



# Unmanned Ground Vehicle (UGV) Forge

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## Objective

UGV is an unmanned autonomous ground vehicle capable of delivering supplies to transmitted GPS coordinates. The goal of this project was to design a vehicle that could be used in search and rescue missions, as well as work in junction with the UC Irvine UAV Forge unmanned air vehicle in the Student Unmanned Aerial Systems Competition (SUAS).



HKPilot 32 PixHawk, GPS Module, and RF Telemetry Set



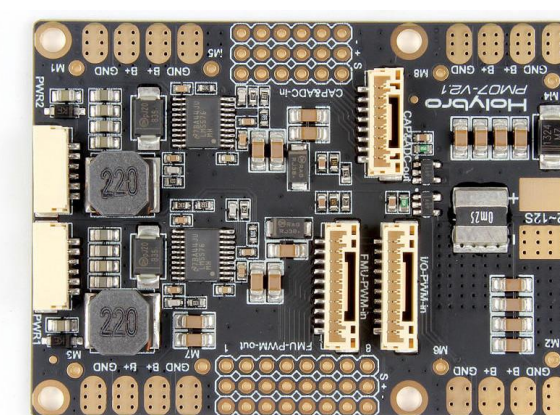
Turnigy 20A ESCs



3 cell LiPO Battery



5V UBEC Converter



Power Distribution Board

## Features

1. Lightweight and compact design for ease of transport and storage
2. High maneuverability for hard to reach and tight areas
3. Option to manually controlled movements
4. Software application for pre-planned mission routes
5. Wireless interface for long distance vehicle control and information retrieval
6. Low cost and widely accessible parts for ease of reproduction and repair

## Implementation

### Components:

- PixHawk 2.1 Microcontroller, GPS antenna, and Magnetometer
- RFD900 Telemetry Transmitter
- Futaba R6303SB Receiver for Ground Station communications
- Turnigy 20An ESC's for motor control
- Q-Ground Control navigation software

### Design:

- Used RC Car as base to save time and money on physical vehicle design
- Reconfigured hardware for ground vehicle usage



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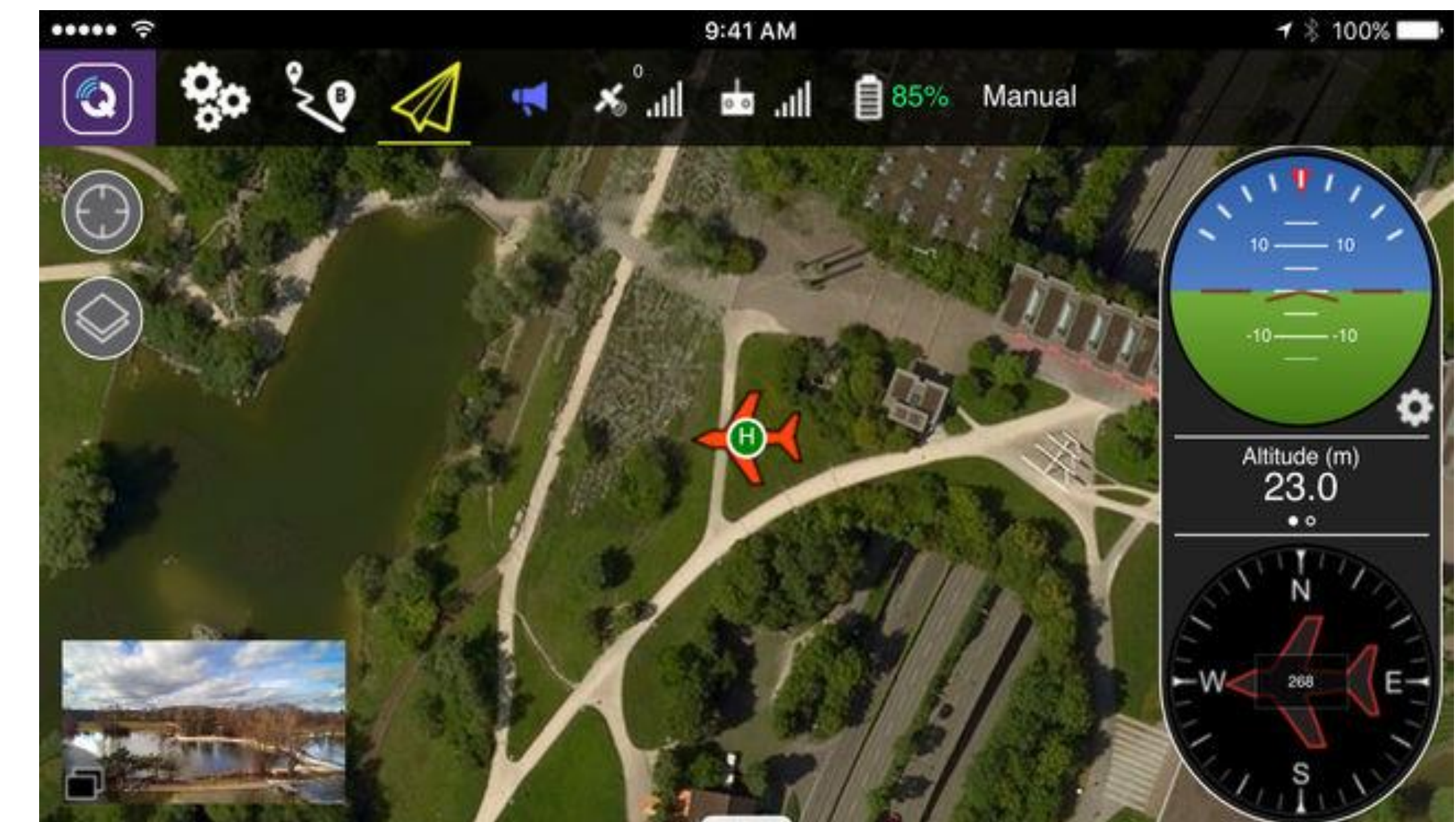
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## Outcome

1. Completion of hardware and software components
2. Full autonomous functionality from pre-planned missions sent using software component
3. Design requirements for different use cases met
4. Components compiled into deliverable

## Challenges

1. Lack of technical support for required components
2. Compatibility issues across different components
3. Software integration with hardware
4. Design constraints to meet requirements of our goals as well as competition rules



## References

- PX4 Dev Team. (2015, December 2). Introduction. Retrieved December/January, 2018, from <https://docs.px4.io/en/>
- Ardupilot Dev Team. (n.d.). Pixhawk Overview. Retrieved December 3, 2018, from <http://ardupilot.org/rover/docs/common-pixhawk-overview.html>
- <https://itunes.apple.com/us/app/qgroundcontrol/id1120779597?mt=8>
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