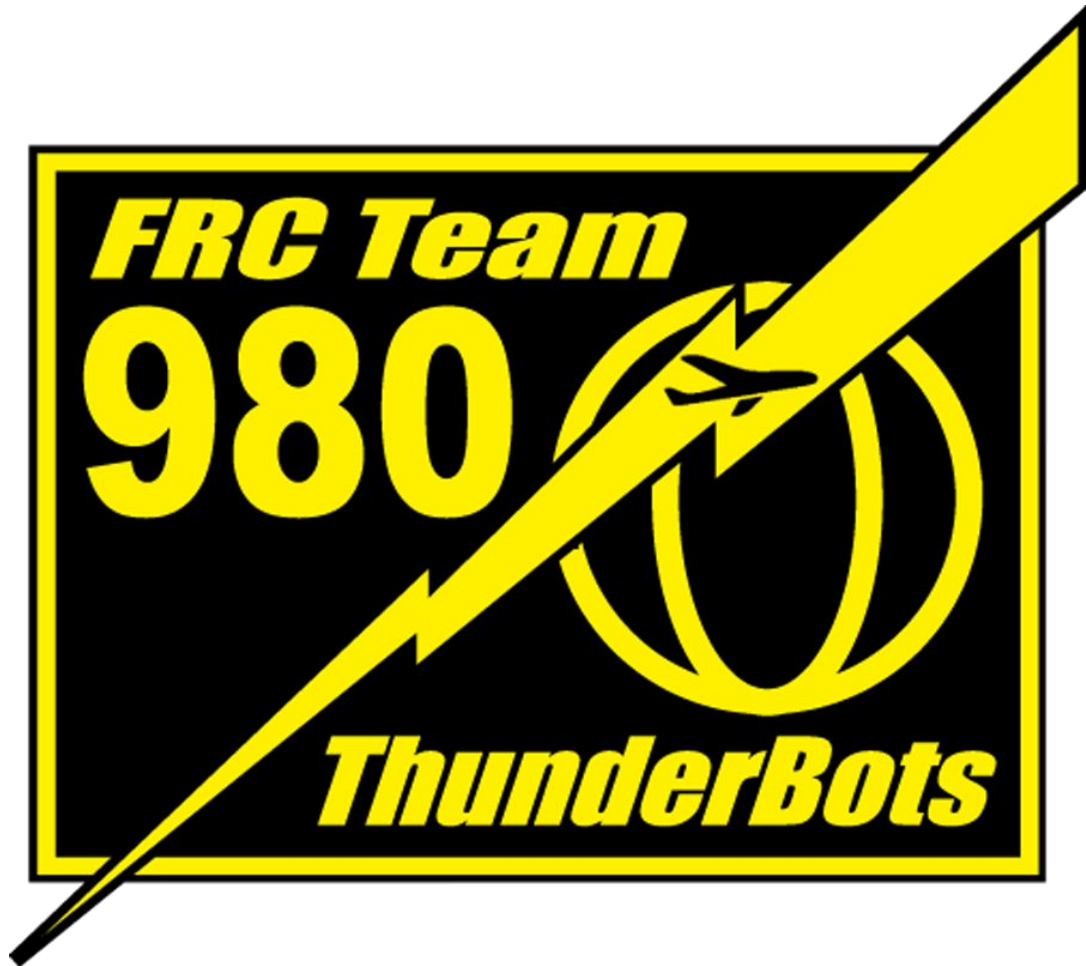


*FRC TEAM 980*

# THUNDERBOTS



**NEW HOME, NEW TEAM,  
SAME DRIVE FOR  
EXCELLENCE**

# The story of Team 980 in 2022 is the saga of our journey through COVID.

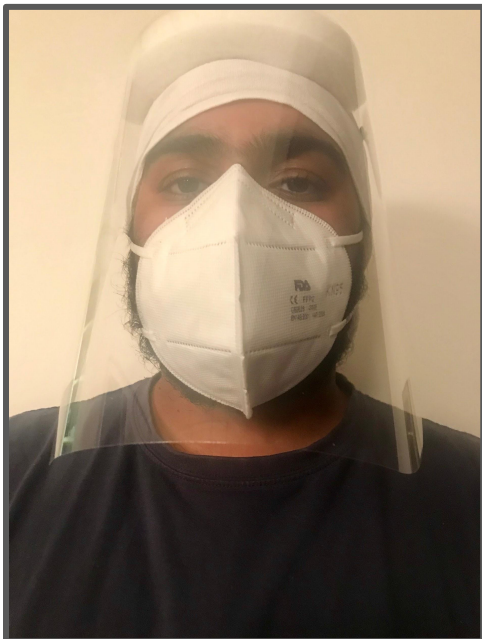
When COVID shut down FRC in March 2020, our team, like all other FRC teams, had to figure out our next steps. Our first priority was supporting public safety efforts. We contributed money to the “SoCal Makers COVID Response Team.”



The SoCal Makers COVID Response Team would like to thank...

**FIRST Robotics Competition Team 980 – ThunderBots**

Michelle Cayton  
Philip Stump  
FIRST Robotics Competition Team 6960 – The Rusty Huskies  
FIRST Robotics Competition Team 980 – ThunderBots  
