

2024 Crescendo Team Notebook
Bit Buckets Robotics FRC Team
#4183

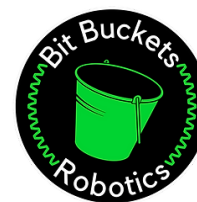
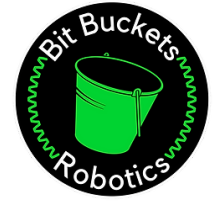


Table of Contents:

| | |
|-------------------|----|
| About Bit Buckets | 2 |
| Team Structure | 6 |
| Year Outline | 12 |
| Finances | 13 |



About Bit Buckets

Team History

The Bit Buckets were started in 2010 by Grant Emendorfer and Van Phu, two students at BASIS Tucson High School. They wanted to begin a robotics team in order to complement the more theoretical learning at BASIS, and spent the 2010-2011 school year fundraising so that they could start a Vex Robotics team. Unfortunately, by the time they acquired enough money, the Vex season was over, and they registered for the FIRST Robotics Competition the following year instead.

The following year, Terry Nordbrock and David Forbes joined the efforts becoming founding mentors. Because BASIS lacked the environment required to adequately support and maintain a robotics team, they met at the Physics Factory at the Boys and Girls Club. Although the Bit Buckets didn't meet at BASIS, they were still technically a BASIS club. Unfortunately, the split funding requirements at BASIS left the team with insufficient funds to sustainably operate. As a result, the team decided to become a community team the following year. The Bit Buckets qualified for the World Championship Competition their rookie year through the Rookie All Star Award, and they were chosen for an alliance at both of their regionals.

In the 2012-2013 season, the Bit Buckets moved to Palo Verde during build season. Palo Verde High School's team, #4841 Optimal Robotics, did not register their team early enough for the FIRST Robotics Competition, so the Bit Buckets were able to use the Palo Verde workspace. Later, Palo Verde was allowed to register last minute, which meant that there was insufficient space to support two teams. Because Palo Verde students had priority on space and equipment the Bit Buckets moved the build operations to Terry and David's house.

In 2013-2014, Xerocraft Hackerspace relocated to Steinfeld Warehouse, funded by a grant from the city. The Mayor came on opening day - and cut the steel ribbon with an angle grinder. The Bit Buckets helped remodel the warehouse. With the reopening of Xerocraft, the Bit Buckets saw a more permanent location complete with a woodshop, metalshop, and classrooms. The robot in our 2014 build season was titled "Great Expectations", winning the Phoenix Judges' Award, and which is currently still used as an outreach robot.

The 2014-2015 season was the first time that the Bit Buckets qualified for the World Championship Competition following their rookie year. With a robot named "Stack Overflow", they beat a hall of fame team, FRC Team 1538 the Holy Cows, at one of their regionals, and also



forged a friendship with them. The second pick team on the Bit Buckets' alliance at one of the regionals, team 3944 the All Knights, qualified for the Einstein field at World Championships. The Bit Buckets did well at the World Championship competition - however, they were not chosen for an alliance.

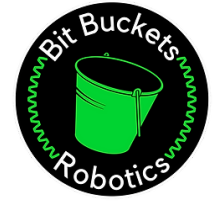
The 2015-2016 season saw organizational changes through a transition between head mentors. The team did very well at competitions with "Puppy", despite playing against very good teams (e.g. 987 the High Rollers, 2468 Appreciate, and 1538 the Holy Cows)- the Bit Buckets at both of their regionals were the alliance captain of the finalist team, and through a Wildcard were able to attend the World Championship competition. They performed very well at Championships but were not chosen for an alliance.

The following season (2016-2017), the Bit Buckets experienced a large brain drain, as the majority of the team from the previous year were seniors and most of the original, founding team members had moved on. Fortunately, the founding mentors came back for one final season, planning on retirement going forward. This year saw a struggle with design and integration, and the robot did not meet expectations; this led the team to rethink how to approach design going forward.

The 2017-2018 season saw yet another transition as the founding mentors decided to retire; fortunately, new mentors stepped up to the challenge. The robot was well designed and despite the fact that Arizona North Regional was populated with many famously high performing teams, the Bit Buckets performance resulted in becoming 7th of 60 during qualification and captain of the fifth seed alliance. At the El Paso Regional, the team qualified 3rd of 37 and captained the second seed alliance, but did not make it past the semi-finals. However, the team was presented the Motorola Quality Award, a strong testament to the approach and presentation of our design.

