

Providing Situational Awareness to Unmanned System Operators and Pilots: A Research Study in Human-Machine Interfacing

**Applicable Systems**



Above are systems that the controller can easily operate. Top right is a drone. Top left is a full-sized boat. Bottom right is a submarine. Bottom left is a ground vehicle. All of which are unmanned Autonomous systems, that require safety drivers to watch after them during operation.

**Visual Aspect**

The screen will display visual aids, such as the path the unmanned system plans to take, to help the safety pilot respond appropriately. Other information such as camera views and the visualizer from the unmanned system can also be viewed to help with piloting remotely or when the system is out of line of sight.

BELOW - 3D rendering of the remote in a finished form. Some design aspects are subject to change following results from a human factors study and ergonomics.

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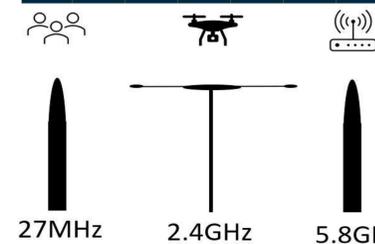
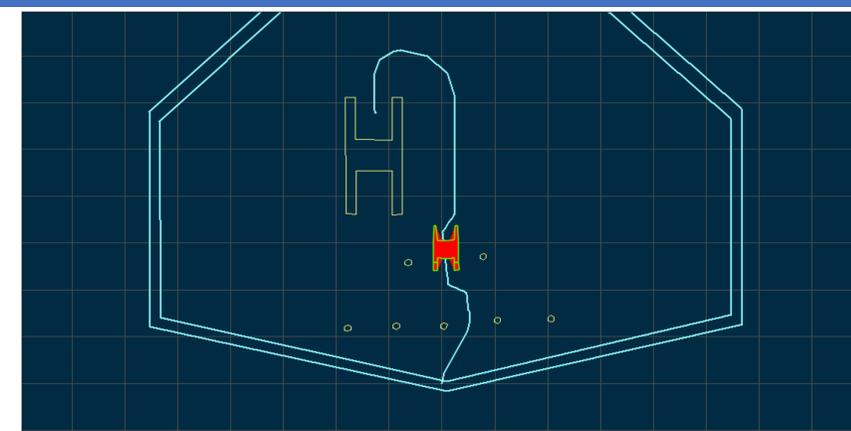
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**Abstract**

There are over 500 RC systems on the market and each controller is set up differently. The goal of this project is to improve human machine interfaces used by unmanned system operators, ranging from hobbyist to military, to ensure pertinent information is communicated safely to the pilot by creating a single, easily customizable controller. Currently, RC controllers can be difficult to learn because there are no standards for control locations. Controllers are not waterproof and do not have the ability to give the pilot access to on board information like a camera view or instrumentation values. To address these concerns, this project aims to research, design, and prototype an RC controller comprised of commercially available parts to help improve the overall safety of RC controller systems. This project is still in developmental phase, but this research will help increase safety and usability for the unmanned systems field.

BOTTOM RIGHT- System diagram of how all the internal components must communicate in order to function properly. The display also shows a view of a visualizer. Visualizer – 3D live rendering of surroundings of unmanned system created by the system itself.



TOP- A closer look at the path planner information given by the tablet to the user that is generated by the autonomous system.

The antenna functions are shown above. 27MHz communicates to the team's hand-held radios. 2.4GHz communicates to the autonomous unmanned vehicle. 5.8GHz facilitates Wi-fi capabilities.

**Design Concepts**

- Waterproof : IP67 Rating
- Displays system telemetry
- Displays onboard camera feed
- Customizable controls
- Easy to learn/ operate
- Durable design

