

Business Plan and Budget Outline

Business Plan Section Outline

Introduction to Penguin Empire Robotics

“The varsity sport for the mind,” FIRST Robotics Competition (FRC) combines the excitement of sport with the rigors of science and technology. Under strict rules, limited resources, and time limits, teams of 25 students or more are challenged to raise funds, design a team “brand,” hone teamwork skills, and build robots programmed to perform prescribed tasks against a field of competitors. It’s as close to “real-world engineering” as a student can get. Volunteer professional mentors lend their time and talents to guide each team.

- **Mission statement**

Our mission is to engage young people in exciting, mentor-based programs that build science, engineering and technology skills, cultivate teamwork and collaboration, inspire innovation, and foster well-rounded life capabilities including, problem solving, self-confidence, communication, and leadership.

- **Team Philosophy**

Penguin Empire Robotics emphasizes teamwork, responsibility, and “gracious professionalism.” We strive to give back to our community, and promote an interest in and passion for the art and science of robotics technology and engineering.

- **Vision statement**

We visualize a world where creativity, knowledge, respect, and science converge to expand the thinking, viewpoints, and contributions of students to one another, their communities, and the world at large.

- **History**

Started in 2007 by San Marin High School students, Penguin Empire Robotics entered our first FRC competition in early 2008. The organization has continued to develop team building, engineering, mechanical, and programming skills. Each year since 2008, we have competed in the regional FIRST competition and continue to work toward our mission and goals together, and dream bigger dreams. In 2013, with the introduction of a new Science, Technology, Engineering, and Math (STEM) program to our high school, we had an influx of freshmen from the program. These students brought fresh enthusiasm and energy, and we look forward to a future collaboration with our club and the San Marin STEM program.

- **Awards received**

In the 2008 FRC Davis Regional competition, we earned the Highest Rookie Seed Award, and our alliance placed second overall. In 2009 and 2010, we won first place two consecutive years in a row in the City of Novato 4th of July parade for our robot and float

design. In 2011, we made First Reserved at the FRC Davis Regional competition. In 2014 we were part of the top eight alliance, finishing in 17th place out of 54 teams overall.

- **Colleges alumni have attended**

As a team that prepares students for nearly every field, our students develop unique talents thanks to their interactions with one another and experiences during competitions. Through their involvement with the FIRST program, students gain bright and shining opportunities for their futures and, more importantly, they have an experience they will never forget. We have alumni attending many prestigious schools, including the following:

- UC Santa Cruz (Inaugural Robotics Program)
- UC San Diego
- UC Los Angeles
- UC Santa Barbara
- UC Davis
- UC Berkeley
- University of the Pacific

Organization

- **Membership**

- Our members are expected to demonstrate a high level of dedication to the team, especially during our build season. We plan and create our competition robot over a six-week period in January/February. During that time, members log at least 14 hours a week in the robotics classroom, building and refining our robot.

- We currently have 21 members, 6 females and 15 males. Our freshman and sophomore membership is strong this year. Juniors and seniors take on mentoring roles in the club.

- **Team structure**

- Penguin Empire Robotics is run by a team of student officers elected by fellow members.

- President:

- Organize and delegate responsibilities
- Focus team on fundraising efforts/Lead fundraising team
- Organize team meetings
- Respond to judge and visitor questions during competition
- Handle team-to-team socializing during competition

- Vice-President:

- Leads team meetings when president is unavailable
- Shares president's duties, as delegated by president

- Secretary:

- Maintains communication with mentors/advisors/parents
- Takes and distributes team meeting minutes
- Compiles meeting agendas
- Tracks action items: Were team meeting goals achieved?
- Creates team contact list

- Takes roll at meetings
- Treasurer:
 - Develops and maintains team budget
 - Updates current team account balance and reports to club
 - Participates in team fundraising strategies
 - Tracks funds from fundraising activities
- **Team calendar**
 - **Team Events for 2014-2015 School Year**
 - September: San Marin High School Club Fair Recruiting
 - September–December: Monday Night Member Meetings: Training, Technology Development, Fundraising
 - October: Western Region Robotics CalGames Competition
 - November: Bay Area Science Fair (Community Outreach)
 - January: FIRST Robotics Competition Kickoff
 - January/February: FRC Build Season (Six Weeks)
 - March: First Robotics Regional Competition, Davis
 - Yearlong: Community Outreach Events

Team Strategy

- **Build strategy (how the group approaches each year's robot)**
 - During the off-season, all students begin by experimenting with new and available components and technologies that could potentially be used on the robot. Each January the build season begins with a kickoff event where a new challenge is announced. As build season begins, the team reviews the competition rules to understand the game and robot parameters, in order to define goals for the competition and brainstorm robotic functions that will maximize points in the competition.

At this point, members work in smaller groups to determine the optimal strategy for robot development, including technologies to be utilized for each function identified as crucial for success, and develop the final design for a single robot.

Employing an empirical approach, teams work on their respective assignments, developing physical models and component optimization that will ultimately result in a skeletal prototype.

Now, team members are cross-trained in the technologies and designs used in developing the prototype, and the entire group comes together to launch the physical building of the robot.