Spyder3D, Inc.  
Boy Scout Troop 378  
Girl Scout Troop 116



We also designed, fabricated and distributed our own PPE to the UCLA hospitals.



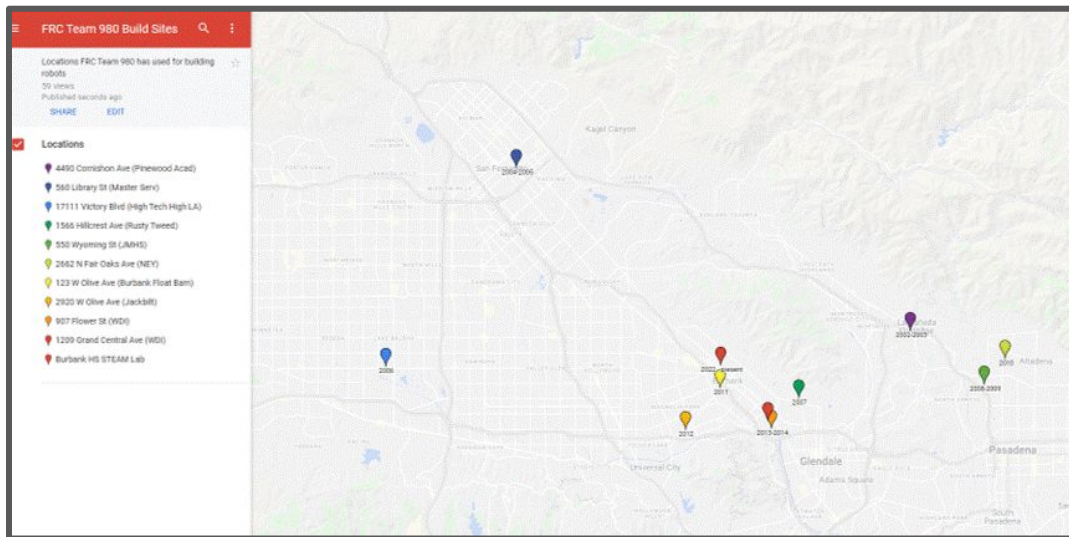
Our **second priority** was redesigning our LEGO RoboCamp as a virtual STEM camp for rising 5th and 6th graders.



Our **third**, and most pressing, **priority** became finding a new home. Almost two years later, in late-December 2021, Team 980 finally moved into our new build site at Burbank High School! Team 980 ThunderBots 2022: New Home, New Team, Same Drive for Excellence.



Having moved 10 times in our 21 years, we had identified in our SWOT that “loss of build space” is a constant threat - and COVID brought that risk from a hypothetical to an actual.

