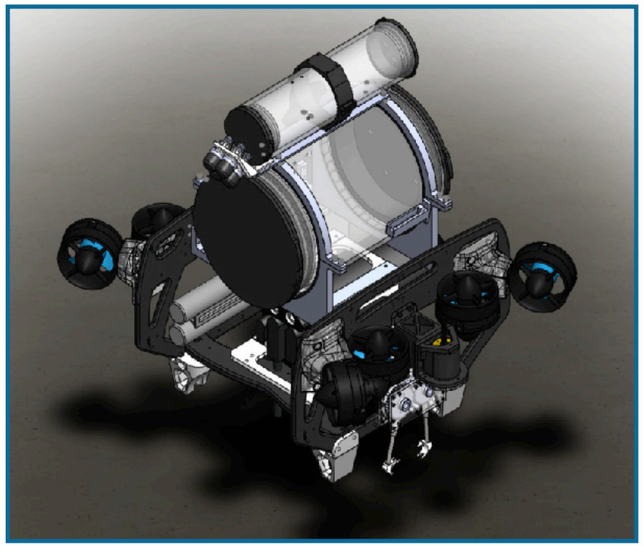
UCSD TRITON ROBOSUB

AUTONOMOUS UNDERWATER VEHICLES

UC San Diego
Jacobs School of Engineering

2020 - 2021 SPONSORSHIP PLAN

What is Robosub?



- International autonomous underwater vehicle (AUV) competition

- Hosted every summer in San Diego at NWIC Pacific Transdec, a military facility designed for naval sonar tests

- Teams design, build, and program AUVs to accomplish an underwater obstacle course completely autonomously

For more information visit: robosub.org

Who Are We?

- We're the representatives at Robosub from UC San Diego, with members spanning over 10 majors from 5 departments

- We were established in 2018, and reached semifinals in our debut year!

- Due to the COVID-19 pandemic, we were unable to finish building our new design, so this year we will be moving forward with safely building and testing!

Student Benefits

By participating in Triton Robosub, team members get to:

- Apply knowledge learned from the classroom to this challenging competition
- Network with other engineering students and industry professionals
- Give students insight into real-world challenges with underwater robotics
- Work on a diverse, cross-disciplinary team and work with talented mentors
- Learn about advanced technologies such as machine learning or ROS

Mission Statement

Triton Robosub exists to develop **hands-on experience** for passionate engineers and **promote learning** about underwater robotics.

Your investment in Triton Robosub is an investment in the quality of this learning experience, and all the donations we receive will go directly back into our program for buying more advanced parts, developing higher-quality workshops, and covering competition and other logistical fees.

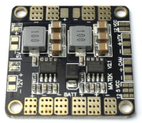
COVID-19 Considerations

The ongoing pandemic has affected our ability to do in-person meetings and events. Like many businesses, we have gone virtual for meetings, but as a robotics team creating physical products is necessary. All building and testing will be done with appropriate personal protective equipment, following social distancing guidelines and state, city & university restrictions. Interactions between students and mentors, industry experts, and peers will be conducted via Zoom. Despite the pandemic, we are committed to providing the best experience possible for our students, and doing the best work we can developing our AUV!

System Overview of 2021 Autonomous Underwater Vehicle

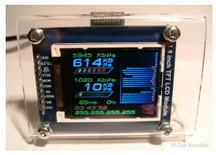
Internals

Our internal components are carefully selected or created to optimize our performance.



PDB

OBC



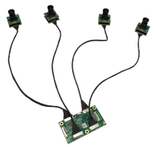
Status Monitor

MCB

FPGA

ESC

FC



Stereo Cameras

- Our On Board Computer (OBC) is our central processor, dictating how each of the other boards should function using data collected from our external sensors and cameras
- The Power Distribution Board (PDB) powers all boards and sensors on board the sub
- The Field-Programmable Gate Array (FPGA) allows us to take in hydrophone data
- Our flight controller provides the OBC with sensor data, and uses the motor Electronic Speed Controller (ESC) hub to move the motors
- The Manipulator Control Board (MCB) dictates movement for manipulator and torpedo launcher
- Our status monitor gives diagnostic information to divers and testers at a glance

Externals

Our external sensors and devices give us enough information to do anything in the water.

Manipulator

Torpedo

Hydrophone Array

Active Sonar

Motors

DVL

- We use eight motors to give us six degrees of freedom while moving through the course
- Our hydrophones collect frequency data from acoustic pingers
- The active sonar allows us to get an acoustic map of the pool around us, illuminating the locations of obstacles
- The Doppler Velocity Log (DVL) gives us high-accuracy local positioning underwater, where traditional location tracking like GPS cannot pass through
- The torpedo launcher lets us shoot torpedos through targets underwater
- Our manipulator allows us to pick up objects underwater

Sponsor Benefits

By sponsoring Triton Robosub, your organization receive the benefits below, and we always love other opportunities to connect our engineers with you! Reach out to us if you have other benefits in mind.

