

## Chairman's Award - Team 1678

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2021 - 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.**

On Team 1678 Citrus Circuits, our 104 current students use a Peer-to-Peer (P2P) model of education where veterans teach new students. This promotes a cycle of technical knowledge transference, empowering students to pursue jobs and internships at companies such as Apple, Google, Uber, and Sunpower. 94% of 1678 alumni attend college (where 87% major in STEM), and others go directly into STEM-related careers.

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

Our team is a driving force for the expansion of *FIRST* in the Sacramento region. Our proximity to UC Davis allows us to collaborate with them on our Shelter Finder and RoboCamps programs, as well as host the Sacramento Regional on their campus. Our team's success in outreach and competition led to the approval of a new on-campus STEM facility that we will leverage as a hub for *FIRST* in our region by providing resources to other FRC teams and increasing the capacity of our own programs.

**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?**

We took our P2P format overseas: 1678 attended two offseason events in Hangzhou, China to help rookie teams kickstart their *FIRST* season by sharing supplies and instruction. Their experience with 1678 established their passion for *FIRST* robotics. Novice team 6304 joined our winning alliance at the event and won the Chairman's Award the following year. We also traveled to Wuping, China with Team 3132 to teach English and FLL robotics with LEGO EV3 kits, inspiring 71 children.

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

Our P2P model develops student leaders: Zatarra & Rachel dedicated hours towards expanding Citrus Service (CS) from 2 to 8 full-time student experts who provided technical support to over 260 teams over 5 years, raising the bar of competition at each event. CS's impact motivated the creation of Service Stations, an initiative to help other teams start their version of CS. In 2020, we trained 7 teams to cover 4 competitions and aim to have one Service Station at every *FIRST* event.

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

Our team started and continues to mentor three FRC teams: 5458, 6174, and 7229. Last season, we also mentored Team 8048 EPA Robotics from Palo Alto. Our team's nonprofit, DRF, fiscally supports these teams' outreach and competitive efforts. In summer 2020, we held video calls with FRC Teams 2168, 2468, 6838, 6896, and 8105 to give advice on student leadership, outreach, and robot design. In 2020, our team spoke at 6 online FRC conferences hosted in Israel, China, and the US.

**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?**

This year, our Davis Youth Robotics (DYR) program has 38 League teams, 11 Schools programs, and 8 weeks of RoboCamps. 33% of current 1678 members first experienced robotics through DYR. We've run STEM activities for 2 local Girl Scout troops, helping them earn STEM badges. 1 of our 4 high school robotics classes, Advanced Robotics Engineering, follows the *FIRST* robotics model and is now a UC-approved Honors course. 265 students have enrolled in these classes since 2019.

**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**

Alongside 9 other FRC teams, we founded and continue to lead The Compass Alliance (TCA). With 16 resource pathways, virtual mentor matching, and a build season call center, TCA is a *FIRST*-endorsed "one-stop-shop" for any team in need of help. Since 2015, in collaboration with FRC Teams 2073 and 3859, we've held Fall Workshops (FW) at the offseason event that we co-host, Capital City Classic (CCC). In Nov. 2020, we ran 29 FW which were live-streamed globally and viewed 5800+ times to date.

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

1678 created our Diversity in STEM initiative in 2018. Since then, we've hosted 10 Girl Powered events, introducing 241 girls to a variety of STEM topics through hands-on activities. We've held the last 5 events online, providing a STEM outlet to girls during COVID. DYR Schools gives 4-8th graders at 11 schools across Davis a free robotics education. We've provided 40 DYR League and RoboCamps scholarships to students that would otherwise be unable to attend, worth over \$10,000, since 2016.

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

Our P2P educational model upholds the core values of our team: Educate, Empower, Excel. Our team is divided into 16 technical and outreach subteams, each led by a student responsible for training and management. Our interview and selection process ensures our student leads are the best fit for the role based on merit and passion, guaranteeing that they can effectively pass down their knowledge to future students and continue the cycle of education, empowerment, and excellence.

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

To recruit new sponsors, we leverage our competitive success, outreach, and community partnerships. Our Sponsor Retention Program enables our students to take the lead in creating and retaining strong relationships with our sponsors. We give consistent updates on our competitive and outreach progress in a monthly newsletter and invite sponsors to our annual Sponsor Open House and the local Sac Regional. At the end of each season, we show our appreciation through Sponsor Thank You Packages.

