



MAVROS-JS: A custom mission command interface to streamline UAV research

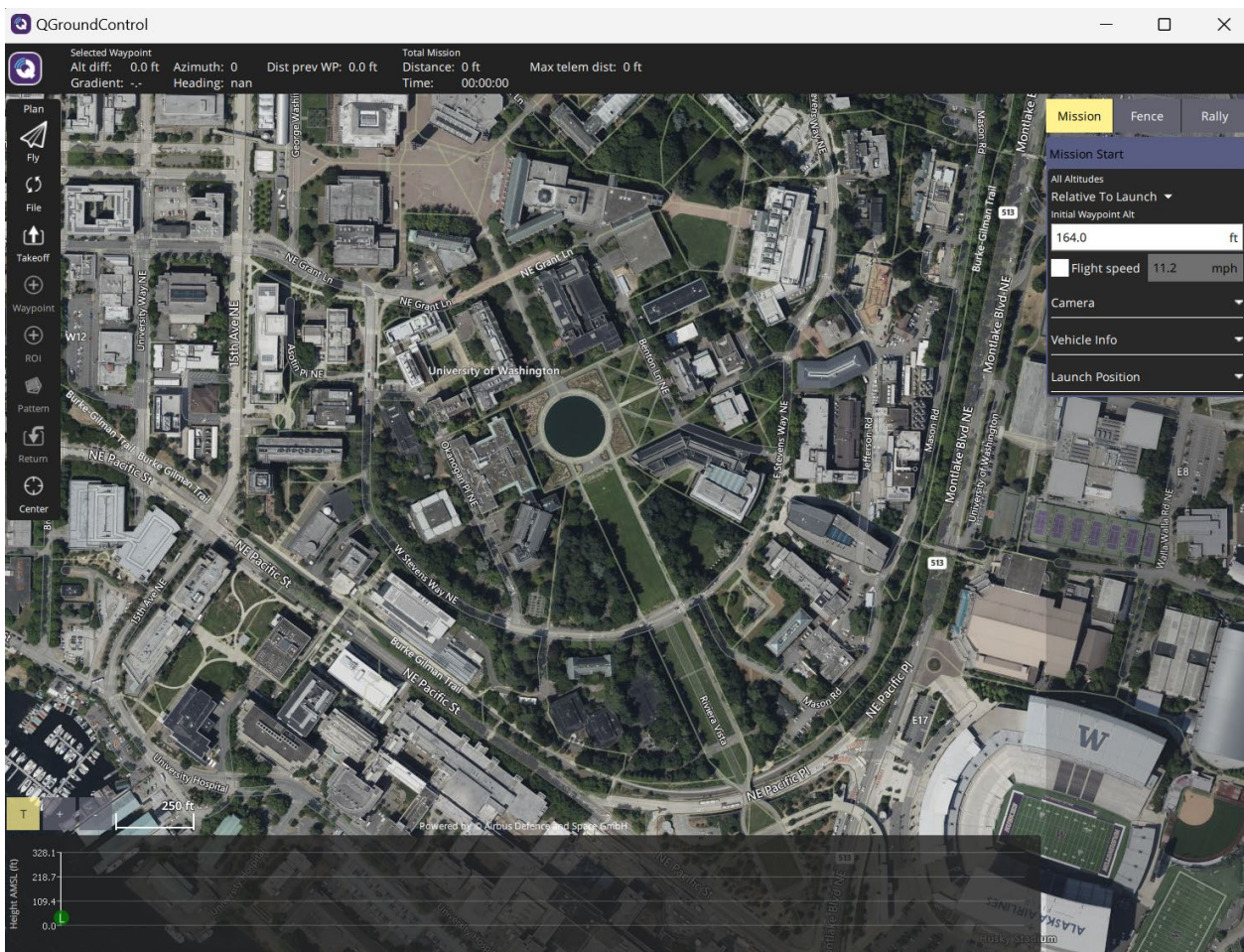


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Motivation and Background

Unmanned aerial vehicle (UAV) flight testing in research is a complex and time-intensive process, often hindered by unreliable, non-plug-and-play software.

