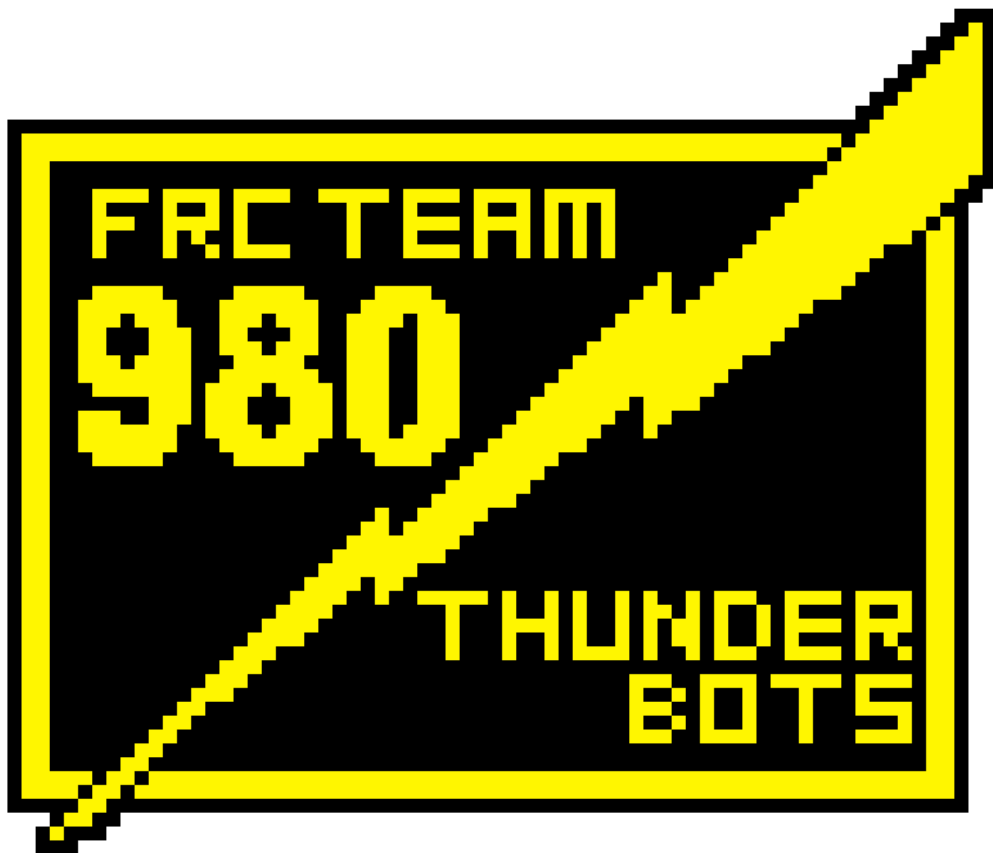


# FRC Team 980 ThunderBots

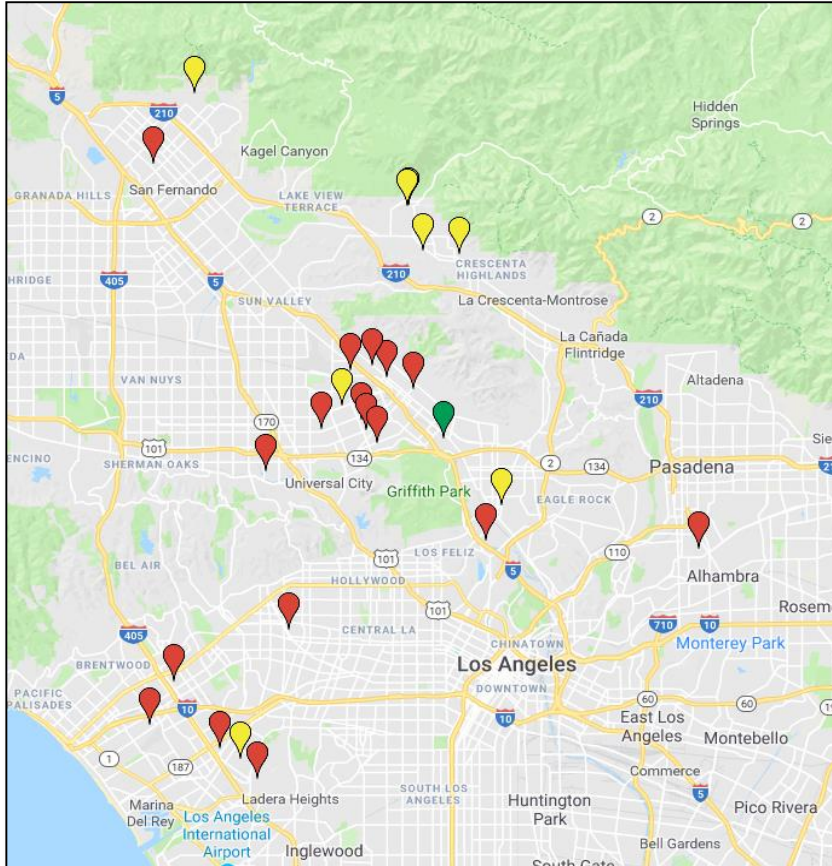
CHAIRMAN'S AWARD  
PRESENTATION 2018



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# FRC Team 980 Student and Mentors Map

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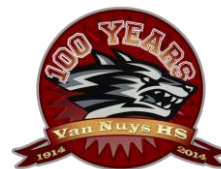
Our footprint –  
Burbank/Glendale/North LA county –  
covers an area of over 2 million people.

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# Team 980 Members' Schools

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34 students from 16 schools

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# Balanced Scorecard (BSC)

## Team 980 strategic plan

PERSPECTIVE	OBJECTIVES	INDICATORS	GOALS					
			Dec-15	Dec-16	Dec-17	Dec-18	Dec-19	Dec-20
	Inspire a growing number of high school students	Number of students participating throughout the year	N/A	N/A	40	50	60	70
Mission	Educate HS students in STEM	Average number of training hours in STEM per year x number of registered members (220 hours per year per student)	3520 hours received	4400 hours received	5500 hours received	6600 hours received	7700 hours received	8800 hours received
	Growing number of members	Number of registered members	16	20	25	30	35	40
Customer	Maintain mentors engagement	Number of registered mentors	n/a	n/a	12	13	14	15
	Be an effective team	Make it into eliminations in at least one regional tournament	yes	yes	yes	yes	yes	yes
		Be awarded at least one individual or team award	yes	yes	yes	yes	yes	yes
	Be active in Inter-team cooperation	Number of teams that we support or partner to execute an activity	4	5	15	20	25	30
	Promote FIRST mission	Number of people who received information about FIRST	3000 people	3500 people	50,000 people	30,000 people	35,000 people	45,000 people
	Be active in community service	Number of community event attended as a team	5 activities	7 activities	8	12	14	16
