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UAV FORGE

UCI Samueli School of Engineering

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Final Design Review

COMPETITION

UAV Forge is an interdisciplinary engineering design project dedicated towards creating a fully autonomous unmanned aerial vehicle (UAV) to compete in the AUVSI-SUAS 2021 Competition. The mission characteristics are motivated by the concept of autonomous unmanned aerial and ground vehicles performing payload delivery. Unfortunately, due to the coronavirus pandemic, AUVSI has entirely canceled the 2021 UAV competition, however we will continued building and improving our design, and produce a drone which meets competition requirements.
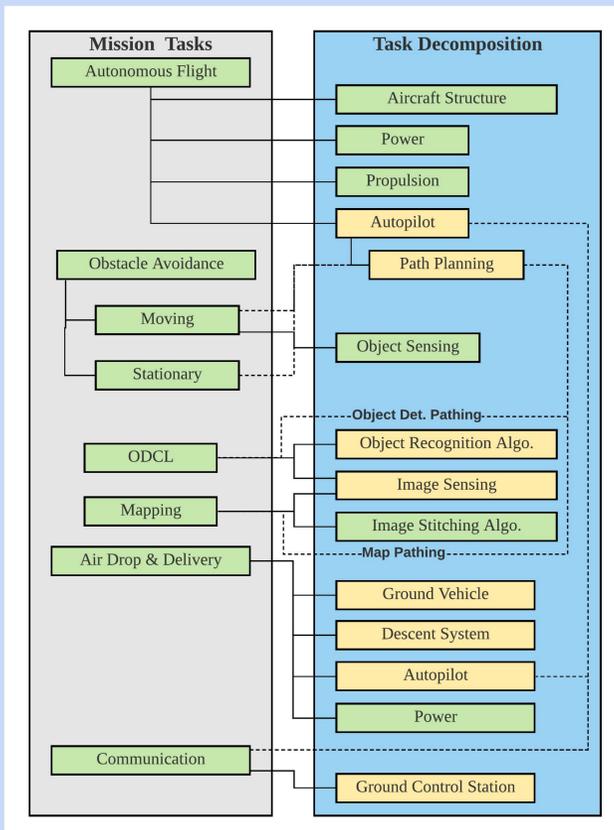
MISSION DECOMPOSITION

Fig. 1: Mission tasks to system conception

Finances

The team began the year with $7,500, with a projected spendings of $9,800 for the aircraft and $5,000 in competition spendings. Through several efforts the team worked to raise $10,000 to contribute to the final aircraft system and competition spendings.

ENGINEERING APPROACH

Competition Aircraft: *Final CAD Design*

Fig. 3.2: Top-level
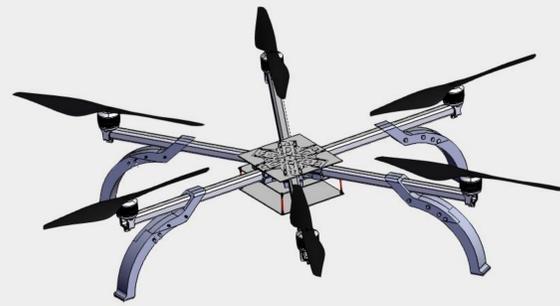
Fig. 3.3: Lower-level

Fig. 3.1: Isometric view of system

The figures above display our airframe design for the 2021 competition. Figure 3.1 is a full view of the aircraft, followed by a top plate view shown in Figure 3.2 which houses the batteries and HPVDP. Figure 3.3 displays our electronics placement on the aircraft frame housed on the lower plate. .
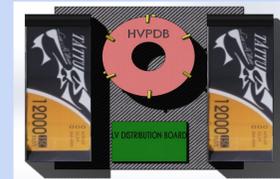
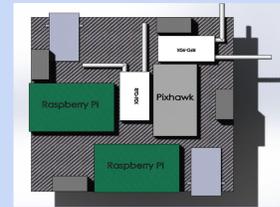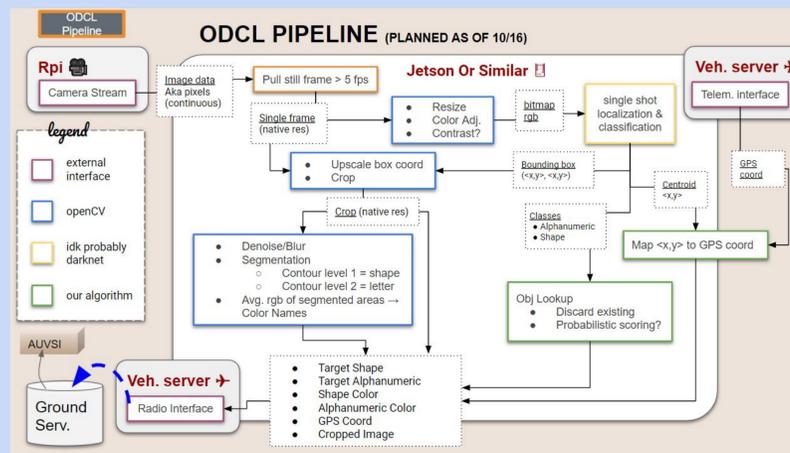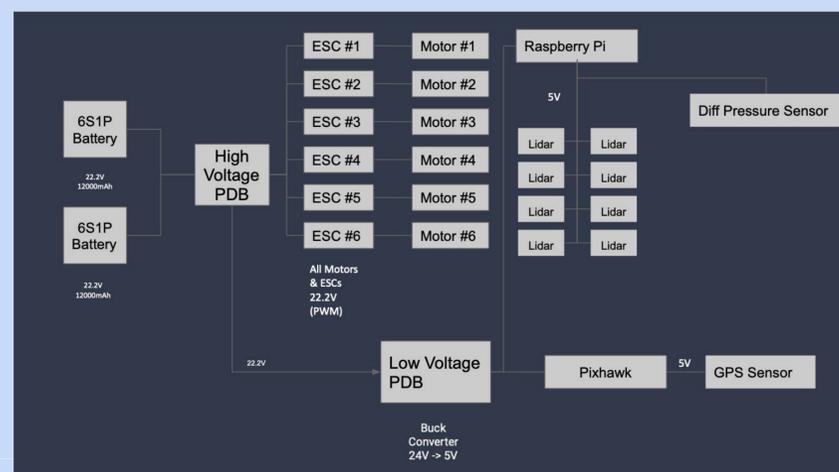### Ground Station User Interface with Geofence

Avionics Systems Block Diagram

TIMELINE

Fall Quarter Progress:
- UAV CAD model finalized, fabrication initiated
- UGV release mechanism prototypes complete
- Operating systems and sensors calibrated and tested

Winter Quarter Progress:
- Implementation phase (purchasing, assembly, fabrication)
- Verification against requirements

Spring Quarter Progress:
- Aerial system development
  - Flight time testing and weight adjustments
- Ground vehicle development
  - Descent system (static-line parachute)
  - Decoupler testing and implementation
- Full flight test of finalized UAV system

SYSTEM CHARACTERISTICS

Specification / Requirement	Value
Propeller count	6
Propeller size	20" x 6"
Diameter (excl. propeller)	44"
Takeoff weight	20 lb (ideal) / 25 lb (threshold)
Payload capability	4 lb
Power Supply	22.8V, 25000mAh, 10C 6S Li-Po (x2)
Thrust:Weight Ratio	1.9
Range	2 miles
Flight Time	32 min (ideal) / 20 min (threshold)

Fig. 2: Projected spending of subsystems and hardware

Mission Logic