This research project aims to create a new software/hardware platform **to simplify UAV integration for research purposes.**



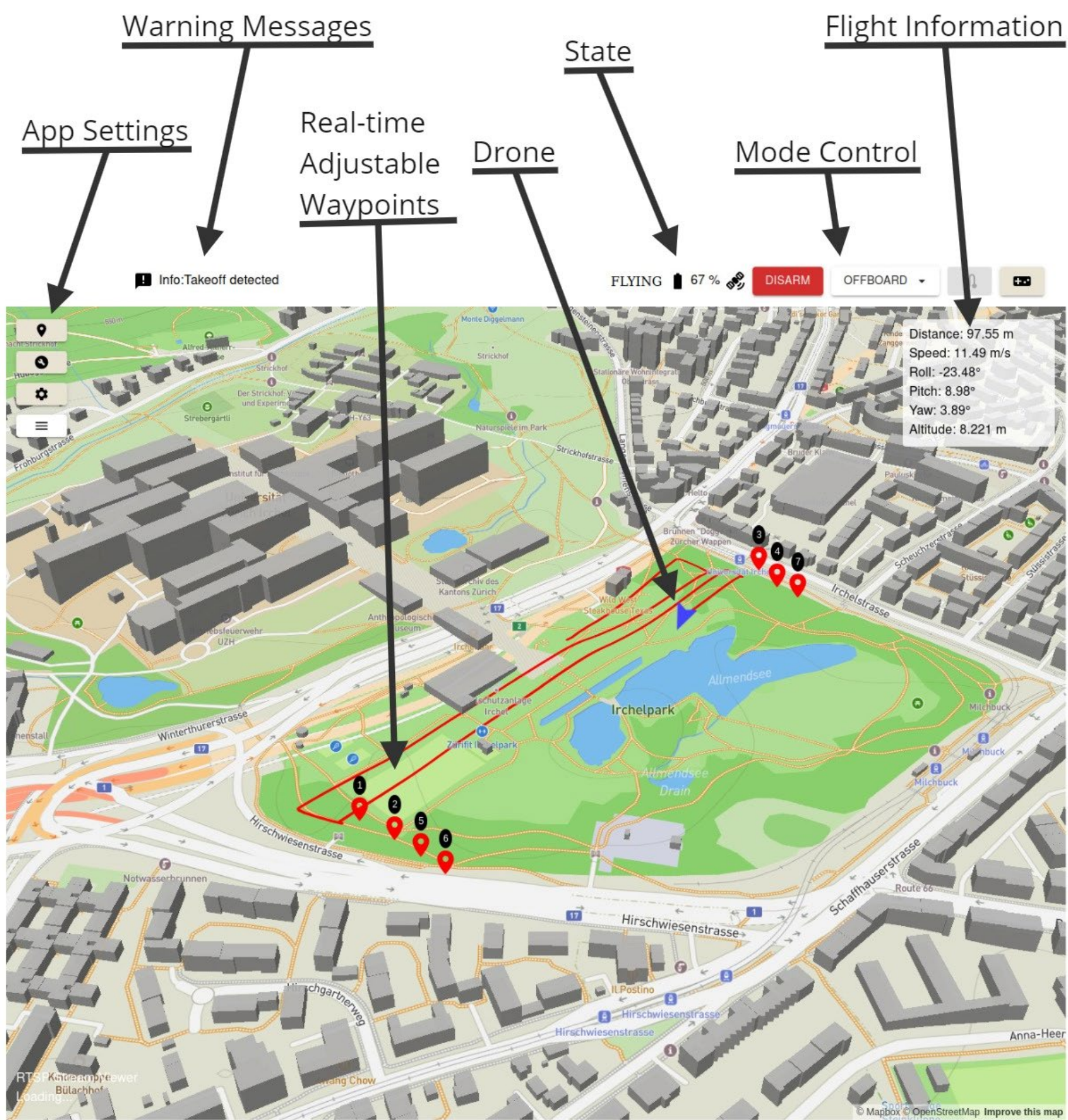
QGroundControl, our current interface.

