of current 1678 students came from a DYR program.

PROMOTING DIVERSITY THROUGH FIRST

Our Diversity in STEM (DiSTEM) initiative promotes equity to all groups. Through Girl Powered events, scholarships, international outreach, and FRC team support, we create new opportunities.

Our Girl Powered events have grown from one yearly to now monthly. Since 2018, 373 girls grades 3-8 have explored STEM at 21 events through activities such as extracting DNA from strawberries. These sessions are led by female 1678 students who are role models as these young girls learn about the STEM career paths they could pursue.

1678 also supports FIRST worldwide. In 2018 and 2019, FIRST in China invited us to take part in the Qianjiang International Robotics Invitational, where we worked and competed with 20 pre-rookie Chinese teams. In 2019, eight 1678 students traveled to rural Wuping, China, with Team 3132 to teach 71 students robotics and English through FLL. We also collaborated with the Chinese company, GoWell Education, to bring 12 students from China to UC Davis for a special session of RoboCamps in 2019. To continue this partnership, during the pandemic we gave a virtual shop tour for 20 international students. We're looking forward to hosting team 8020 Cyberpunk from Taiwan in March 2022 and providing them supplies for the Sacramento Regional.

1678 is dedicated to supporting FRC teams in underserved communities. Since 2015, we've reached beyond Davis to start and establish local FRC teams (5458, 6174, 7229), sharing our equipment and technical guidance. All-Latino East Palo Alto Team 8048, founded at the onset of COVID-19, has continued with our direct support. Furthermore, 1678 is dedicated to reaching diverse demographics across the global FIRST community, as a vibrant resource hub for all FRC teams (e.g. code/CAD releases on Chief Delphi).

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From educating girls in Girl Powered events, providing 67 scholarships through DYR, reaching across the globe, and supporting teams in underserved communities, 1678 promotes STEM for all.

ROLE MODEL IN FIRST

1678 is a force in the FIRST community. Through The Compass Alliance, Fall Workshops, and Citrus Service, we ensure that every student has a rewarding FRC experience.

Since 2017, the Compass Alliance (TCA) has served as a one-stop-shop for all teams—new and experienced. 1678 is one of the 4 leadership teams of TCA, a FIRST-endorsed hub for FRC resources. In recognition of the 24/7 call center, virtual mentor exchanges, and 16 resource pathways in 4 languages on topics from Pneumatics to Competition Preparation, FIRST HQ asked us to make 15 resources specifically for the FIRST website, thus strengthening our partnership. Through our work with TCA, teams not only achieve competitive success, but create their own self-sustaining programs.

Our annual Fall Workshops (FW) expanded exponentially during the pandemic by moving to an online platform. We produced 30 presentations/panels, and collaborated with 29 teams globally on topics ranging from programming to outreach to robot design. Starting in 2014 with 11 workshops at the Capital City Classic offseason event, 1678 has reached 73,049 people in the past 8 years via attendees and YouTube. By having presenters from across the globe, and educating teams around the world, 1678 unites the entire FIRST community.

"Citrus Service (CS) is the perfect example of what FIRST is best known for: teams helping other teams" (Joel Lee, Lead Robot Inspector, 2019 Central Valley Regional). Since 2016 we have helped over 275 teams by dedicating our most technically talented members to supporting teams at competition. In 2018, we were invited to the Silicon Valley Regional solely for CS. Seeing the impact of CS, 1678 started Service Stations, a program under TCA that helps other teams start their own version of CS. We have trained 7 teams and aim to have a Service Station at every FIRST event by 2024.

The reliability and presence we have gained through our technical success has allowed us to serve as role models in the FIRST community, directly assisting hundreds of teams and reaching thousands more through programs such as TCA, FW, and CS.

EXPANDING BEYOND FIRST

1678 educates its students so that they can make a difference and reach FIRST's ultimate goal — inspiring the STEM innovators and leaders that will be the change of tomorrow.

Students gain valuable skills from their experience on 1678 that prepare them to go directly into the workforce. 30 internships have been awarded in the past 7 years. Students are able to apply what they learn to the real world through our Shelter Finder app, written and run by 1678 students, that has been connecting first responders to homeless shelters since 2017.

Upon graduation, our alumni actualize the mission of FIRST. 97% have attended college, 89% of whom majored in STEM subjects, and the rest entered directly into the workforce. They have been hired at places such as Apple, Google, Tesla, Microsoft, small startups and research labs. Alum Bryton said, "The skills I gained on Citrus working on a subteam and understanding the intricate workings of an intensive and large engineering project were the perfect catalyst for job preparation."

In 2015, we leveraged our competitive success with FIRST and our community visibility to establish high school robotics classes in collaboration with our biggest sponsor, DJUSD. Our 4 classes, ranging from introductory to advanced, are integrated into the Career Technical Education Pathway and have brought STEM to 631 students through a FIRST Robotics-based curriculum. The University of California system recognizes Advanced Robotics Engineering as an honors class. Capitalizing on the educational value of these classes, our school district invested in a new robotics facility that will include a machine shop and full FRC field. Construction will begin in March 2022 and serve as a hub for FRC teams in the greater Sacramento area.

From DYR Schools to high school classes, 1678 has built a free robotics program for all students grades 4-12. We have paved a path to change by educating students to apply career-ready skills and technology to real-life innovations.

CHANGING CULTURE THROUGH FIRST

By educating, empowering, and bringing others to excellence, 1678 promotes cultural change through FIRST. The commitment and curiosity of our students, the dedication and drive of our mentors, and the sustained support of our sponsors, have allowed us to grow into the team we are today. We've created a pathway for free robotics education for all students grades 4-12. We've used what FIRST has given us to open doors of opportunity within our community and beyond. We've elevated FRC teams from across the globe to success through resources and direct support. Through the longevity and impact of our outreach, 1678 leaves a lasting legacy. We will continue to educate. Continue to empower. Continue to excel.