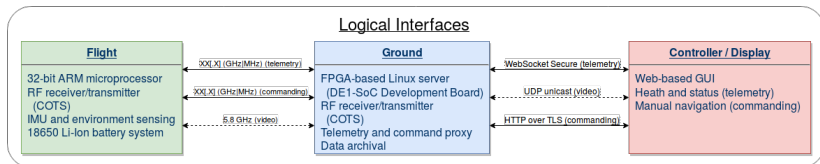# Fault-Tolerant Quadcopter

ECE 453 Project Proposal (Fall 2018)
University of Wisconsin-Madison

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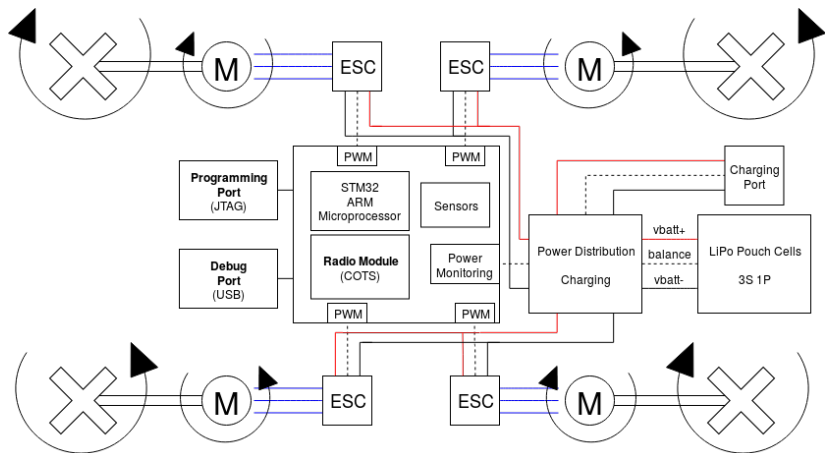# Overview

Quadcopter – Battery-powered, four-motor flying machine
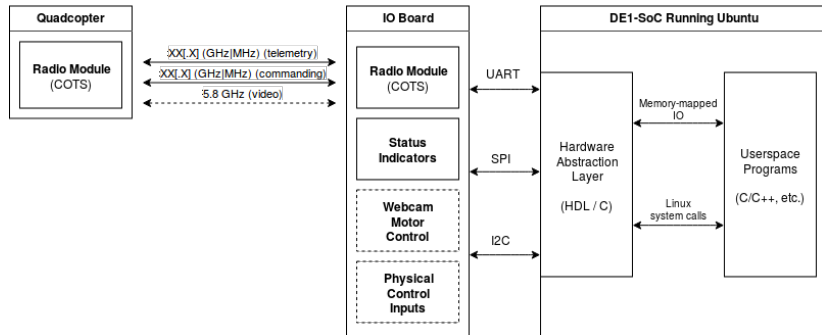
Ground Station – Linux server managing the quadcopter's radio endpoint, hosts wired-network services (i.e. telemetry)

Web-based UI – A modern dashboard for visualizing data and manually commanding the vehicle

Quadcopter

Ground Station

User Interface

API Commands (A)

HTTP over TLS

```
https://host/move/up/{0 - 100}
https://host/move/down/{0 - 100}
https://host/move/left/{0 - 100}
https://host/move/right/{0 - 100}
https://host/move/forward/{0 - 100}
https://host/move/back/{0 - 100}
https://host/move/rotate/{-100 - 100}
...
```

Telemetry Data (B)

Secure WebSocket

```
telemetry_packet {
  timestamp: 1536646557,
  age: 15,
  type: "sensors",
  data: [
    temperature: 22,
    pressure: 101325,
    gyro: {
      rate_xy: -1,
      rate_xz:  2,
      rate_yz: -3
    }
    ...
  ]
}
```

Client Browser

Commanding
Web-based UI - Production
Postman (or similar) - Dev/Test

Telemetry
Web-based UI - Production
Console log - Dev/Test

POST
(secure commands)

A

GET
(data queries)

DE1-SoC Running Ubuntu

IO Service

C/C++
(Hardware
abstraction
layer)

A

B

RESTful API

Java
(Spring Framework)

B

Telemetry Backend

Language TBD

Inter-process communication over local-loopback socket streams (TCP)