Gibson Ek Circuit Trees Technical Design Report 2026

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Abstract-Gibson Ek High School has worked hard to bring to competition this year's iteration of Sir Swims-A-Lot. We've focused on software upgrades and standardization of our practices in order to pass down information to newer members

I. Competition strategy

This year we are not attempting every task, instead, we strategically determined what tasks we could achieve over the course of the year. We additionally intend to attempt our stretch goals on site at robosub. It's important to note that our goals are broken into main goals and stretch goals. We will only put significant resources into stretch goals in the event that we can complete the items that fall into the category of main goals.

A. Coin Flip

The coin flip challenge is among our primary goals. It is also something that we should already be able to complete with the code we already have, and we have opted to not to attempt the restore and recovery role options.

B. Roll

The smaller size of our BlueROV2 gives us an advantage in rolling, and we have been able to achieve this in past years. Because of this, we are going to attempt this every run, in order to score additional points. Due to our confidence in our ability to complete this part of the challenge, this has also been designated as a primary goal.

C. Slalom

We have determined that the slalom fits the category of main goal. Due to testing constraints, we have made the determination to have a skeleton of systems in place for this challenge, and ironing out testing at competition. The end result might look like using Sir Swims-A-Lot's camera to detect color.

D. Gate

The gate is something our team can consistently achieve, and we haven't put additional resources into it this year. We run open loop code to move the robot down and forward for specified amounts of time.

E. Surfacing in the Octagon

As a primary goal, our team intends to surface in the octagon. We plan to achieve this by using the onboard compass to maintain a heading and keep the robot stable enough to guide it precisely enough to surface accurately.

F. Return home

Returning home is a stretch goal. Aided by our goals of achieving stability, we intend to attempt to return home, only if all of our other goals are met.

II. Design strategy

Our strategy this year encompasses both our individual goals, as humans, and our goals for the robot's capabilities. We've put a strong emphasis on people, and making learning more approachable. Because of this our team has focused a lot on streamlining clear procedures, including documentative, code-centric, connective, and electrical processes alike. Our robot is a BlueROV2 that we are trying to get the most out of.

Our robot is a Blue Robotics BlueROV2 Heavy Configuration with a Raspberry Pi 4 running Ubuntu and BlueOS. We have converted the ROV to an AUV using two methods. The first is a python library, bluerobotics_navigator, which interfaces directly with the robot's navigator board. The second is ArduSub MAVLink. This year, we are transitioning from only using the navigator library and have begun to integrate MAVLink into our software design.

A. Connection

[Tether, wifi]

B. Compass

One of the big advantages provided by the ability to get data from the robot. With that we have been attempting to design a way to achieve spatial stability with the robot, and prevent drift and potentially even

C. Torpedos

Something we have been working on in the background, as preparation for future years, as well as a great learning exercise is torpedoes.

III. Testing Strategy

Our testing strategy this year centered around getting the robot to move more consistently, as well as discovering new ways to get information from the robot

A. Hover

Something we have spent a lot of time of time adjusting was the motor speeds and their ability to balance themselves

B. Compass

IV. Acknowledgements

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"BlueOS Documentation." *Blueos.cloud*, 2026, blueos.cloud/docs/latest/usage/overview/. Accessed 13 May 2026.

"BlueROV2 Assembly." *Blue Robotics*, bluerobotics.com/learn/bluerov2-assembly/.

"MAVLink Basics — Dev Documentation." *Ardupilot.org*, ardupilot.org/dev/docs/mavlink-basics.html.

"ROS 2 Documentation — ROS 2 Documentation: Rolling Documentation." *Docs.ros.org*, docs.ros.org/en/rolling/index.html.