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Group #4 UAV Synopsis

A UAV is a broad term used to describe any aircraft that is operate without a human presence onboard. Our goal through this design project was to create an aircraft that would be able to adhere to the strict guidelines of the SUAS UAVSI competition which is to take place in May of this year. Unfortunately we were unable to sign up for the competition due to a lack of funding, but we still continued the project adhering to the parameters of the competition. The two most important of these design oriented rules for this competition stated that an aircraft must not exceed the mandated weight limit of 55 pounds and that the vessel should be able to maintain flight for a period between 20 and 45 minutes (depending on how long the course is completed). The original plan for this, due to the time restraint, was to purchase a premade airplane fuselage and modify it in order for it to be able to house all of its electrical components. However, when we presented this proposal last semester we were encouraged to go further in depth with the design of the craft. So, the first step we took to implement a design was to use CAD software (SolidWorks) to create a virtual representation of our plane. From this drawing we were able to conduct a fluid flow analysis over the airfoils and fuselage to determine whether the geometry had the right aerodynamic properties to obtain and maintain flight.

After creating the scaled down solid model, the only thing left for us to do was to wait for the proper dimension from the electrical team in order to create the accurate dimensions for our plane. During this time we encountered a few problems involving our budget; last semester we had been informed that NASA was set to sponsor our project and grant us a sum of \$1500, but this money wasn't seen until about a month and a half into this semester. This drawback caused a halt in our production because we had no way of knowing how to size the plane without having any components to size it to. Eventually, as the dimensional parameters started coming in the manufacturing process began to unfold. For this plane we chose to go with the conventional cutting, joining and forming techniques that are prevalent in RC plane design. The material we chose to go with for our design was expanded polystyrene (EPS) foam. This foam is brittle but it great for cutting shapes to create designs.

In addition to the model that the team constructed, several different types and models of commercially available RC planes were purchased. The different models were to all be tested with and without components in order to determine the design and configuration best suited to handle the competition requirements. During testing, several planes were inadvertently destroyed due to unfavorable wind conditions or poor maneuverability of certain models. This is the major reason for the testing of different designs.