Introduction
The Space Hardware Club (SHC) is a volunteer student-ran organization of the University of Alabama in Huntsville. SHC focuses on the design and development of flight hardware used in rockets, high altitude ballooning, extraterrestrial rovers, and orbital satellites. The Club is currently represented by several different academic majors including Computer Engineering, Physics, Chemical Engineering, Mechanical Engineering, Aerospace Engineering, Computer Science, Mathematics, Electrical Engineering, Industrial and Systems Engineering, and Optical Engineering. SHC is currently comprised of over 100 members who are actively working on the club’s many projects and programs.

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BalloonSat ($7,000)
The Space Hardware Club was formed in 2005 to develop and launch high altitude balloon payloads to altitudes of 100,000 feet and above. As it sits, BalloonSat is the flagship program of SHC. Each flight can carry up to twelve pounds of scientific payloads. Our club manages all aspects of the flights which include launching, tracking, and recovery of the payloads. To date, the club has completed over 52 BalloonSat flights with 38 of those flights occurring within the past 4 years. Currently BalloonSat fosters three small projects: Eclipse (Solar Eclipse instrumentation testing), Physoon (A Geiger counter payload), and Zero Horizon (A zero pressure balloon).
The International CanSat Competition ($18,000 for 2 teams)
For the past 9 years, SHC has entered the CanSat competition which is a design-build-fly rocket-launched mock satellite competition where students receive hands-on engineering experience in mechanical, electrical, software, and ground station operations along with project management and team dynamics. For the 2017 competition, the club is planning to bring two teams, comprised mainly of freshmen, to the competition. There, they will compete against senior design teams and graduate students from around the world. Two years ago, SHC’s Team GroundPounder placed second in the world and first in the United States. Last year, Team Skydive placed third in the world. In previous years, we had three teams but due to budget cuts had to drop to two. **We are considering having a third team through sponsorship for 2018**
One-Month Program ($7,000)

SHC’s One Month program is a fast-paced training project that places new club members onto teams tasked with building a high-altitude balloon payload within a one-month timeframe. The project requires these new club members to design, fabricate, test, and fly a payload that meets the goals and specifications laid out by senior members of the club. The purpose of the one-month program is to get new members onto the training pipeline that the club uses to pass down information, knowledge, and experience. This past year, over 100 cadets made it through this project; our largest class!
CubeSat ($2,500 for 2016)

ChargerSat-1, the first satellite developed by SHC, was a 1U CubeSat that was developed to improve communications for pico-satellite operations, to demonstrate passive nadir axis stabilization for pico-satellite attitude control, and to improve solar power collection for pico-satellite operation. ChargerSat-1 launched on November 19th, 2013 aboard the US Air Force's Operationally Responsive Space 3 mission.

The club has begun the design of its next CubeSat, ChargerSat Azure, which is hoping to launch by 2018. This project is partnering with the College of Science to observe inland bodies of water over the course of a year.
High-Powered Rocketry ($16,500)
This year, SHC is adding to its project list two major rocketry projects. The first being a Supersonic Challenge! Two teams will complete internally to build a supersonic rocket and put them to the test in Spring 2017. The other will be a Multi-stage rocket that will go 100,000 ft. Their first test launch will be next year of a subscale level at 30,000 feet in Kansas.

CAD of the Multistage Rocket
Past Projects

The Battle of the Rockets ($9,500)
For the third time in the club’s history, SHC will be participating in The Battle of the Rockets. This year, the club will be participating in the Mars Rover Mark II and Target Altitude events. The primary goal of the Mars Rover event is to successfully design, test, fabricate, and fly a fully operation autonomous rover. The rover is carried by a large rocket to an altitude of 1000 feet where it deploys from the rocket and much return to the ground safely. Upon landing, the rover must carry out a variety of tasks that are prescribed by the competition guidelines. In 2014, that last time SHC competed in the competition, our team placed first in the Mars Rover event.
Space Grant Midwest High-Power Rocketry Competition ($11,000)

Two years ago, SHC participated in the Minnesota rocket competition for the first time. It was the competition’s first year opening up to schools beyond the Space Grant Midwest territory. The goal of this competition was for students to design and construct a high-power boosted dart which can collect and characterize the dart rotation in the X, Y, and Z axes over time. SHC placed second at this competition.
Future Projects:

The Space Education Initiative ($2,500)
The Space Hardware Club is hoping to fund a brand-new outreach program in the form of a week-long camp. This camp will be designed for high school and middle school students and divided into two parts. The first half will teach the students the fundamentals of rocketry, and ending with the launching of small model rockets built by the camp participants. The second part, will be a day of creating a single balloon payload by the students and launching the payload on the final day of the camp. This project is currently in need of funding to make it a possibility.

The University Rover Challenge ($50,000)
The University Rover Challenge is a robotics competition where teams from over 20 schools design, build, and compete with real life Mars rovers. Held annually in the desert of southern Utah, Space Hardware Club hopes to raise enough money to be able to attend the competition in 2017.