Blaine Vollmer

**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:** Blaine is a mechanical engineering student at the Milwaukee School of Engineering and has a strong  
interest in the aerospace field. He has been involved with several projects at MSOE including the design of a CNC machine, planning and design of a futsal field, development of an optimization program using a genetic algorithm, and the design and construction of a SuperMileage vehicle.

**Congressional District:** 4

**Congressional Representative:** Gwen Moore