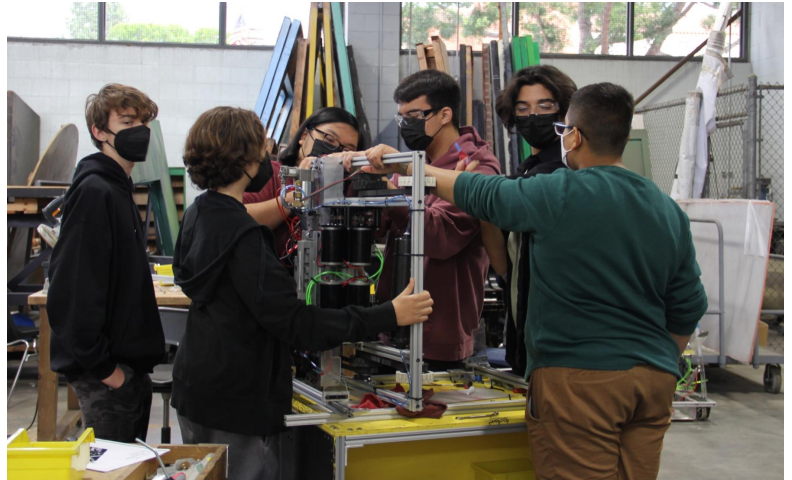


Due to the impact of COVID at the Walt Disney Company, we lost access to our build space at Walt Disney Imagineering (WDI) in March 2020, and then had to vacate that space completely in 2021. We had to make a big move or Team 980 wasn't going to survive. Applying SWOT, we sought to change the threat to an opportunity.

For a couple of years we had been talking to the Burbank Unified School District NAF Academy about collaborating, but with our equipment in storage, we needed more. Our discussions evolved from “send your students to us” into “bring us onto your campus.” After months of effort, that’s exactly what happened. Team 980 moved into the NAF Academies STEAM lab at Burbank High School. BHS students responded by joining the team in record numbers! Our roster has doubled (capped at 35 due to COVID space restrictions), and the girls of BHS have turned out to make up about 40% of the team. We’re not yet an official part of BHS, but we’ve taken the first step to making this a permanent relationship. We envision a FIRST program across the schools of BUSD, with collaborations with the BUSD Career Technical Education and corporate partners (including media and entertainment leaders).



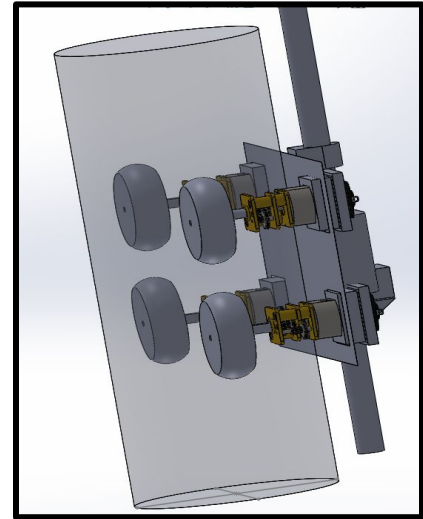
Now that we had overcome the challenge of where we can build robots, our next challenge was **how we would build**. We graduated strong student leaders in 2020 and 2021, but with COVID interrupting the 2020 and 2021 seasons, they were unable to train the younger students. Even our returning students were hands-off our robot for much of the 2020 and all of the 2021 seasons. We are essentially a rookie team, but we see that as an opportunity for long-term growth. Several of our new students are in middle school and are very engaged in the robot engineering process. This bodes very well for Team 980's future!



Team 980 has moved during build season before, but we never had to set up a well-equipped shop during build season. That made for a slow start, but we are determined to do what it takes to succeed. That includes encouraging our returning students to step up and become the student leaders, coordinating between sub-groups (Design, Fabrication/Assembly, Controls and Business), delegating tasks, and training the rookies. Team 980 has always had a clear organizational structure which suffered because of COVID, but we've done our best when we've had strong student leadership.

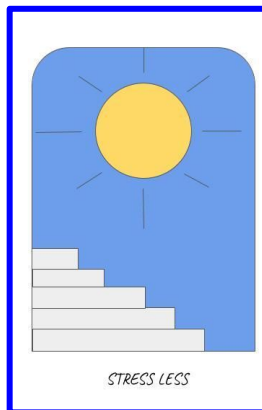


Our Design Lead, Elan, was a rookie when [Beach Blitz 2020](#) announced their [virtual “mini-bot” competition](#). Using his own 3D printer to fabricate parts, and doing assembly and testing via Zoom, the result was a small, compact robot that fulfilled the Beach Blitz and 980 design requirements, matching the performance of mini-bots made in machine shops, and that received the Judges’ Award. Our simple and cost effective design piqued the interest of a judge from Kettering, who asked us for the mini-bot’s CAD files, budget overview, and assembly instructions so that they could integrate it into their summer camp curriculum. We were also invited to participate in Kettering’s Virtual Robotics Competitions.



