

Team 8: VTOL Aerial Vehicle for AUVSI Competition

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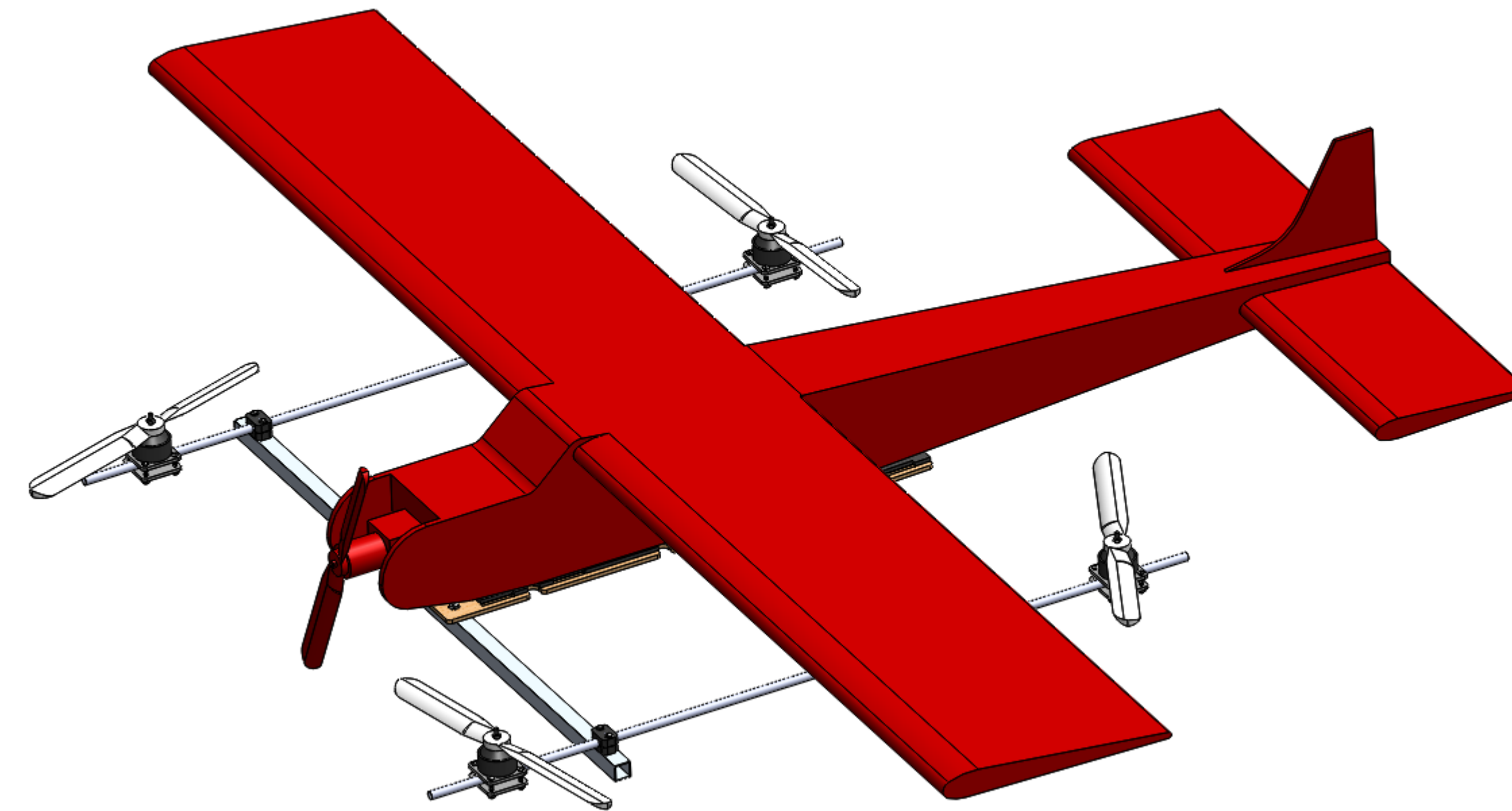
BACKGROUND:

- Unmanned Aerial Vehicle technology needs further advancement
- AUVSI SUAS Competition inspires innovation in the field
- 2013-2014 team provided a Senior Telemaster plane
- FIPSE: Fund for the Improvement of Postsecondary Education
- Two members of Team 8 studied in Itajuba, Brazil during Fall 2014

