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 continue building and improving our design, and produce a drone which meets competition requirements.

**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.

**Completion Aircraft: Final CAD Design**

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**

**SYSTEM CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Specification / Requirement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propeller diameter</td>
<td>6</td>
</tr>
<tr>
<td>Propeller size</td>
<td>20&quot; x 6&quot;</td>
</tr>
<tr>
<td>Diameter (std. propeller)</td>
<td>44&quot;</td>
</tr>
<tr>
<td>Takeoff weight</td>
<td>20 lbs (std) / 25 lbs (threshold)</td>
</tr>
<tr>
<td>Power Supply</td>
<td>4 lb</td>
</tr>
<tr>
<td>Thrust Weight Ratio</td>
<td>19</td>
</tr>
<tr>
<td>Range</td>
<td>2 miles</td>
</tr>
<tr>
<td>Flight Time</td>
<td>32 min (std) / 20 min (threshold)</td>
</tr>
</tbody>
</table>

**Mission Logic**

**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

**Start Up**

- Mission Failed
  - Start Up
  - PreFlight Check
  - Success?

- In-Flight Vehicle Avoidance
  - Airdrop
    - Yes
    - No

- Reset

**Final Design Review**

**Faculty Advisors: David Copp**

**FINAL DESIGN REVIEW**

**MISSION DECOMPOSITION**

**ENGINEERING APPROACH**

**TImeline**

**Fig. 1: Mission tasks to system conception**

**Fig. 2: Projected spending of subsystems and hardware**

**Fig. 3.1: Isometric view of system**

**Fig. 3.2: Top-level**

**Fig. 3.3: Lower-level**

**Finances**

**UAV FORGE**

**UCI Samueli School of Engineering**