	Processes	Recruiting and induction	Number of students recruited in year	5	10	15	20	25
Number of recruiting events			3	5	6	7	8	9
Percentage of student retention			85%	95%	95%	95%	95%	95%
Marketing process		Number of press mentions of Team 980	3	5	5	6	7	8
Effective design		Simple and effective designs to meet our game objectives	90%	100%	100%	100%	100%	100%
		Number of students using CAD to contribute to the robot design	2	4	4	5	6	7
Organization		% of team utilizing organizational tools	n/a	n/a	80%	90%	95%	100%
Solid fabrication		Competition robot complete	1 week before bag day	2 weeks before bag day	2 weeks before bag day	2 weeks before bag day	2 weeks before bag day	2 weeks before bag day
		Build a second robot on time	on bag day	1 week before bag day	1 week before bag day	1 week before bag day	1 weeks before bag day	1 week before bag day
Effective controls		Student contribution to the source code	50%	80%	90%	100%	100%	100%
		Student contribution to the control design	50%	80%	90%	100%	100%	100%
	Controls features meet robot design objectives	85%	95%	100%	100%	100%	100%	
Personal Growth	Personal development	Percentage of graduating students who go on to higher education	n/a	n/a	95%	95%	100%	100%
	Commitment	Attendance	80% of students with 70% of attendance	90% of students with 80% of attendance	90% of students with 80% of attendance	95% of students with 80% of attendance	95% of students with 80% of attendance	95% of students with 80% of attendance
	Leadership and team work	Number of hours for leadership and team work training	4	6	8	9	10	11
Financial	Increase partnership with sponsors	Updates sent within the year	2	3	3	4	4	4
	Get new sponsors	Number of potential new sponsor meetings	5	10	12	12	13	14
		Number of new sponsors secured	2	3	3	4	4	5
Increase Student Fundraising	Amount of money raised by students	\$4000	\$5000	\$9800	\$10,000	\$12,500	\$15,000	



