Nicholas Hennigan

**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:** Nicholas M. Hennigan is a Mechanical Engineering student at the Milwaukee School of Engineering. He will be starting his junior year this coming winter (2017/18). Mr. Hennigan is a recipient of the 2017 Wisconsin Space Grant Consortium Elijah Balloon Payload Team Fellowship Program. Mr. Hennigan is a member of the American Institute of Aeronautics and Astronautics (AIAA); Turners National Gymnastics Organization; and volunteer Technologies Project Director for Council of Scottish Clans and Associations. From a young age, Nicholas has been fascinated by how the universe works. Captivated by theoretical physics and black holes, Nicholas has a dual interest in space related research and mechanical engineering. Supported by a loving family, Nicholas also shares a love for competitive gymnastics and has placed 2nd overall at the Chicago Turnfest National Gymnastics competition. Other hobbies include Stage Acting, Musicianship (Trumpet, Classical Piano, Ukulele), cooking and hanging out with friends.

**Congressional District:** 4

**Congressional Representative:** Gwen Moore