The 2018-2019 season is also expected to be a year of opportunity as about ½ of the team from 2017-2018 were Seniors. Spanning six high schools and some new homeschool students, the Bit Buckets is truly a diverse community team.

The 2019-2020 season was unfortunately cut short due to COVID-19, and the team was unable to compete in any regional competitions. However, the team ended up still building a great robot, Shawty.



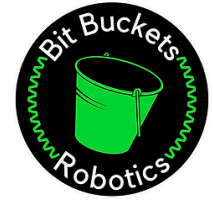
The 2020-2021 season was all online, but the team was still able to hold a fun build season with at-home competitions for the students. The team was able to hold weekly meetings for each subteam, and continued to teach new students.

The 2021-2022 season returned to in-person meetings at Xerocraft, and the team was able to build a well designed robot. At the Arizona North Regional, the team finished 8th out of 36 in qualifications despite having a rough first day, and was chosen by the fifth alliance in the semifinals. At the Las Vegas Regional with many high performing teams, the team robot, Appa, ranked 18th of 44 in qualifications, and managed to be the first pick of the second alliance. Appa made it to the finals with the second alliance, but unfortunately lost due to one failed climb.

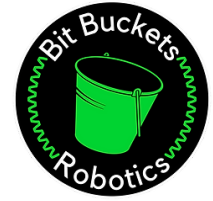
In our 2022-2023, we experimented with different mechanisms and code libraries which we hadn't used in the past. We were able to return to our normal rate of outreach events, participating in 2 science/engineering fairs over our season. At the Orange County regional, we ranked 31 out of 47, placing us in the first alliance as the second pick. This regional was rough for us, as it was far more competitive than any other regionals our team had attended in the past. Despite this, we were fortunate to meet many incredible teams and students, and it was a huge learning experience for everyone. At our second regional, AZ West, we faced issues with our robot, with our rank being 18 out of 41. We were the first pick of the eighth alliance, and enjoyed our competitive playoff matches.

Team Awards

1. 2012
 - a. Rookie All Star - Utah Regional
2. 2013
 - a. Judges' Award - Phoenix Regional
3. 2014
 - a. Quality Award by Motorola - Hub City Regional
 - b. Excellence in Engineering by Delphi - Arizona Regional
4. 2015
 - a. Regional Winner - Arizona East Regional
 - b. Creativity Award by Xerox - Arizona East Regional
5. 2016
 - a. Finalist - Arizona North Regional
 - b. Finalist - Arizona West Regional
 - c. Excellence in Engineering by Delphi - Arizona West Regional



- d. Wildcard - Arizona West Regional
- 6. 2018
 - a. Quality Award by Motorola - El Paso Regional
- 7. 2022
 - a. Finalist - Las Vegas Regional