Major problem for teens:  
acute stress

Designed StressLess, a  
simple-to-use app and  
wearable device pair for  
adolescents dealing with  
acute stress.



Our Business Lead, Yogini, took the lead in our [2021 Innovation Challenge](#) submission, providing crucial research, professional resources and a steady guiding hand in writing and delivering our presentation.

**Don't stress, StressLess!**

Our Controls Lead, Kaylee, brought her experience with LEGO RoboCamp and 2020 Virtual STEM Camp to help train our new members to teach the 2021 Camp.

And our Fabrication & Assembly Lead, Rylan, is a rookie, but don't tell him that, because he has made that area his own!



Pre-COVID, our two main off-season activities were “Build 2.0” and LEGO RoboCamp.

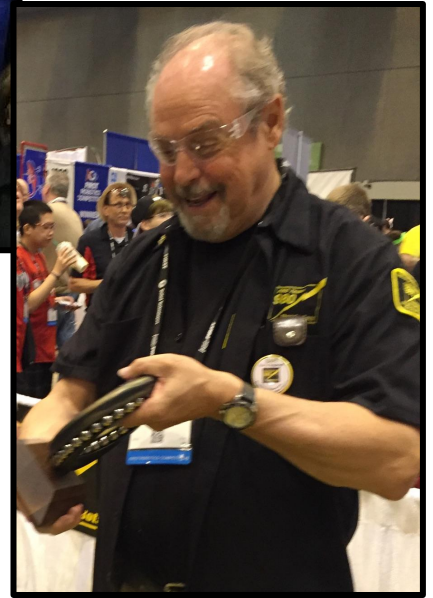
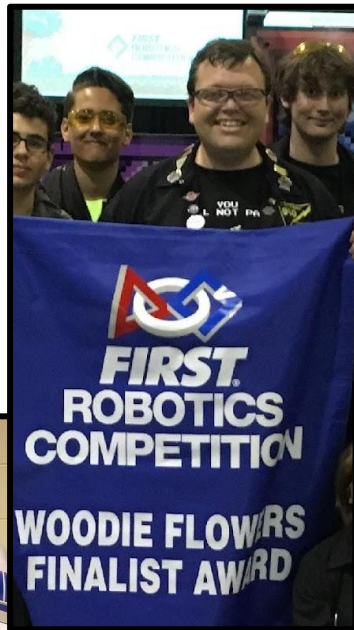
Inspired by the 2018 Captain’s return for 2019 Kick Off, Build 2.0 was started by our 2019 graduates who volunteered their pre-college summer to lead a review of the robot and redesign/rebuild of elements that did not operate optimally. Build 2.0 was an opportunity for interested students to get their hands dirty and learn about the basics of robotics. The end result of Build 2.0 was a robot that competed successfully at off-season competitions, and new team members who had mastered the basics of robot design and construction.



LEGO RoboCamp - a week long instruction of LEGO Mindstorms as preparation for FLL - faced a major rework due to COVID - and the new format worked really well. Our in-person LEGO RoboCamp was limited by space to 25 students per session. In 2020 we adapted the camp as an online STEM camp. Team 980 students created, refined and taught the curriculum themselves, and the camp was a huge success. Our camp curriculum is available for free at [team980.com](http://team980.com). We had 60 registrations, and instead of just teaching LEGO Mindstorms, we introduced middle school students to Onshape CAD as well as robotic design and mechanical engineering and brought in guest speakers from JPL, Northrop Grumman, mechanical design and IT.

Middle school students were doing Onshape CAD designs far beyond what we anticipated, even staying behind during breaks to work with other students on their designs. Additionally, other than an internet connection, participants did not have to buy anything, meaning that the program was available to everyone regardless of financial situation. Everything was done virtually - no requirements to buy a Mindstorms kit, subscribe to a service, etc. This aspect of the program caught the attention of Kettering’s Robotics Outreach Manager, who has asked for our camp materials to affect a similar program of their own. We held our Virtual STEM camp in the summer of 2021, but this time in collaboration with Burbank Public Library, with even greater enrollment.