List of Benefits	BRONZE $999 OR LESS	SILVER $1,000 TO $1,999	GOLD $2,000 TO $3,999	PLATINUM $4,000 TO $7,999	DIAMOND $8,000 OR MORE
Your logo on our website with a link to your webpage	✔	✔	✔	✔	✔
Your logo on all banners, promotional materials, and documents	✔	✔	✔	✔	✔
Quarterly networking events between your company and our team	✔	✔	✔	✔	✔
Testing invitations & exclusive opportunities to connect with our team		✔	✔	✔	✔
Your logo on all team uniform items			✔	✔	✔
Your logo on the submarine's hull				✔	✔
Our participation in your corporate events					✔

Budget Breakdown

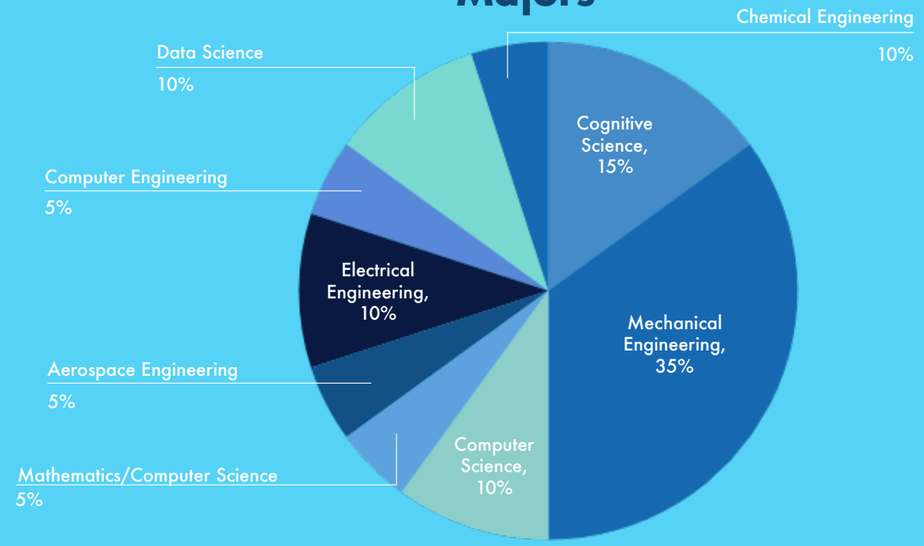
Triton Robosub is a 501(c)(3) nonprofit under the UC Regents and the Computer Science & Engineering Department.

Operating Costs		Parts Budget	
Competition Cost	$1,000	Chassis Redesign	$4,000
Personal Protective Equipment	$1,000	Autonomous Control System	$1,500
Machine Learning Training Computer	$1,000	Software Testing Bench	$1,500
Logistics Costs	$1,500	Active Sonar System	$3,500
Total	**$3,500**	**Total**	**$10,500**

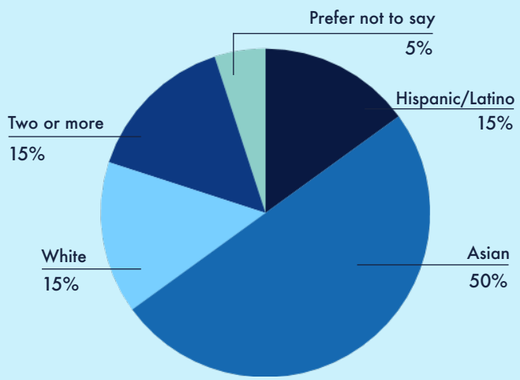
Total Costs: $14,000

Team Diversity

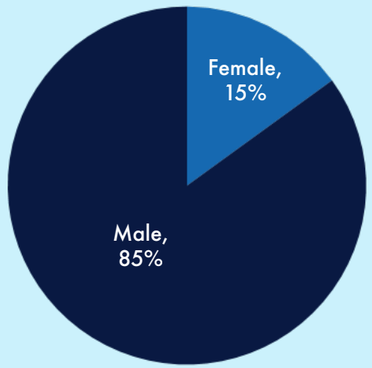
Majors



Ethnicities



Genders



As a proud member of the Jacobs School of Engineering (JSOE) community, maintaining and growing our team's diversity is an important part of our overall mission. Having a plethora of unique ideas and perspectives only makes our team stronger, and we have been taking larger strides every year to increase diversity, especially with respect to gender. This year, we made significant changes to our recruiting process to introduce less bias in our application, get the word out to more women by partnering with the Society of Women Engineers, and opened a dialogue with the Associate Dean of JSOE on what changes we can make to demonstrate our inclusivity. Beyond the recruiting season, we will be implementing an Equity, Diversity and Inclusion plan to host workshops aimed at underrepresented communities, and prepare our future team leaders for the next year of recruiting.