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

Having a team of 90+ students for the past 4 years, we struggle to help students representing 5 different schools feel connected and recognized. In the past few months, we have addressed this by enhancing our P2P model with a buddy system and providing Student Advocates for members to reach out to when troubled. We are planning to host a week-long team orientation next year to help students acclimate to the team and make a more informed decision on which subteam they join.

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

Through each of our programs, 1678 inspires STEM in our communities—whether that be locally, internationally, or in *FIRST*. We educate future engineers through DYR, we empower young girls through DiSTEM, and we invite others to excel with us through CS, TCA, and FW. Our programs have provided opportunities to practice innovation through STEM that would not have existed without 1678. The success of each program enables further growth of our outreach.

**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.**

In June 2020, our Citrus for Change initiative designed and sold special-edition team shirts in support of Black Lives

Matter and LGBTQ+ rights, raising \$1800 for local charities. FIRST chose our team to be featured in an official Star Wars Force for Change video, shown at the 2020 kickoff. We've provided 12 laptops and 15 robotics kits to a newly formed robotics program in rural Honduras. In 2020, we created and delivered 819 PPE face shields to 10 nursing and medical facilities.

## Essay

Educate. Empower. Excel. This is the foundation of Citrus Circuits and what we strive to embody in every aspect of our program, from the classroom to the competition field. By educating our youth, empowering underrepresented communities, and inspiring other teams to excellence, 1678 creates real change in the world around us.

### WE EDUCATE.

Davis Youth Robotics (DYR) introduces children to FIRST values at a young age through our Schools, League, and RoboCamps programs. 33% of current 1678 students began their robotics journeys by participating in DYR.

DYR Schools provides robotics opportunities to all students regardless of income through a collaboration between our 501(c)(3) non-profit, the Davis Robotics Foundation (DRF), and our school district (DJUSD) that allows us to fully fund programs at 11 elementary and junior high schools. Through these classes and after-school programs, students work in teams to build robots that compete at end of year events. One 6th grade teacher, Ms. Cook, told us her student Miguel hugged her coming into class and said that robotics was the reason he liked coming to school every day. Without the Schools program, students like Miguel wouldn't have the opportunity to meaningfully explore STEM and robotics before high school.

DYR League provides a competitive robotics experience outside of school for students in grades 4-8. Founded in 2015 with one team, League has since grown to 38 teams serving 130 students in 2020. Each team is offered a 1678 student mentor who is trained to use the skills they've learned in FIRST to foster students' teamwork, critical thinking, and problem-solving skills. 1678 students create a welcoming environment at DYR tournaments by featuring classic FIRST competition songs and dances. We traditionally host three League tournaments a year; this year we expanded to five online events, allowing students to continue to safely participate in robotics despite the pandemic.

DYR RoboCamps began with two weeks in 2016 and has grown to eight weeks in 2020. During this week-long robotics challenge, students in grades 4-8 develop not only a love for STEM, but important life skills like communication and teamwork as they work in pairs to complete their robot. Every RoboCamps week is staffed by 1678 student counselors who enthusiastically guide campers through the engineering process, providing strong role models for younger students. This year, to transform the camps to an at-home, COVID-safe format, we provided personal robot kits to all registered students and hosted the camps over Zoom. All RoboCamps profits are reinvested into DYR, allowing us to grant 40 scholarships since 2016 to students that wouldn't otherwise be able to participate.

In collaboration with DJUSD, we've created four high school classes that make FIRST a recognized part of the California Career Technical Education pathway: Intro to Robotics Engineering, Intermediate Robotics Engineering, Advanced Robotics Engineering, and Advanced Robotics Engineering Honors. In the past three years, 265 students have explored robotics concepts during school through these classes. The success of our FIRST program coupled with the strength of these classes has resulted in the approval of a new STEM facility, including a machine shop and FRC field, at our high school. This STEM center will be a hub for the Greater Sacramento FRC community, supporting outreach and competition efforts of not only 1678, but teams across the region as we plan to open our doors to all.

Along with Teams 2073 and 3859, we run Fall Workshops (FW) at the offseason event we co-host, Capital City Classic. Every year, FW includes panels and presentations on over 20 different FIRST-related topics, including outreach, programming, and robot design. In 2020, our presenters represented 29 teams from across the world. We also added presentations on remote teamwork and online collaborative CAD. 2020 FW saw 1678 students give 13 of 29 presentations, and the recordings of the live workshops have 5,786 views to date. Katie, a student that watched our Outreach for Success panel, said that learning about how other teams give back to their communities gave her many ideas to implement within her own team.