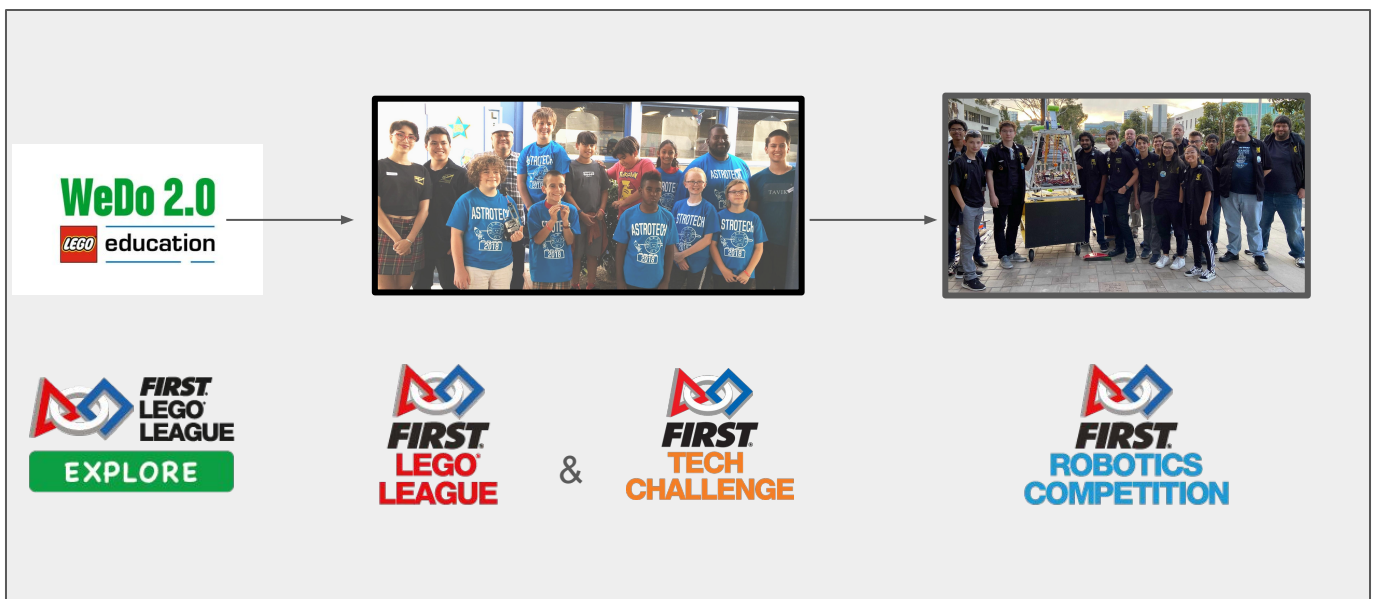


Team 980 would not be where we are without our alums and mentors. Our alums are our inspiration. Not only do we have a 100% high school graduation rate, many have gone to top universities, progressed into successful technical careers and they use their experience to improve the world. When we need help - moving our entire build site, guest lecturing for our STEM Camp, or acting as our Fabrication Mentor while attending college full time, our amazing alums are there. Our four main mentors - David Brinza, David Toyne, Alex Davis & Robin Dorfman - are all WFFAs and have almost 70 combined years in FIRST. Their dedication means that Team 980 not only survived, but thrived during the years of COVID. They helped us transition to a virtual format with regular online collaborations and then secure a relationship with the BUSD NAF Academy. Now they are guiding us through the first build season for most of the team. In addition to mentoring Team 980, they act as role models through their volunteerism. David Brinza, Lead Mentor, is a long-time FRC Lead Robot Inspector, Vice-President of LA Robotics, and member of the LA Regional Planning Committee. He was especially instrumental in developing the partnership between BUSD NAF Academies and Team 980. He and mentors Alex Davis and David Toyne were featured guest speakers at our Virtual STEM camp, inspiring young engineers by sharing their own professional experiences. Robin Dorfman is an experienced FLL and FRC Judge and Judge Advisor, and she and David Brinza served also as Judge Advisors for the Infinite Recharge At Home challenge. We thank them for their support and acknowledge the Culture of Volunteerism they have fostered in Team 980.





