



**NASA Selects Two South Dakota Proposals for Student Flight Research
(Project Period: Jan. 1, 2016 – Dec. 31, 2017)**

The following two undergraduate “student-led” research proposals from South Dakota were each selected for \$200,000 in NASA funding under NASA’s Undergraduate Student Instrument Project (USIP) Student Flight Research Opportunity, which was made available through the National Space Grant College and Fellowship Program. A total of 47 such projects were funded nationally for \$8 million among 43 universities. The South Dakota School of Mines & Technology was one of only four universities to receive two awards. <[NASA press release listing all 47 winners](#)>

* South Dakota Space Grant Consortium institutions collaborating on project	Project Title	Funding Summary
* SDSM&T * Raven Aerostar	Acoustic Temperature Measurement of Lift Gas in High-Altitude Balloons	\$200,000 (NASA) \$24,000 (industry match from Raven Aerostar)
* SDSM&T * SDSU * Raven Industries Bison Aerospace, Inc.	Development of a Multi-Spectral Imaging Device for Aerial Crop Monitoring	\$200,000 (NASA)

Project Abstract

Acoustic Temperature Measurement of Lift Gas in High-Altitude Balloons

Through collaboration with Raven Aerostar International, an industry need has been identified to measure the lift gas temperature within high-altitude balloons along with the temperature of the ambient air outside the balloon in real time at altitude. Accurate temperature measurements of this nature would assist in validating the performance characteristics of future balloons. The multidisciplinary SDSMT student team will work on developing the technology necessary to do this.

The primary objective of the investigation, to be explored by a series of senior capstone design teams, will be on designing and developing an acoustic temperature measurement system. Results will be compared with more traditional measurement systems using radiant insulation.

The anticipated mission will include flying the technology on a balloon launched and recovered by Raven Aerostar, either out of their facilities in Sioux Falls, SD, or Sulphur Springs, TX. The project will be an experience like no other for the students and faculty involved. The innovative technology developed through this project will provide the student team with opportunities to conduct research and learn new techniques in systems engineering, design, and manufacturing. Fixtures that hold electrical sensors or relays will have to be designed and integrated into the balloon design. Different students will have the opportunity to lead sections of the project giving them firsthand leadership experience. Faculty advisors will monitor the students and their progress. Underclass students will be trained and mentored by senior students. This project will be crucial for students wanting to learn more about the aerospace industry.

Project Abstract

Development of a Multi-Spectral Imaging Device for Aerial Crop Monitoring

This document outlines a joint proposal led by South Dakota School of Mines and Technology (SDSM&T) and its partner South Dakota State University (SDSU) on a project to develop a multi-spectral imaging device for crop observation. This device is intended for use on a tethered aerostat platform provided by industrial partner Raven Industries/Aerostar Inc. This project is designed to improve upon, calibrate, and harden a prototypical design of a multi-spectral camera created during a previous student NSF REU program in the summer of 2015 at SDSM&T. Furthermore, this project intends to foster an understanding of concepts vital to engineering including: interacting with multiple disciplines, designing for safety and reliability, and implementing detailed documentation among other realistic constraints.

This project has a heavy focus on mentoring. To that end, it is important to note that this proposal was written by students under the mentoring of the PI and Co-Is. Also, this project will be executed as a series of coordinated senior design/capstone projects at SDSMT as well as a series of closely coordinated student lead projects within the agricultural education and research programs at SDSU. This team will be student-led with students receiving mentoring and guidance from the project PI and Co-Is. Having students lead the team and holding the team to real industry standards intends to promote an understanding of real world engineering processes and promote leadership abilities in those students as they manage their team.

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