## Key Items From the BSC that Align With the FIRST Mission

### Student Growth

OBJECTIVES	INDICATORS	GOALS		
		Dec-17	Dec-18	Dec-19
Growing number of members	Number of registered members	25	30	35

Our goal for Dec 2018 is to have 30 students: we currently have 34.

### Promoting FIRST


OBJECTIVES	INDICATORS	GOALS		
		Dec-17	Dec-18	Dec-19
Promote FIRST mission	Number of people who received information about FIRST	50,000 people	30,000 people	35,000 people

We re-set our goal of # reached to 30,000 people by Dec 2018.  
 In 2017 we reached 24,000 people.  
 [In 2016 we reached over 1 million!]

### Inter-team Cooperation

OBJECTIVES	INDICATORS	GOALS		
		Dec-17	Dec-18	Dec-19
Be active in Inter-team cooperation	Number of teams that we support or partner to execute an activity	20	25	30

In 2016 we partnered with over 30 different FIRST teams for community and outreach events.



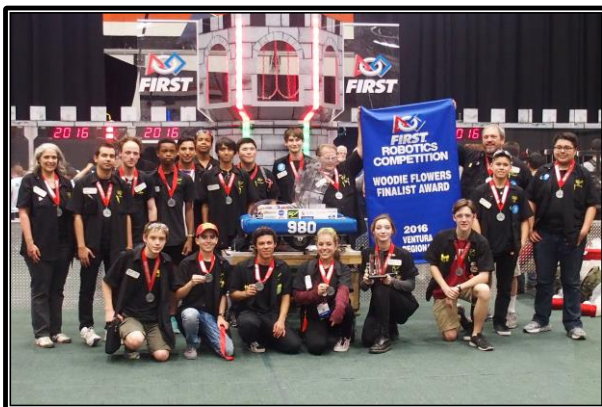
# Recent Awards



2017 Central Valley - Andrew Farrow,  
Dean's List Finalist



2017 Los Angeles - Entrepreneurship



2016 Ventura – Engineering Inspiration



2016 Ventura – David Toyne, WFFA

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# Our Community Team

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The Foothill Record: local paper for Sunland/Tujunga, Shadow Hills, Lake View Terrace in North LA County - population over 165,000

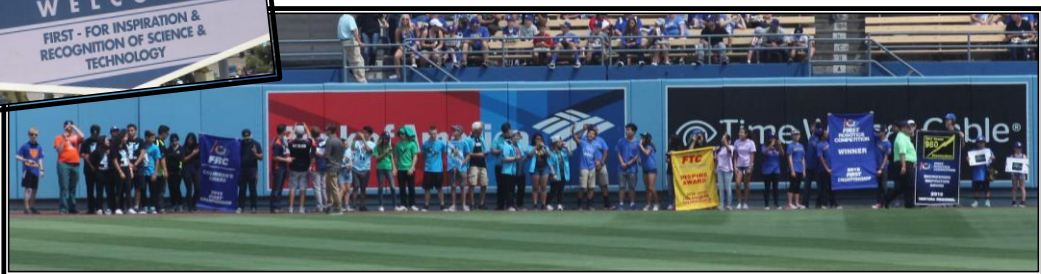
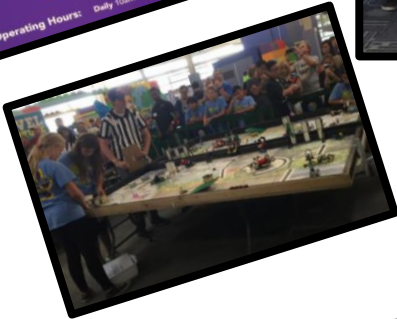
# Burbank – In Our Backyard