Our platform will facilitate more efficient UAV research for various applications, including **wilderness search and rescue, firefighting, and salmon population counting.**

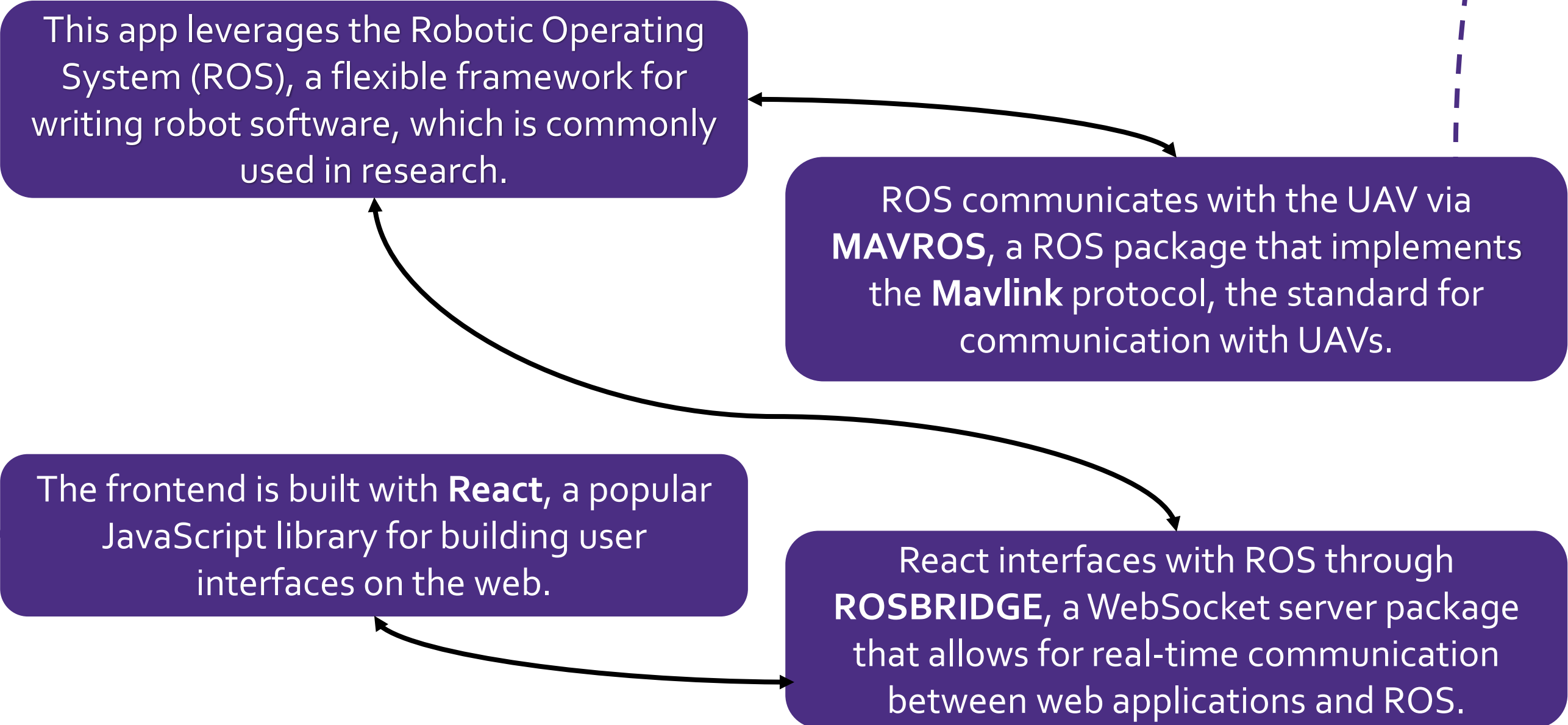
UAV software options

- Open-Source Ecosystem: QGC, Ardupilot, Betaflight**
Offer customization and community support but can suffer from inconsistent updates and stability issues.
- Closed Ecosystem: AMC, DJI**
Provide streamlined experiences with robust support and regular updates but lack flexibility and customization which is needed for research.
- 3rd Party Closed Source: UGCS, Dronelink**
Offer advanced features and integrations but are costly and have licensing restrictions.
- Custom: Mavlink, Mavros, DJI SDK**
Provide maximum flexibility and integration but require significant technical knowledge and development effort.

Architecture



Screenshot of a simulated mission with the new interface.



Flight testing

The app has undergone a successful flight test where the UAV was fully autonomously controlled through the GUI. For this test, we used a PX4 development UAV from Holybro, selected for its affordability and straightforward setup.



Holybro PX4 development UAV (x500 v2),
Photographed during flight testing.

We evaluated various functions, including a simple waypoint pattern, autonomous takeoff and landing, and in-flight waypoint control. The UAV was controllable from both desktop and mobile devices.

Future work

Future development of this project will focus on adding a real-time video feed, implementing machine vision functionality and tracking, and integrating with non-aerial robots.