For the last few years, Team 980 has been working on establishing a “FIRST Pipeline” in Burbank. With the FRC team now housed at Burbank High School, BUSD now offers FLL, FTC and FRC teams within its schools. In addition, pre-COVID we had plans to offer a WeDo program with the Burbank Public Library. With that in place, students could go from WeDo to FRC within Burbank for the first time. Over the last 3 years, Team 980 has mentored 4 rookie FLL teams in Burbank, plus our veteran FLL team at Delphi Academy. We plan to strengthen those teams and establish more - enough to bring an FLL QT to Burbank.



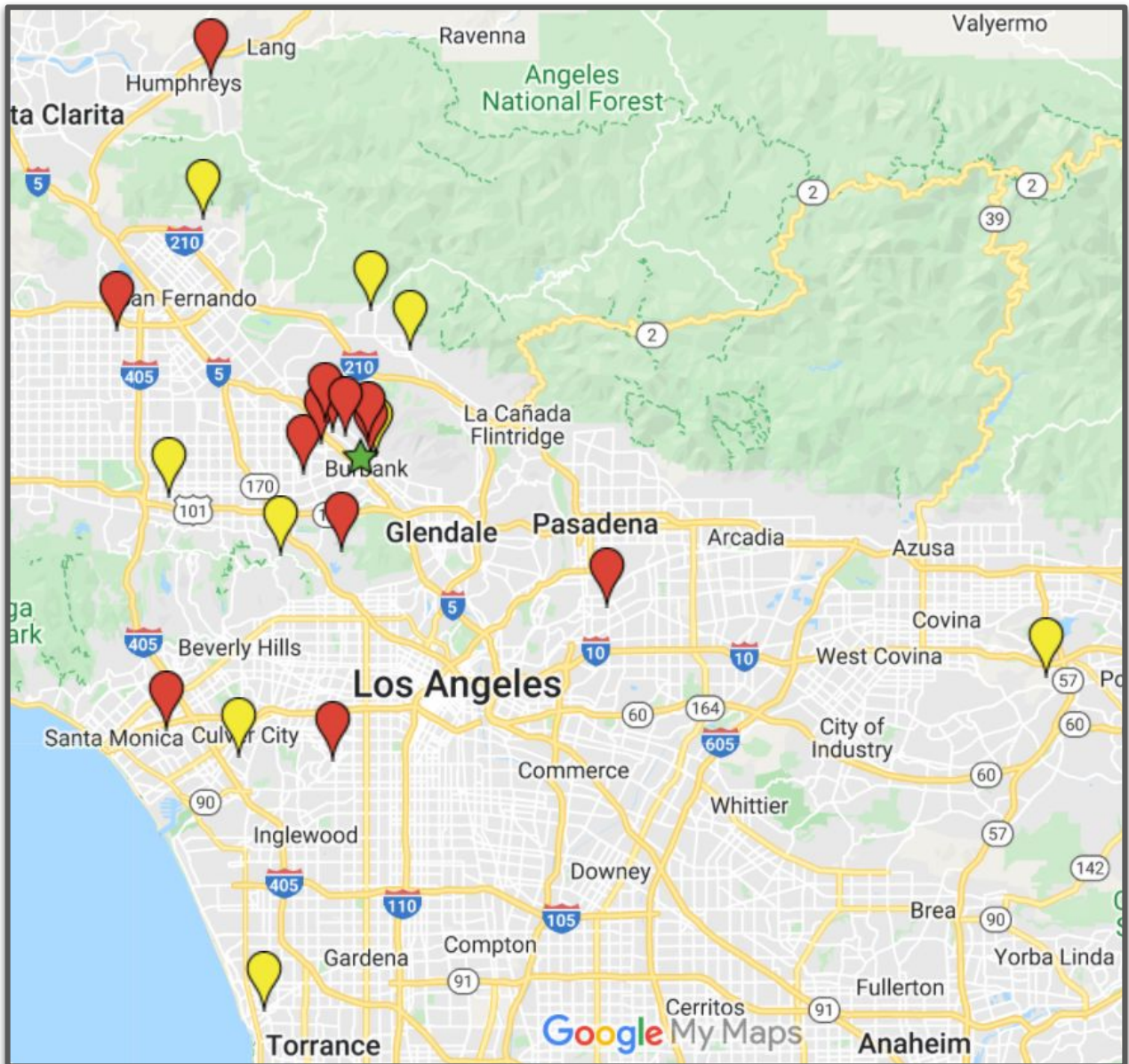
While doing that we will continue to support the FIRST community on our own and with our sponsors. We will be back out with our demo robots, spreading the word about robotics and FIRST. We will build on our new relationship with BUSD and the BUSD NAF Academy and look for new ways to spread the word about robotics and FIRST.