# Los Angeles County



# FLL QT Pacoima Charter School



# LEGO® Robo-Camp

Burbank Public Library Children's Services presents

## Robot Workshop!

open to kids entering grades 5 & 6 and led by

**FRC Team 980 ThunderBots**  
A Community Team

**BUILD AND PROGRAM A ROBOT  
USING LEGO® MINDSTORMS®  
AT A WEEK-LONG  
MINI STEM CAMP**

**TWO CAMPS WILL BE OFFERED**  
Space is limited and  
registration is required  
for this free event  
call 818-238-5610 to sign up

10 a.m. - 12 p.m.  
Monday - Friday  
July 17 - 21, 2017  
**BURBANK CENTRAL LIBRARY**  
110 N. Glenoaks Blvd.

10 a.m. - 12 p.m.  
Monday - Friday  
July 31 - Aug. 4, 2017  
**BURBANK VISTA BRANCH**  
300 N. Buena Vista St.

FUNDED BY THE FRIENDS OF THE BURBANK PUBLIC LIBRARY

**Welcome  
workshop members!**

Sorry -  
Pre-registration was required.  
Program is full





# ThunderScout

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Tablet-based. custom scouting software designed by team member Luke Myers. Available now on Google Play and Amazon App Store.





## Future Plans

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FRC Team 980 introduces **tens of thousands** to STEM, Engineering, and FIRST.



We are creating **strategic partnerships** with groups in our area who are also reaching out to thousands or tens of thousands of youth.

We are also continuing to **spread the word** about **FIRST, Robotics and STEM Education.**





# Chairman's Questions

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## **Briefly describe the impact of the FIRST program on team participants with special emphasis on the current season and the preceding two to five years**

FIRST teaches how to pose and solve real world problems. Mastering critical thinking, time management, and engineering skills provides tools for future success. All 2017 Team 980 grads went on to higher ed., 2 to Engineering Programs (UCLA and Cal Poly Pomona). Previous grads attended Caltech, Cal Poly SLO, CSUN, Purdue, Stanford, and UC Berkeley. Of this year's 13 grads, all are applying for higher education; 10 to engineering, 2 to USAF. One 980 member attended 2017 Apple Technology Camp.

## **Describe the impact of the FIRST program on your community with special emphasis on the current season and the preceding two to five years**

Team 980's focus is our own community. We created Lego RoboCamp for Gr 5 & 6 at Burbank Libraries and hosted first FLL QT at Pacoima Charter Elementary. We introduced robots to HS families at Burbank Library, at Burbank on Parade, the Annual SoCal Fire Dept "Spark of Love" Toy Drive, Club Rush at both Burbank high schools, and Scout Expo at Rose Bowl. We've held FIRST Robotics Day events at Dodger Stadium and DiscoveryCube LA along with other SoCal FIRST teams.

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

We demonstrated FIRST robots in Burbank on Parade and at Burbank Library. We held LEGO RoboCamp at Burbank Library and participated in Google Fashion Show and A360 conference. We organized FIRST Robotics Day at Dodger Stadium – 26 FIRST teams introduced during pre-game. Held Robotics Day and FLL QT at DCLA, open to all visitors. Filmed FIRST storyline on The Fosters. Social Media: Snapchat, Instagram (1,316 followers), Twitter (1,465), Team980.com (1,600+ visitors) and Facebook (683 likes).

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

3 Dean's List Finalists in 5 years. 2 WFFA winners. 3 team leaders became Eagle Scouts in 2017. Strong enduring relationship with primary sponsors WDI and NASA/JPL. Hosted FIRST Robotics Day at DCLA: 8 FRC, 2 FTC & 2 FLL teams. Organized FIRST Day at Dodger Stadium: 26 teams, including FRC, FTC & FLL. Volunteer at FLL tournaments & host a QT with other FIRST teams. ThunderScout, our custom scouting software, is free download on Google Play. LEGO® RoboCamp documents shared at team980.com.