GOALS & OBJECTIVES:

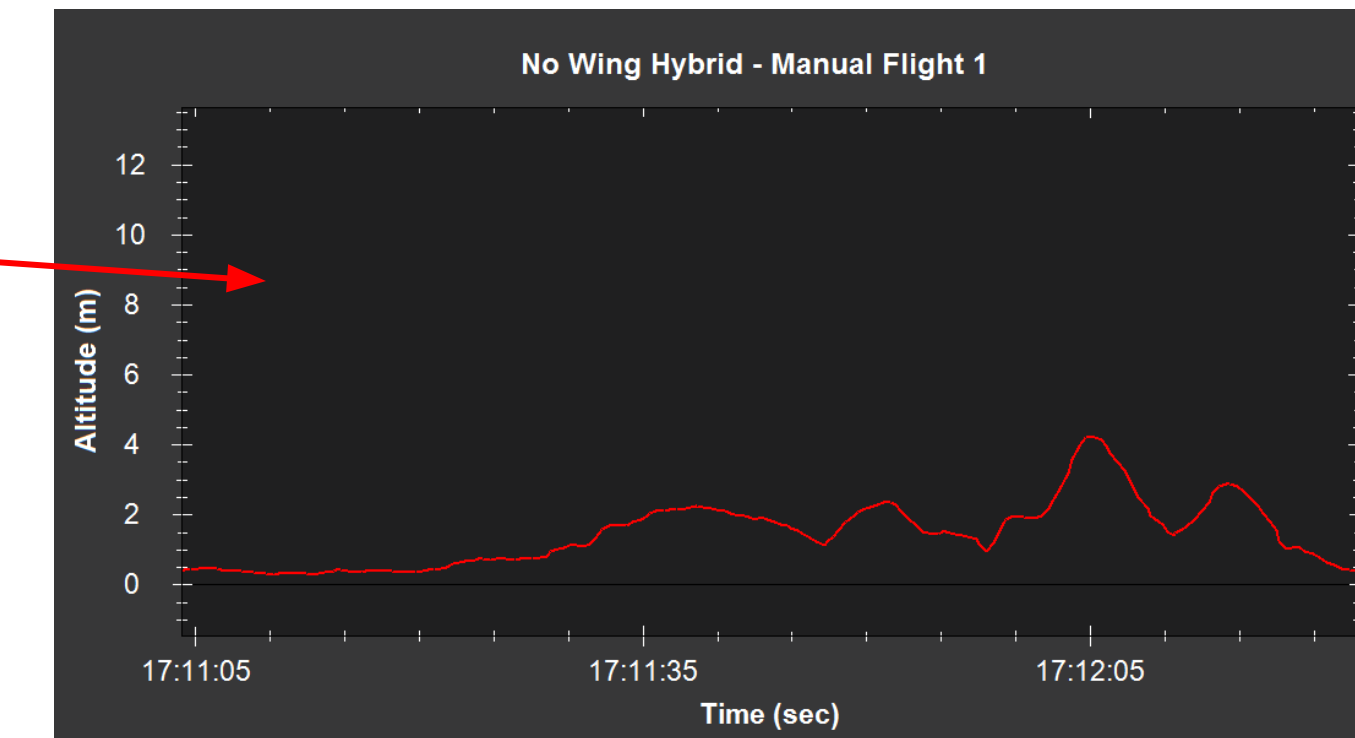
The goal of this project is work effectively as an international team to create a Vertical Takeoff and Landing (VTOL) aircraft for future success at the 2016 AUVSI SUAS Competition.