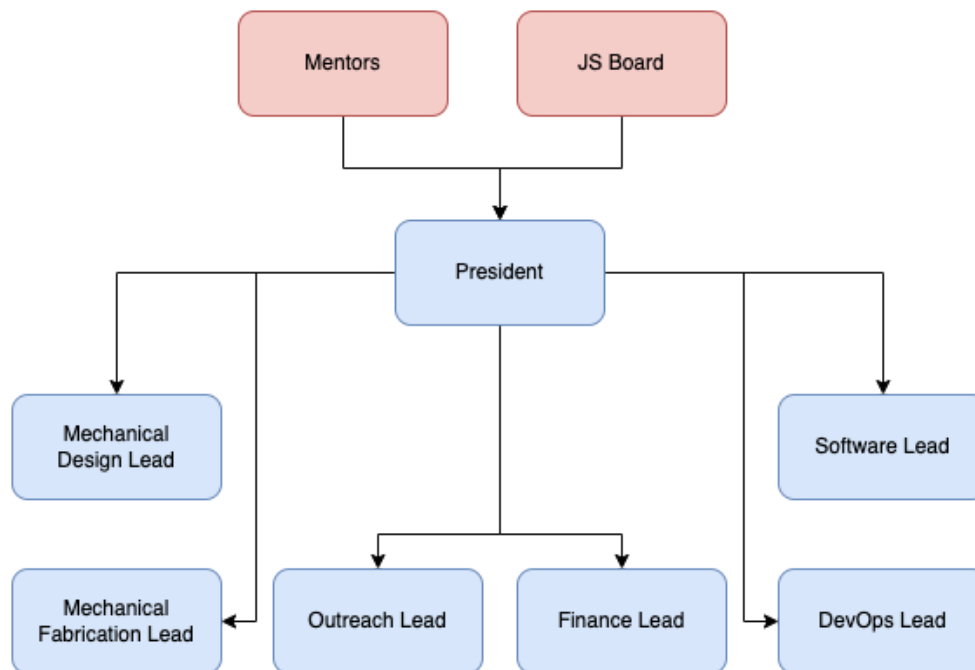


Team Structure

(From Election Packet 2023-2024)

The team is divided into mechanical and software subteams that work together to build our robot.

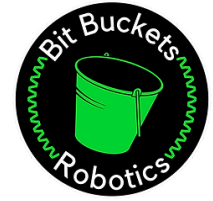
2023-2024 Team Structure Visual



Leadership Roles and Responsibilities

Responsibilities of all Leadership Positions:

1. Set a good example for future leaders
2. Create and maintain a timeline/list of tasks (the agenda)
3. Document processes for future years
4. Ensure that the team presents a good, cohesive team image
5. Ensure that mentors and all students remain engaged, safe, and comfortable
6. Fulfill all responsibilities associated with their position
7. Present a healthy, positive attitude to all challenges and disputes the team faces



8. Assist in Administrative work
9. Creates and share written achievable goals before each meeting
10. Work with Scout Masters and Team/Event Coordinators to determine events
11. Attend all leadership meetings

President:

1. Assign and manage top-level objectives and coordinate the overall organization of the team
2. Lead the Leadership team and assist with creating and maintaining a timeline/list of tasks
3. Coordinate with leadership to ensure they have all necessary resources
4. Assist leadership when tasks are falling behind
5. Lead the team's decisions, and meetings, ensuring all voices and concerns are heard
6. Organizes Google Drive, creates folders for different projects and parts of a season.
7. Make Drive folders for the season and archive old folders into the Archive folder.
8. Organize, clean-up, and archive discord chats and voice chats
9. Help keep records of the season and past seasons in correct locations.
10. Maintain a welcoming, tolerant, and diverse team ethos and environment

Mechanical Leadership:

1. Develop, maintain, and enforce team engineering standards (this includes part numbering and naming, file templates, design process techniques, etc...)
2. Maintain training plans
3. Define training projects
4. Facilitate training projects
5. Manage project assignments

Design Lead

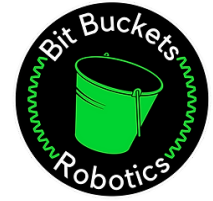
1. Ensure Journals are being completed throughout the season
2. Lead CAD and design training

Fabrication Lead

1. Lead manufacturing training
2. Coordinate with software lead for electrical training
3. Ensure all students are practicing safety at all times

Software Leadership:

1. Teach code



Software Lead

1. Ensure students are familiar with the software architecture and development views
2. Ensure students know how to use Java
3. Train students on FRC WPI architecture
4. Coordinate with fabrication lead for electrical training
5. Orchestrate the season codebase
6. Teach students how to update firmware on Talons, RoboRIO, etc.

DevOps Lead

1. Ensure students are trained in the basics in git / github / whatever task system we use / devops
2. Develop and maintain software standards (code format, code quality, etc)
3. Develop and maintain DevOps standards (organization of repository, etc.)
4. Ensure Journals are being completed throughout the season
5. Maintain the wiki
6. Maintain the website
7. Teach students how to maintain branches, whatever else we use in the future
8. Tell the judges about the project
9. Optimize software development pipeline (automation of repetitive tasks)
10. Organize tasks and work with software lead to designate them to team members

Outreach Lead

1. Manage social media accounts
2. Compose and send out monthly newsletters and updates
3. Lead outreach events for the Bit Buckets
4. Make sponsor panel for robot
5. Create t-shirts tailored to each specific year's challenge
6. Work with Finance to send out thank you letters and gain and retain sponsors
7. Can appoint separate outreach coordinators, pr manager, t-shirt logo maker, other roles