With the support of our mentors, families and community we will face and overcome any challenges that come our way.

**We ARE Team 980.**



# STUDENT/MENTOR MAP



FRC Team 980 ThunderBots is a community team in north Los Angeles, with students and mentors from Torrance to Palmdale to Altadena.

With our move to Burbank High School, most of our current students live in or go to school in Burbank.

# GRADUATES' SCHOOLS



MICHIGAN STATE  
UNIVERSITY



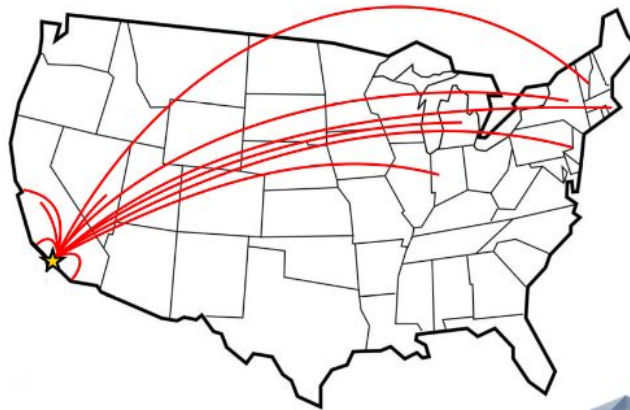
Berkeley  
UNIVERSITY OF CALIFORNIA

CORNELL  
UNIVERSITY



Caltech

Ucla



PURDUE  
UNIVERSITY



CAL POLY

UC San Diego



CalPoly Pomona



CSUN

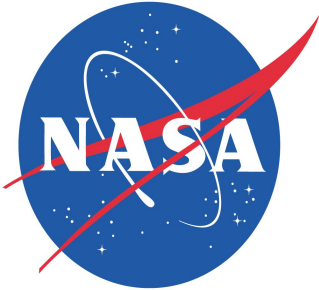
SCIT-ATC



Our graduates pursue STEM educations and go on to have successful careers in Aerospace and other Engineering fields.



# OUR SPONSORS



## 2022 FRC Team 980 Chairman's Executive Summary

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.

As a community team, we track our alums' careers. 2019-2021 grads are attending Duke, UC Berkeley, UCSD, CalPoly Pomona, Embry-Riddle, UC Merced, Woodbury, and SoCal Inst of Architecture. A 2021 grad is our Fabrication Mentor while attending a local college. Previous alums attended Caltech, MIT, Cornell, Harvey Mudd, Drexel. 2017 Capt graduated UCLA and is in first year at UCI School of Medicine. 2010 graduate rec'd (BS Caltech), (MS UCLA) in 2021, now Software/FPGA lead at Northrop Grumman.

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

Based in Burbank, Team 980 is one of the few Community Teams in the LA Area; our reach extends from Torrance to Palmdale to Altadena, an area of over 2 million residents. Currently located at Burbank High School, we are working with the NAF Engineering Academy and CTE programs in BUSD. We offer non-paid internships to NAF Academy students. We created a "FIRST Pipeline" in Burbank for students from FLL (WeDo & Mindstorms) to FRC (Team 980).

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 have established the FIRST Pipeline in Burbank from FLL to FRC. When younger students are introduced to robotics through LEGO, they want more! We mentor FLL teams and run a LEGO RoboCamp/Virtual STEM Camp to expose middle school students to the basics of robotics and engineering. Linking with NAF Academy has expanded FRC in Burbank, attracting many new members to Team 980. We have our veterans training rookies, guaranteeing a transmission of technical knowledge, team loyalty and growth.

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

3 DL Finalists, 4 WFFAs and a Culture of Volunteerism. We're at FLL and FRC events (Regional, off-season, Champs). We teach LEGO Robo-Camp and Virtual STEM Camp with students from other teams. We've helped other teams (domestic and international) during build season and at competitions. Lead mentor is VP for LA Robotics, LRI at Regionals/Champs, and Judge Advisor for 2021. Outreach Mentor is judge for FLL & FRC, & JA for FRC. LEGO RoboCamp and Virtual STEM Camp documents free at team980.com.