### WE EMPOWER.

Our Diversity in STEM (DiSTEM) initiative empowers underrepresented youth in and around our community to be active participants in STEM. We've run 10 Girl Powered (GP) events since December 2018, where we've engaged 241 girls in hands-on STEM activities. In 2020, we adapted GP events to an at-home format, allowing female 1678 volunteers to continue to inspire young girls despite COVID-19. One girl, Vidya, said that the GP event she attended made her determined to build her own robot when she grew up. In March 2021, DiSTEM is hosting a week of RoboCamps-style activities for low-income children at a Yolo Community Housing center.

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In 2019, eight 1678 students traveled to rural Wuping, China with Hall of Fame Team 3132 to teach 71 students English through FLL robotics. Emily, a Chinese student, said that she was so grateful for the bonds she made with the visiting students and that she would never have been able to experience STEM and robotics if it weren't for the trip. We also collaborated with a Chinese company, GoWell Education, to bring 12 students from China to UC Davis for a special session of RoboCamps in August 2019. They were so impressed by our program that we scheduled multiple sessions of "bicultural" RoboCamps, where Chinese and American students would be paired to work through robotics challenges, but the camps were put on hold due to COVID-19.

We started and continue to mentor three FRC teams in neighboring communities: 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. We also act as a role model to other teams in the FRC community, virtually assisting teams from around the world with leadership, design, and programming questions through emails, video calls, and online forums.

1678 alumni have taken the skills they've learned from FIRST and gone on to do great things. 94% of our alumni have attended college, 87% of whom major in STEM subjects. Some like Wesley who works at Google, dive straight into STEM careers following high school. Other alumni remain involved in FIRST: our alumna Kelly now mentors Team 125 in Boston and has developed field systems for a recent FIRST Global event in Dubai.

WE EXCEL.

The Compass Alliance (TCA) is a FIRST-endorsed resource hub that we co-founded in 2017. Through 16 resource pathways, a build season call center, and virtual mentor exchanges, TCA draws on the knowledge of teams across the world to guide teams in need of help. Under our co-leadership, TCA has also published reopening plan guides and virtual meeting advice to help teams continue through COVID-19. 1678 is one of four leadership teams, and we've written 34 of 68 published documents.

Through Citrus Service (CS), we raise the level of competition at every event we attend. With our BIZ plan for success Bumpers, Inspection, Zoom we make sure that every team at competition has working bumpers, can pass inspection, and can drive during their matches. At each competition, eight 1678 students are dedicated solely to CS, meaning quality technical help is constantly available. CS has assisted 275 teams over five years and reached 104 teams in 2019 alone. In 2018, we were invited by the CA Regional Director to the Silicon Valley Regional, where we were not competing, to run CS. Because of CS's success, we founded Service Stations, a new TCA program, patterned off of CS.

During the PPE shortage at the beginning of the COVID-19 pandemic, we repurposed many team machines towards making PPE to support local healthcare workers. Our team fabricated 819 face shields and delivered them to 10 nursing and medical facilities in the Greater Sacramento area. We distributed 3,500 pounds of PET plastic donated by the Coca-Cola Company to organizations across Northern California working to make face shields. Using our 3D printers, we manufactured 75 adapters that converted scuba masks into PPE, all of which were donated to doctors at the local Sutter Davis Hospital.

We use skills learned from FIRST to help people in our community through the Shelter Finder (SF) application, a student-developed web app that tracks open beds at local homeless shelters. This effort has grown to include four local shelters that serve up to 25 people a night. Our students have collaborated with UC Davis Health, the Davis Police Department, local emergency rooms, and local shelters to lead trainings for 95 first responders and volunteers in the past four years. Each time the SF app is used, a person experiencing homelessness is able to spend a night off the streets and in a shelter.

All of these efforts are a testament to the breadth and impact of 1678's outreach. Whether it's engaging 241 young girls in STEM, assisting 275 teams at competition, or providing a free robotics education to students at 11 schools, 1678 embraces the values of FIRST to provide opportunities both locally and globally - opportunities that are instrumental in growing excitement and passion for STEM. How do we do this? We educate. We empower. We excel.