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

In 2017/18 we helped with the formation of and provided support to FRC Team 2810 JetStream in Palos Verdes. In 2016 season provided organizational and outreach support to Rookie Team 5810 X-Bots. We introduced the FLL team at American School in Lima, Peru to FRC 2576 Chilean Heart to help them create FRC team.



## **Chairman's Questions pt. 2**

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

We are embarking on an initiative with the Sunland-Tujunga Chamber of Commerce to introduce FLL and JrFLL to Sunland/Tujunga Elementary and Middle Schools. We are beginning a project to bring more advanced robotics - like FTC - to Verdugo Hills High STEMM Magnet Program. Our outreach and educational events encourage Burbank, Glendale, and Sun Valley families to ask their schools for FLL teams with Team 980 students as mentors. We resurrected the dormant Delphi Academy FLL Delphi Dragons.

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

We help Team 2404 TNT and Team 2810 JetStream and mentor FLL Delphi Dragons. A student from FTC Marlbots 3526 joined Team 980 to learn FRC and share her knowledge with her FTC team, who then demoed their robots at our Pacoima FLL QT. We've run FLL QTs, and volunteer at other FLL QTs and the SoCal FLL Regionals. We invite neighboring FRC teams to our workshops on leadership, entrepreneurship, C++, Java, Controls/Electronics, Basics of Engineering, and SolidWorks.

### **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 mentored Team 2404 in vital FIRST skills, including design, fabrication, controls and software, and employing effective strategy. We advised Team 2810 on setting up their new build space and on 2018 game strategy. We mentor the FLL Delphi Dragons. We graciously assist less experienced teams at FRC events, including doing robot repairs when needed. When we run our fall guest speaker and education program we invite local FRC teams, including 3328 Noho Robo and 4413.

### **Describe your Corporate/University Sponsors**

Our major corporate sponsors are Walt Disney Imagineering, NASA/JPL, Boeing and Raytheon. Walt Disney gives us mentors, major financial support, and a build space. Boeing and Raytheon give us mentor and financial support. NASA/JPL has supplied mentors and funding since our creation in 2002. We also thank Cooler Master for their generous donation of equipment.

### **Describe the strength of your partnership with your sponsors with special emphasis on the current season and the preceding two to five years**

In 2018 we have two new Controls mentors from WDI and Raytheon. We attend FIRST recruitment and other special events at WDI. We look forward to our annual insider tour at the NASA/JPL Open House, led by our lead mentor from JPL. Cooler Master visited us at our build site, helped us build our own state of the art computer, and provided valuable hardware support. In return, we created a very cool promotional video which we debuted at Beach Blitz 2016.



# Chairman's Questions pt. 3

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

Imagine a colony on Mars. Imagine life-saving surgery being done by a robot. Imagine roads full of zero emission cars and heavy machinery that returns oxygen to the atmosphere. Imagine the future. Who are the innovators and creators? Students inspired to pursue STEM careers. Engineering and business professionals who mentor their successors. That's FIRST, a robotics program that cultivates generations of creative problem-solvers. FIRST isn't just building robots. FIRST is about the future.

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

With students from 15 schools across northern LA county, we come from a wide variety of cultures and socio-economic backgrounds. Everyone is welcome. We've produced three Dean's List Finalists in the last 5 years. We use industry standard organizational tools such as Slack, GrabCAD, and GitHub for efficiency. Our Lead and Design Mentors are Woodie Flowers Finalists. Our lead mentor is acting Pres of LA Robotics and is a Lead Robot Inspector, and our Mentors judge at FLL and FRC tournaments.

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

Since 2002, we've built in 10 different locations, welcoming a diverse community of students and mentors. Since winning Engineering Inspiration in 2016, we been even more inspired to bring FIRST to our community: Burbank/Glendale, North LA County. Winning Entrepreneurship at LA in 2017 showed us that our strong business foundation is paying off. Good organization allows us to excel at everything we do, be it engineering, outreach, or education. We ARE Team 980.