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

Mentored 4 new FLL teams in BUSD & veteran Delphi Dragons. Took FLL AstroTech to Burbank City Council to lobby for FLL in every ES and MS in Burbank. BPL gave us 2 LEGO Mindstorms for outreach events. Assisted veteran and rookie FRC teams with design, controls, fab, awards. We helped a rookie team from Turkey that we met at LAR in 2020. We volunteer at FLL QTs and SoCal FLL Regionals, FRC Regionals, Champs and off-season FRC events. We invited local FRC teams to our shop and workshops.



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?

During COVID, LEGO RoboCamp became a Virtual STEM camp, with double the attendance and greater reach. Taught MS students robot/mechanical design, CAD, coding. Build 2.0 is an instructional program to teach robotics basics during the off season. Teaching Robotics Merit Badge to Boy Scout Troop 36 continues 980's tradition of working w/BSA. We provided our minibot design information to Kettering University's Robotics Center for their outreach. We are seeing more and younger students join 980.



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

Team 980 formed a partnership with the NAF Engineering Academy in Burbank USD. We plan to establish a broad FIRST program within the district. We lead efforts to recruit mentors and volunteers for FIRST. Mentors from JPL, Raytheon and Boeing bring us vast technical expertise. Burbank Public Library has long promoted our programs in Burbank/Glendale. Our outreach has led to 4 FLL teams, yearly summer camps, joint STEM events, and a city council meeting promoting STEM in Burbank schools.



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

Team 980 has a strict non-discrimination policy. We believe in equal opportunity to learn and grow regardless of socio-economic, ethnic, and religious background; that this team can be a place of belonging, where minority and LGBTQ+ voices can be heard. At BHS, we have many new members from Girls' STEM Club and Girls Who Code - nearly 40% of the 2022 team! Our outreach mentor is one of the few women WFFA winners. We believe that it is our actions, not our traits, that define who we are.



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

Since 2015 we have used SWOT Analysis to assess risks and lay out opportunities, and the Balanced Scorecard for our 1-, 3- and 5-year goals. We put a special emphasis on recruiting younger students onto our team so they can grow into experienced engineers who lead our team. We also rely on our strong student leadership to guide each sub group and train the rookie members, assuring that Team 980 will have sustainable growth and a reliable transmission of skills and knowledge.



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

Corporate sponsors are NASA, Boeing, Raytheon, Walt Disney Imagineering & Schmuecker Renewable Energy System. Boeing and Raytheon give mentors and financial support with students and alums applying for internships with hopes of future employment. JPL has supplied mentors since our creation in 2002 and funding since 2008. WDI gives us financial support, and until 2021, a build space. We support their FIRST outreach and recruitment events. Schmuecker provides financial support.



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

Our team's organizational structure eroded during COVID. Early this season, we focused on creating a new space, but didn't encourage our experienced, veteran students to take the lead in our sub-groups. We have reestablished the student leadership model, and tasked those student leaders to delegate tasks and train their rookie members. We are now working better while guaranteeing the future of the team. By learning from veteran students, rookies will be ready when it's their turn to lead.



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

[The mission of FIRST® is to inspire young people to be science and technology leaders and innovators, by engaging them in exciting mentor-based programs that build science, engineering, and technology skills, that inspire innovation, and that foster well-rounded life capabilities including self-confidence, communication, and leadership.]

Team 980 is a student-driven program. They are supported by mentors who are experts in their fields who empower students by sharing technical knowledge, encouraging them as leaders and communicators, and exposing them to ideas and opportunities unique to FIRST. We are passing this on by mentoring FLL teams and creating the FIRST "Pipeline" in Burbank, from FLL to FRC. Having established a partnership with BUSD NAF Academy, we're bringing FIRST to many more students across Burbank.



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.

COVID was a major threat to our survival, but we came out of it with a New Home, New Team, Same Drive for Excellence. We lost our build site at WDI, but ended up partnered with the NAF Academy at Burbank HS - a long term goal - and sharing their space. We are now ON the BHS campus, fulfilling our dream of a FIRST Pipeline in Burbank from FLL to FRC. BHS students are enthusiastic about our presence! Our roster has doubled (capped only by COVID), and BHS girls make up about 40% of the team.