- Designed a hybrid VTOL aircraft using existing plane
- Built to meet all AUVSI design specifications
- Achieve autonomous Vertical Takeoff and Landing
- Show transitional flight capability



MISSION PLANNER:

- Ardupilot 2.6 Controller Interfaced
- Automatic Motor Thrust Adjustment
- R/C, 3DR, and GPS communication
- Calibration of PID Controls
- Real-time Flight Data :
 - Pitch, Roll, & Yaw
 - Altitude & Position
 - Velocity & Acceleration
 - Motor Output & More



RESULTS:

Vertical Thrust	18 kg
Total Weight	8.2 kg
Vertical Hover Time	5.48 mins
Optimal Vertical Velocity	4.18 m/s



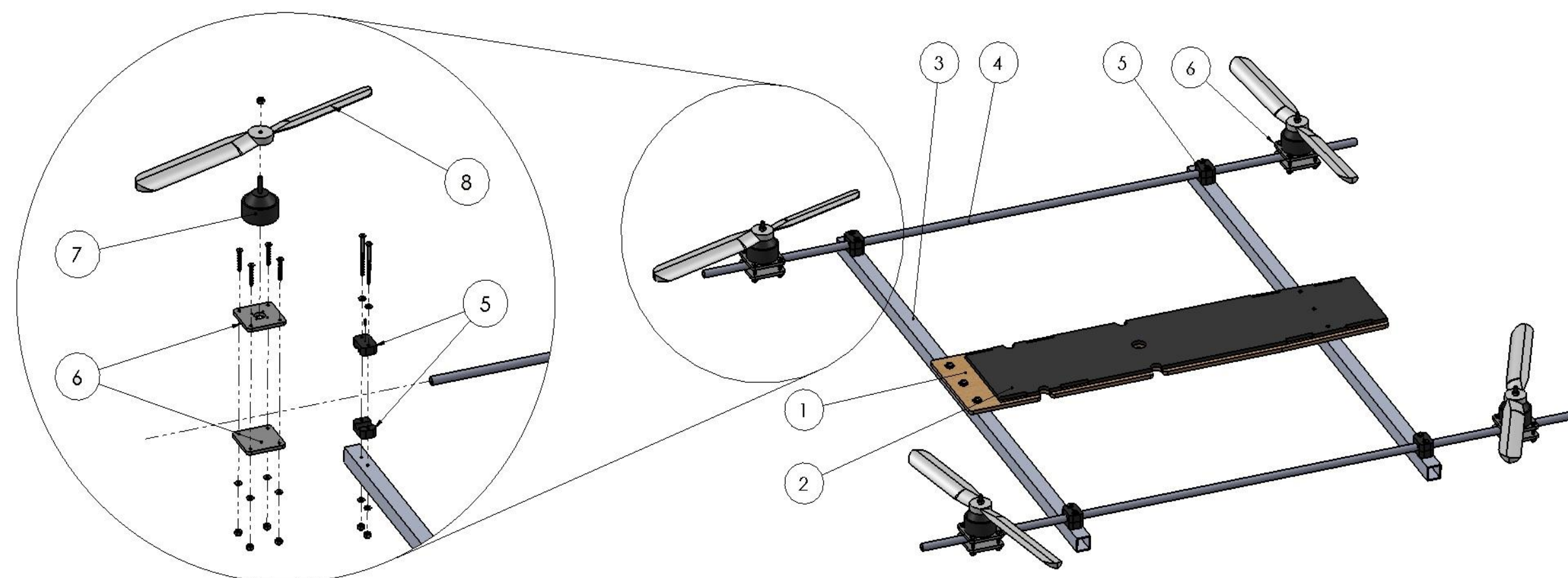
ACCOMPLISHMENTS:

- Achieved autonomous VTOL and GPS navigation with the quadrotor
- Stayed within budget constraints (\$1500)
- Prepared next year's team to be competitive in the competition

FUTURE WORK:

The VTOL hybrid aircraft is designed as a two year project. The final goal is to compete in the 2016 AUVSI SUAS Competition. To achieve this next year's team must:

- Get certified and learn how to fly the RC plane as well as the existing quad rotor both manually and autonomously
- Optimize frame materials
- Verify horizontal flight with test flight
- Program the transition from vertical to horizontal flight
- Implement secondary objectives from the competition
- Compete in the 2016 AUVSI SUAS Design Competition



MATERIAL SELECTION:

1. Plywood Base
2. Quick-Recovery Foam Pad
3. (2) Aluminum Cross Bars
4. (2) Carbon Fiber Arms
5. (4) ABS Arm Clamps
6. (4) G-10 Motor Mounts
7. (4) Cobra 4510 DC Motors
8. (4) APC 18x5.5" Props
9. (2) 5500mAh Venom Flight Packs
10. (4) Cobra 60A ESC
11. Ardupilot APM 2.6
12. 3DR Telemetry Kit