# Chairman's Essay

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## In Our Backyard

Since Team 980's Reinvention in 2015-16, we have found new energy for our outreach, promotion and educational activities. At the start of our transformation, capped by an Engineering Inspiration Award at Ventura in 2016 and a trip to Champs, we cast a wide net. We organized events from DiscoveryCube Los Angeles in Lake View Terrace to Dodger Stadium, where we featured 26 FIRST teams from across SoCal for the first FIRST Robotics Day. We discovered our a passion for FLL, hosting an FLL QT, and supporting LA Robotics' FLL competitions across the LA Region. But as we addressed our main goals of "Promoting the FIRST mission," "Being active in community service" and "Recruiting and induction," we realized that the community that needs our attention the most is our very own. Our neighborhood includes everything from underserved areas like Lake View Terrace and Pacoima to affluent cities like Burbank - which doesn't even have robotics teams in its schools! Team 980 takes our status as the only community team in North LA County very seriously, and we have dedicated ourselves to promoting FIRST and STEM right in Our Own Backyard.

Team 980 meets in a space graciously provided by one of our major sponsors, Walt Disney Imagineering, on the Burbank/Glendale border. Most of our students attend either Burbank HS or John Burroughs HS (in Burbank). For the last few years we've been bringing a robot to the high schools' Club Rush events, recruiting students for Team 980, but also helping the schools' robotics and engineering clubs recruit their own members.

Our ties to the Burbank community as a whole are getting stronger. In 2017 we - and our robot - marched in the annual Burbank on Parade, introducing thousands to Team 980 and FIRST Robotics. We have a special relationship with the Burbank Public Library, having served as unofficial hosts and helpers at several of their robot and space-themed lectures - always with a robot demonstration on the side. Two of our robots joined us at our 3rd Annual Toy Drive for the KABC-7 and SoCal Fire Department Spark of Love Toy Drive with members of the Burbank Fire Department, who particularly enjoying playing catch with our baseball shooter robot. All of these events are opportunities to educate Burbank families on STEM and FIRST Robotics and encourage them to ask for FLL and FTC teams at their schools.

We launched an exciting initiative in the summer of 2017. When the Burbank Public Library asked us to do a robotics program for kids, we jumped at the chance. We created and ran a LEGO® RoboCamp using LEGO® Mindstorms. Designed and taught by Team 980 and students from FTC Marlbots, FRC 589 Falcon Robotics, and FRC 3328 NoHo Robo, the camp introduced 5th and 6th Graders to STEAM, FIRST, and LEGO® robotics. From learning how to code and building a robot as a group, talking to judges, and feeling the thrill of a competition, our campers thoroughly enjoyed the experience and returned to their parents wanting more robots. The camp was a wonderful success and our relationship will be continuing into 2018. All our documentation - curriculum, schedule, and mat layout - is available for free at our website.



## Chairman's Essay, pt. 2

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Other highlights from summer 2017 included joining the team from LA Robotics at the 2017 Aerospace Games at Dockweiler Beach (students from a variety of FRC teams), sending team veteran Andy to Apple's Engineering Technology Camp, where he had the opportunity to work shoulder to shoulder with Apple Engineers, and Lead Mentor David Brinza being Guest Speaker at the Eagle Court of Honor for one of our three 2017 Eagle Scouts.

Fall is for outreach and team development. We added workshops on Java, Electronics, and Basics of Engineering Design to our lineup. Along with SolidWorks and Fab 101, we now train our members in all areas of robotics engineering. Fab team members also set up and learned to use the new professional tools we had donated to our machine shop: a mill, lathe, and horizontal band saw. Their fall project: making modifications and taking our robot to the 2017 Beach Blitz in Huntington Beach.

Fall is also FLL season. In addition to mentoring FLL Delphi Dragons, Team 980 works with LA Robotics at FLL QTs and the Regional Championships. This year we co-hosted a new FLL QT at Pacoima Charter Elementary School, an underserved area in great need of STEM. Team 980 students staffed the volunteer positions and we invited FTC Marlbots to join us and demonstrate FTC to the students and guests. We also sent judges and volunteers to the FLL Kick Off, Training events, QTs, and the SoCal Regional Championships.

We helped new FRC Team 2810 JetStream to launch and get set up. We also continue to help FRC Team 2404 TNT with technical and manufacturing advice and assistance with coding. Two of our members participated in the 2017 Google Fashion Show with other FIRST teams. We wrapped up our season with our annual family potluck at our build space. With student members from as far away as Santa Monica, Culver City, Westwood, and South Pasadena, our parents are integral to getting us to meetings and competitions, putting in miles and hours to help their children and our team succeed.