Students now engage in machining, welding, fabrication, and programming to build a solid frame for the robot in the first week, and a functional working robot within 3 to 4 weeks. In the two weeks that follow, robotic electronics, mechanics, movement, and

functionality are fine-tuned and optimized to achieve overall goals for the competition.

This strategy allows for 1 to 2 weeks of final testing and practice before heading to the competition.

- **2014 Robot Design**

- Our 2014 robot was designed to compete in the FRC Aerial Assist competition. This competition required each robot to be able to shoot, catch, and pass a 24" diameter yoga ball. The central design for our robot was a spring-powered kicker with a pneumatic cocking system that facilitated consistent and accurate shooting and passing abilities. Pivoting wings provided the ability to catch and control airborne balls. In addition, our robot used a pivoting rear claw for ground ball retrieval. A targeting camera assisted in Teleop (remote) mode operation. C++ programming allowed the robot to consistently shoot one ball through the goal while in autonomous (pre-programmed) mode.

- **Technology Employed**

- Powered by five pneumatic cylinders, our robot employed a two-motor, four-wheel drive system with rear omni wheels and a state-of-the-art compressor-cooling fan. Passing and shooting was accomplished with a dual-spring 180 lbs. cocking/kicking mechanism. We custom built the aluminum frame and steel components using various metal working tools, including MIG welders, a chop saw, lathe, drill press, and grinding wheel. We designed the robot to operate in both Teleop (remote) and autonomous (pre-programmed) modes. The robot algorithms were coded in the C++ programming language.

School Involvement – Interaction

- **School Support**

- The school provides us with a large classroom with auto shop tools, storage facilities, and computers.
- The team participates in school events (assemblies, club fairs, back-to-school night).
- Our teacher advisor is one of our English teachers, Denise Smith. She is both enthusiastic about and supportive of our team and can be found in the front row of the competitions, cheering loudly in her Penguin Empire t-shirt.

- **Interface with STEM**

- In the 2013-2014 school year, a STEM program was introduced to our high school. The program brought an influx of freshmen members to Penguin Empire Robotics. In the future, we hope to expand integration with the teachers and members of the STEM program to bring depth to both programs.

Financials

- **2014-2015 Season Budget Plan: Attending One Local, One Regional , and One National FRC Event**

Expense	Cost	Notes
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Local Events		
Event Registration	\$1,500.00	
Food at Event	\$500.00	10 Attending Members @\$50/day each - 1 day
Travel (Mileage Reimbursement)	\$300.00	
Trailer for transporting robot & equip.	\$200.00	
Regional Event (Davis)		
Event Registration	\$5,000.00	
Lodging	\$1,000.00	5 rooms, 2 nights @ \$100 ea night
Food at Event	\$2,250.00	15 attending members @\$50/day ea - 3 days
Travel (Mileage Reimbursement)	\$500.00	
Trailer for transporting robot & equip.	\$200.00	
National Event (St. Louis)		
Event Registration	\$5,000.00	
Lodging	\$1,000.00	5 rooms, 2 nights @ \$100 ea night
Food at Event	\$2,250.00	15 attending members @\$50/day ea - 3 days
Airfare	\$5,250.00	15 attending members @\$350/ticket
Shipping for Robot	\$500.00	
Materials		
<i>Construction</i>		
Raw Materials (metal, polycarbonate, wood etc.)	\$1,000.00	
Mechanical Components (sprockets, chains, wheels, etc.)	\$1,500.00	
Electronics (speed controllers, sensors etc.)	\$1,500.00	
Hardware (fasteners, bearings, etc.)	\$250.00	
Practice Field Components	\$300.00	
Pneumatic Components	\$1,000.00	
Shipping Crate	\$200.00	
<i>Marketing & Promotion</i>		
Banners and Signs	\$300.00	
Tshirts & Marketing Materials	\$500.00	
<i>Tools & Equipment</i>		
Computers & Printer	\$1,500.00	
Shop tools	\$300.00	
<i>Educational & Outreach</i>		
Vex Robotics Kits	\$3,000.00	
Displays and Handouts	\$200.00	
<i>Miscellaneous</i>	\$500.00	
TOTAL EXPENSES	\$37,500.00	

Sponsors and Mentors

- **Team Sponsors**
 - Past sponsors have included Google, the Bryn Wojwicki Foundation, NASA, Precise Automation, and the Novato Sunrise Rotary Club.
- **Build Mentors**
 - Mike Sousa has been a Penguin Empire mentor since 2008. A life-long automotive and mechanical enthusiast, Mr. Sousa worked for 27 years as a transportation fleet

manager at United Parcel Service. Mr. Sousa holds Biology and Biochemistry degrees from UC Santa Cruz, and has taught auto shop at San Marin High School.

- o Tim Buss is a founding member of Penguin Empire Robotics. With 30 years of experience in the software industry, Mr. Buss is a robotics enthusiast whose two children have also been involved with the team.

- **Parental Involvement/Mentoring**

- o Penguin Empire Robotics is also supported by a group of parents who mentor the group in additional areas, such as website building, fundraising, technology scouting, marketing, club administration, transportation, leadership and event planning.

DONATIONS -

Make check payable to "San Marin High School" with memo "For Robotics Club"

A Non-Profit Organization

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San Marin High School

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CONTACT INFORMATION

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