**EXECUTIVE SUMMARY**

Swimming alone on open waters is dangerous, especially when traveling long distances. The current measures that long-distance swimmers take are to either (1) attach a flotation device to themselves, increasing drag through the water, or (2) to ask a friend to paddle next to them. These solutions are inefficient and not always feasible.

Team 14 designed the P.A.L. to make long distance swimming safer. The P.A.L. autonomously follows a swimmer and provides a flotation device that allows the athlete to ride back to shore if necessary. Much of the electrical and mechanical design of the P.A.L. lies inside of the hull which takes the form of a Hydro Kaddy, an injected molded plastic hull originally intended to be pulled behind a kayak.

The electrical design focused on utilizing both radio and ultrasonic communication in congruence to control the response of the boat and allow for the autonomous tracking of the swimmer. A radio signal is sent from the boat to the swimmer, triggering ultrasonic waves to be transmitted from the swimmer. The P.A.L. then receives those ultrasonic waves with receiving sensors. As a result, the boat calculates the swimmer's position.

The swimmer’s position is used to control two motors. One motor controls the thrust which revolves around the uniquely designed jet propulsion unit. The second motor controls the yaw of the boat. Control lines and a custom nozzle were designed to connect the electrical response to the mechanical action in directing the boat to follow the swimmer.

Finally, to help with smooth control and protection of the internal components, the team conducted proper weight distribution testing and waterproofing. For the swimmer's personal benefit, an LCD displays the distance swam and the temperatures of the water and the air. The finished product resulted in a working proof-of-concept, demonstrating the possibility of safer long-distance swimming.