# Cube Satellites: Miniature Satellite Design and Operations for Pulsed Plasma System Applications

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Miniature satellites are revolutionary to the space industry. Most do not function more than a year or even four months, but they are inexpensive, light weight, and quickly produced. This engineering project focuses on engineering software and hardware to create a functioning miniature satellite. My methodology is of the following: (1) gather information, (2) set budgets for the project, (3) develop hardware and software evaluation criteria, (4) implement the solutions to needs and test, (5) test hardware function, (6) test hardware durability in vacuum, (7) test hardware function in vacuum, (8) develop and improve hardware and software, (9) integrate software and hardware to form systems, and (10) integrate systems together for satellite. The following restrictions were set: the satellite costs under $1000, has a mass no more than 1000 g, and does not consume more than 6 watts of power. Budgets were revised over time. A functioning 2U cubesat was created with the payload of a pulsed plasma thruster (PPT) system in mind. Only one PPT prototype was created and tested minimally. In the flight control system, the satellite is able to rotate based on IMU readings, identify it’s location above the earth, read temperature, read pressure, and store data. In the power system, the satellite uses two mono-crystalline solar panels and a Ni-MH battery pack for power. The communications is a bluetooth serial port for demonstration. The computer is a Arduino Mega micro-controller. More PPT testing and design will be done in the future.

**Awards Won:**
Fourth Award of $500