Finance Lead

1. Manage team finances and Quickbooks
2. Find and apply for grants
3. Work with Outreach on contacting sponsors, shirt orders, and team image
4. Contact local businesses for sponsorships, donations, and discounts



5. Delegate roles accordingly and include students at all points in the finance process (by having students for contacting sponsors, finding grants, coordinating with business, or emailing food sponsors, as examples)

Competition Roles and Responsibilities

Each year the driver will be selected from a pool of candidates based on skill. The remaining drive team will be selected around that driver. Students may hold one competition role. The Media position will be available to any student on break and that wishes to help the Marketing Team out by taking some shots they requested. We know scouting is not the most enjoyable activity, so we will have some scouts rotate through the pit, and technician positions so they can get experience on the field, and in other roles. Scout Masters are incredibly important to the team's success at competitions and they need to be extremely knowledgeable about local teams, prior FIRST challenges, and competition structure.

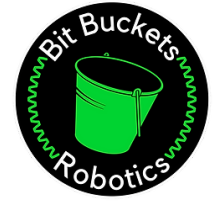
****These roles are competition roles and should be treated as such, no one gets special preference, or gets out of activities because of them.****

Drive Team:

1. Drive, Operate, Coach, and Assist Robot at Competitions\
2. Hold drive team meetings as needed to ensure good performance at events
3. Utilize all times with the robot to its fullest extent
4. Knowledgeable about the robot and able to conduct basic mechanical and software repairs to the robot
5. Extremely available the weeks preceding competitions
6. Report any problems with the robot or disagreements with other teams to Pit Crew and Scout Masters.
7. Level headed off and on the field
8. Polite and respectful to all teams during the competition
9. Debrief after each match to discuss what happened and what we can improve on
10. Be ready to queue with the robot on time every match
11. Listen and do everything field officials mandate

Pit Crew:

1. Maintain the robot's operation throughout competitions
2. Extremely knowledgeable of the robot and how it operates



3. Knowledgeable of Pit Layout
4. Prepare BOM before competitions
5. Maintain a high attendance throughout the season
6. Polite and respectful to all teams during the competition

Scout Master:

1. Assist in Kickoff preparations
2. Extremely knowledgeable of the teams competing at each of our competitions.
3. Run pre-scouting and pit-scouting for competitions
4. Develop match strategy at competitions
5. Develop alliance selection strategy for competitions
6. Work on and maintain the online scouting system
7. Work with Coach and Drive team to provide insight and match strategy before matches
8. Facilitate scouting at competitions, create and maintain a scouting schedule
9. Facilitate alliance selection meeting with Coach
10. Manage scouts and ensure online scouting system is up to date during competitions
11. Encourage and engage scouts (fun competitions, special food...)
12. Stay knowledgeable throughout the season by watching matches and other competitions
13. Form and maintain a picklist throughout competition
14. Work with Travel/Event Coordinators and Leadership to determine events
15. Polite and respectful to all teams during the competition
16. Responsible for the accurate accumulation of data about other teams performances at competition

Scout:

1. Knowledgeable of teams competing at each of our competition
2. Responsible for the accurate accumulation of data about other teams performances at competition
3. Polite and respectful to all teams during the competition
4. Timely and does not miss a shift according to the scouting schedule
5. Polite and respectful to all teams during the competition

Media:

1. Responsible for video and photography throughout the season and shots requested by the Marketing Team at competition



Communication

Discord: The team uses a server to communicate among students and mentors. The plans for builds and meetings are posted on the server. Additionally, information can be found and shared easily, making absences easier to catch up on.

Emails: Each student and mentor has a personalized team email which is used to access the google drive, and communicate with sponsors and mentors. Announcements and details are also sent to keep everyone informed.

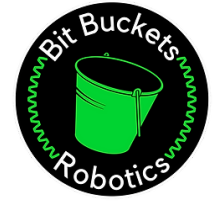
Google Drive: We use a google drive to store our documents and data of our progress during build season, and during offseason. The drive allows students to easily access information they might have missed, and track their own progress. This year, the drive is also used to share access to our CAD files.