2019-2020 SPONSORS

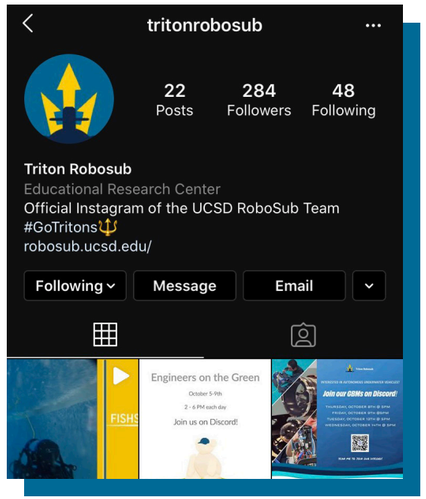
UC San Diego JACOBS SCHOOL OF ENGINEERING

brain corp

TESC Triton Engineering Student Council

TELEDYNE MARINE Everywhereyoulook™

Connect Tech Inc. Embedded Computing Experts



Social Media

Social media is one of the best ways to reach people, and we are active on all major platforms. Follow us on Facebook, Instagram, Twitter, YouTube, and LinkedIn, all with @TritonRobosub.

Our website, robosub.ucsd.edu, has links to all of our social media. It is developed in-house, and also features a documentation wiki curated by our members.

Outreach

We are always expanding our reach, and in our sophomore year have participated in events such as:

- Tech it Out
- UCSD Summer Research Conference
- Engineering on the Green

We also have outreach events planned for the upcoming year, including:

- Virtual workshops covering technologies we work with, such as ROS or ML
- Partnerships with other UCSD engineering to make differences in our community

Your brand will be associated with these events, helping us create positive impacts.

UNIVERSITY OF CALIFORNIA, SAN DIEGO UCSD

BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO SANTA BARBARA • SANTA CRUZ

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
9500 GILMAN DRIVE
LA JOLLA, CALIFORNIA 92093-0443

PHONE: (858) 534-8908
FAX NUMBER: (858) 534-7029
EMAIL: kastner@ucsd.edu

June 30, 2020

To Whom It May Concern:

As the faculty advisor for the Triton Robosub team, I endorse their request for financial support. The team's primary goal is to develop an autonomous underwater vehicle to compete in RoboNation's annual Robosub competition. This international competition is held annually at SPAWAR (now NWIC) TRANSDEC facility. Students from universities around the world have created autonomous submarines to complete a series of challenges while simulating conditions found in oceans and other aquatic environments. There are typically 30+ teams at this competition including many of the top universities in the world.

Triton Robosub is a new group and will be representing UCSD as they compete for the second time. UCSD had a team many years ago (I was also the advisor of that team), but it dissolved and to the best of my knowledge, there has been no UCSD representation for many years. The Triton Robosub team is posed to make long term and successful team for this competition.

After a successful first year competing on the international stage (reaching semifinals in their debut year), the team has managed to secure an approximately $15,000 sponsorship by obtaining a Doppler Velocity Log. This incredibly precise sensor enables high-accuracy local positioning and gives the team a huge edge against their competition. The team's size has also tripled, meaning that even more students are exposed to the engineering challenges associated with underwater robotics.

In addition to integrating the DVL, the mechanical sub-team has been hard at work developing a new chassis for their robot, which takes careful consideration of physical limitations such as buoyancy, as well as ensuring the power supply is sufficient for extended operation of all subsystems. The software sub-team has been hard at work this year as well, developing complex deep learning models for underwater computer vision. They've made great strides in the past year with all other aspects of the software stack as well, with improved motor control, positioning, and decision-making. Finally, the electrical sub-team has been exploring digital signal processing with the addition of hydrophones, opening an entirely new realm of possibilities.

Competitions like this allow our students to develop their skills in real-life applications. This competition in particular has benefits in tying together UCSD and NWIC. And it highlights UCSD strengths in robotics, engineering, and oceanography. The members of the team are given an interdisciplinary view of engineering. And they are exposed to other innovative students from around the world who have vastly different experiences and perspectives. This is a great opportunity, not only for the students involved, but the university as a whole.

Sincerely,

Ryan Kastner
Dept. of Computer Science and Engineering
University of California, San Diego
Bio: http://kastner.ucsd.edu/ryan/about-me/

Contact Information:

Triton Robosub

Patrick Paxson, ***Team Lead***

Website: robosub.ucsd.edu
Email: robosub@eng.ucsd.edu
Instagram: @tritonrobosub

We are located:

2112 Computer Science and Engineering Building (EBU3B)

9500 Gilman Drive, Mail Code 0404
La Jolla, CA 92093-0404

SCAN ME