

## SOCIETY OF PHYSICS STUDENTS (SPS) EVENT

# Developing a Miniaturized Antenna

**Nathan David Smith**  
**Cleveland State University**  
Senior - Physics, Math, Education

For the past three summers, I have had the opportunity to study in the LERCIP internship program at NASA Glenn Research Center here in Cleveland. The LERCIP program offers internships for every level of student from high school through to graduate students and school teachers. For the past two summers, my mentor, Dr. Felix Miranda, has guided me through the development of a miniaturized antenna.

There are many different kinds of antennas out there, and, as this was my first exposure to the field of antennas, I had to do a lot of research about different kinds of antennas and how antennas work in general. I learned about dipole antenna, monopole antennas, and patch antennas. Each kind has its pros and cons, and it was my job at first to learn which ones would be best for lunar applications.

For summer 2007, my studies were centered around an application for lunar communication. I had to try and learn about, and even to develop, a type of antenna that would be lightweight and powerful enough for astronauts to communicate with each other and the main computer. I also had to learn the method for testing and determine the best environment to test in.

For my third summer, an antenna had been developed by a retired employee that was left untested. It was an electrically small patch antenna to be used in damage sensing along a propeller blade. My task was to analyze it and see if it worked practically as it was simulated to. Additionally, I was to try to develop my own antenna to see if I could get better results using a different method.

Overall, studying antennas is difficult as it is hard to develop an intuition about what moves to make, even if you have been working in the field for a long time. However, I learned great laboratory techniques, was exposed to some very interesting concepts about communication, and, in this talk, I will explain what I did over these two summers and how you can also participate in something like this.

### WHERE

**SI – 117 (room next to Physics Computer Lab)**

### WHEN

**Noon- 1pm**  
**Thursday, October 16, 2008**