We have learned that a strong organizational foundation is necessary to accomplish everything that we want to do. Through the use of business applications like Slack, Trello and Google Drive we can increase efficiency while keeping every student and mentor on track and in the loop. Team 980 supports a professional engineering environment and has adapted Boy Scout leadership techniques, led by our 3 Eagle Scouts. We run our subteams - Design, Fabrication, Controls, Business - like Scout patrols or business departments, working toward targets set by team leadership, and coordinating daily at a leadership level and weekly at full team meetings and requirements reviews. Our three Organization Boards show how we adapt this throughout the year for the Build, Competition, and Off-Seasons.



## Chairman's Essay, pt. 3

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Mechanical Design, led by Kenny, works with both SolidWorks and pencil and paper to create the original designs for each of our robots. Fabrication, led by Ethan, constructs field elements as well as manufacturing parts and assembling the competition robot. Controls, led by Kyra, is in charge of code and electronics - and this year proudly built their own practice robot! Our Business team, led by Oliver, creates our promotional materials and writes everything from press releases to a letter to Cooler Master Santa. They also create and submit all the awards submissions and do the Chairman's presentation at competition. As we move into Competition Season, the Drive Team, led by Team Captain and Dean's List Finalist Andrew, takes control of the robot, and our Scouting team, led by Luke, can be found in the stands with ThunderScout, our custom designed scouting software, running on a matched set of tablets and feeding scouting data directly to the Drive Team and our alliance partners.

We would not be who we are without our mentors. Lead Mentor and WFFA David Brinza, Principal Systems Engineer at NASA/JPL, has been with Team 980 since 2003. David Toyne, WFFA, does one-of-a-kind machinery such as an alternate energy, solar power based plant. Mark Lingua is a racing legend with a degree in medical and electronics manufacturing, a long history in the Aeronautics industry, and multiple land speed records. Robin Dorfman, who graduated from Harvard with a degree in Medieval History, leads the outreach and business teams. New mentors for this year include Alex Davis, LMU grad in EE, and David Graves from Raytheon, Cal State LA grad in EE and a FIRST alum from FRC 702. FIRST Ambassador Eileen Kahn; Jeff Rubenstein from WDI; Anna Stern, FRC Team 639 alum, RIT Graduate and Mentor for FRC 3838; and Patrick Hammer, also from WDI, round out our principal mentors.

Team 980's most important product is the group of students we've developed into well rounded and creative innovators. Team 980 has almost 300 alumni, of which over 90% have gone on to college, with most entering STEM fields. We've had "superstar" members attend institutions like Caltech, Purdue, UC-Berkeley, UCLA, Williams, and CalPoly (SLO and Pomona), with several moving onto graduate school. One female alumna, who became proficient in milling as a Team 980 member, earned a B.S. in ME at Caltech and now works at Northrop-Grumman. Kaitlyn, our 2015 Dean's List finalist, became an ME major at Purdue. Another female alumna majored in Physics at UCLA and now is in a doctoral program at U. of Michigan. We've also had entrepreneurial success stories, including a student who started a successful metal fabrication company while he was an ME major at CalPoly-Pomona. Another student led the SAE Formula team while majoring in ME at Cal State Northridge, was hired as an Indy car engine designer for Honda Racing Development and then started his own speciality design and fabrication company. One of our current students has brought us a compelling project for the off season - a robotic exoskeleton for his partially paralyzed neighbor. We truly believe that our students are Team 980's greatest achievements.

With everything we have done this year, we still ask ourselves what comes next. There are so many students in our community that do not have access to STEM and the opportunities that FIRST offers. From the city closest to our build site to the edges of LA County, Team 980 has found an overwhelming need for programs, teams, and mentorship support. From our LEGO® RoboCamp, Robot demos, and FIRST Robotics Days, to our recruitment drives at Burbank and Burroughs high schools and appearances throughout our region, we are bringing FIRST to all of Burbank/Glendale/North LA County. That's what it means to be Team 980.