Stuart Oliphant

**Award**: Elijah Balloon Payload; $4000.00

**Advisor:** Dr. William Farrow

**Research Topic:** The Elijah Project -- 2017 High Altitude Balloon Project

**Abstract:** The 2017 WSGC Elijah High-Altitude Balloon Payload Fellowship focused on three different topics for high altitude research: Modular Payload Design, Balloon Dynamics, and Energy Harvesting. A modular payload system was created using advanced manufacturing methods, which improved assembly and field operation. Minor structural fracturing was observed upon recovery. All instrumentation recovered were functioning. Vertical flight dynamics of a high-altitude balloon were studied to create a model that was compared against experimental data. Predictions did not accurately replicate GPS altitude data, possibly due to incorrect internal-balloon pressure readings and underlying assumptions. Habitability of high-altitude environments were explored by monitoring insect analog in pressurized environment. A slow pressure leak induced insects into a comatose state. Radiation was detected visually with camera.Investigated energy generation from balloon kinematics. Flight data not obtained but flight simulation data produced average voltage = 0.0039 V and total energy = 245.13 J.

**Biography:** Stuart was born in Madison into a family of five kids. The family continued to grow to include  
ten kids in total. While Stuart’s family never moved during his childhood he did participate in  
ample amount of service helping others in his church community move. Stuart was constrained  
by a difficulty in reading until his older sister introduced him to the Harry Potter series in the  
third grade such that by fifth grade independent reading was one of his favorite moments of the  
school day. Through his dad’s hobby of bee keeping Stuart has been stung on countless  
occasions in his life, but also knows the method to extract honey, and thus knows its fresh  
sweetness. A few hobbies that Stuart has learned are chainmail armor and jewelry, net making,  
and whittling. One of Stuart’s chainmail necklaces entered at Dane County Fair was awarded the  
honor of being entered in the Wisconsin State Fair. By the end of high school Stuart had also  
earned the awards of Eagle scout through B.S.A., silver medal at state forensic competitions, also  
lettering in forensics, cross country, band, and academics. Stuart is now in college majoring in  
mechanical engineering, continues to play sousaphone in the university’s marching band and has  
so far added swing dancing and unicycling to his talents and hobbies. Stuart has always been  
interested in how things work, and understanding things at a deeper level. He plans to graduate  
with a bachelor of science degree from UW-Platteville in December of 2018.

**Congressional District:** 3

**Congressional Representative:** Ron Kind