Fabrication of Rocket and Payload Bay Area
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Abstract
Rocket design, specifications, and payloads are being constructed at the Payload Applied Technology Operations (PATO) lab using state-of-the-art materials, manufacturing and 3D printing techniques. The rocket will be used as a platform to launch and test different payloads. By using ANSYS static structural analysis, the preliminary results simulate the maximum acceleration loads that the payload will experience during the main parachute deployment. Through this analysis, the resulting maximum acceleration load the payload would experience was determined to be 310 m/s² (12,174 in/s²). The design for the coupler tubes and nose cone have been finalized and are ready to be fabricated as represented in Figure 3 and Figure 4.

Methodology
1. CAD design with CATIA for specifications of the nose cone, motor tube, and payload bay area
2. 3D Printing and CNC machining for fabrication for payload
3. Custom avionics identification and assembly
4. Rocket fin analysis using AeroFinSim software
5. Preparation of operating procedures and checklists
6. ANSYS software used for structural analysis for payload as shown in Figure 5-9

Timeline
- Design and Analysis: January 2019 - March 2019
- Composite Fabrication: April 2019 - December 2020
- Assembly: January 2021
- Testing: January 2021
- Flight: March 2021

Construction
1. Utilize state-of-the-art materials, software and techniques for design, development and fabrication as shown in Figure 1 and Figure 2
2. The design and fabrication of the payload bay area was optimized to have four TubeSats and two Nanolabs
3. Build, test and investigate payload for desirable results and safety compliance

Objectives
1. Utilize state-of-the-art materials, software and techniques for design, development and fabrication as shown in Figure 1 and Figure 2
2. The design and fabrication of the payload bay area was optimized to have four TubeSats and two Nanolabs
3. Build, test and investigate payload for desirable results and safety compliance

Preliminary Results
- Embry-Riddle Future Space Explorers and Developers Society (ERFSEDS)
- Dr. Sathya Gangadharan, Professor, Department Mechanical Engineering
- Students in the SAT Club
- AMS department

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