Social Media: The team has a variety of accounts to share our progress and growth:

Youtube:

Instagram:

Website: www.bitbuckets.org



Year Outline

Offseason

(April - December)

Goals:

1. Recruit new students
2. Train students
3. Gain new engineering experience
4. Prepare for build season
5. Go to outreach events
6. Gain grants and sponsorships
7. Team building activities

Schedule: Meet about once a week for 5 hours

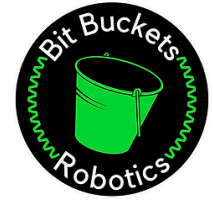
Build Season

(January - March)

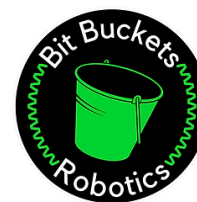
Goals: Specifics determined by team that year, but overall, encourage and excite STEM in our community, while learning and developing new skills

Schedule: Meet about 20 hours a week

- Wednesday 6-9pm
- Friday 6-10pm
- Saturday 4-10pm
- Sunday 1-9pm (Optional 9am-1pm)

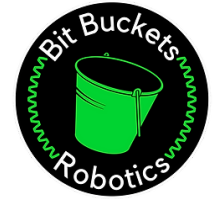


| Expense Categories | | Amount |
|---------------------------------|--|--------------------|
| FIRST Robotics Competition | | |
| 1st Regional: Salt Lake City | | |
| | Registration / KoP | \$6,000.00 |
| | Mentor Lodging (5 rooms x \$205/night 2-4 nights) | \$2,870.00 |
| | Student Lodging (2 nights x 4 rooms x \$205/night) | \$1,640.00 |
| | Mentor Flights (3 * 300) | \$900.00 |
| | Food (2 dinners, 2 lunches) | \$1,500.00 |
| | Robot Transportation (Van/Trailer Rental) | \$250.00 |
| 2nd Regional: AZ East | | |
| | Registration | \$3,000.00 |
| | Mentor Lodging (5 rooms x \$300/night 2-3 nights) | \$3,600.00 |
| | Student Lodging (2 nights x 5 rooms x \$300/night) | \$3,000.00 |
| | Food (2 dinner, 2 lunches) | \$1,500.00 |
| | Robot Transportation (Trailer Rental) | \$200.00 |
| Robot and Competition Materials | | |
| | Robot Hardware | \$8,000.00 |
| Marketing & Merch | | \$500.00 |
| Build Season | | |
| | Field Element Materials | \$1,000.00 |
| | Xerocraft member fees | \$3,600.00 |
| | Friday Meals | \$3,250.00 |
| | Practice Space | |
| | Rent | \$6,489.72 |
| | Electric | \$900.00 |
| | Supplies | \$1,800.00 |
| Total Expenses | | \$49,999.72 |



| Income Categories | | Budgeted |
|------------------------------------|--|---------------------|
| Starting Balance | | \$50,000.00 |
| Membership Fees | | |
| (500x18)+(250x6) | | \$11,250.00 |
| Sponsorships | | |
| Texas Instruments | | \$7,500.00 |
| Raytheon | | \$2,500.00 |
| Society of Women Engineers (Apple) | | \$25,500.00 |
| Pitt Family Foundation | | \$2,000.00 |
| Apple | | \$3,000.00 |
| Apple Volunteer Match | | \$5,000.00 |
| Total Income | | \$56,750.00 |
| Income + Starting Balance | | \$106,750.00 |
| Leftover | | \$56,750.28 |

| Student Expenses (Average) | | Estimated |
|---|--|------------------|
| Tuition | | \$500.00 |
| T-Shirt | | \$15.00 |
| 1st Regional: Utah | | |
| Lodging (2 nights, team room) | | \$100.00 |
| Food (Thursday Lunch, Saturday Dinner + Snacks) | | \$50.00 |
| 2nd Regional: AZ East | | |
| Lodging (2 nights, team room) | | \$100.00 |
| Food (Thursday Lunch + Snacks) | | \$50.00 |
| Total Expenses | | \$815.00 |



Sponsors

Bit Buckets Robotics 4183

We are proudly sponsored by



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An RTX Business



Pitt Family Foundation

Bit Buckets Families
and the community of Tucson Arizona