



NEVADA SPACE GRANT CONSORTIUM HIGHLIGHT

By David Bombara, UNR

DEVELOPMENT OF AN ARTIFICIAL MUSCLE-POWERED ROBOTIC GRASPER FOR NASA ROVERS

For my undergraduate research in mechanical engineering at the University of Nevada, Reno (UNR), I proposed a project titled: "Development of an Artificial Muscle-Powered Robotic Grasper for NASA Rovers." I work on this project in Dr. Jun Zhang's Smart Robotics Lab at UNR. This project has improved my skills in problem solving and technical communication. During the summer, I was also fortunate to intern at NASA Ames Research Center, working under engineers Shannah Withrow and Dr. Lee Kohlman at the center's Office of Rotorcraft Aeromechanics. There, I helped create a proof-of-concept indoor search and rescue robot. The internship allowed me to make lifelong friends and develop strong teamwork skills. I plan to graduate in May 2020 with a degree in mechanical engineering, then pursue a master's degree in the same major. Funding from the Nevada NASA Space Grant Consortium has allowed me to work on projects that excite me and share my research findings with a wider audience. Emerging robotic technologies have enormous potential. I hope to be on the forefront of that development and eventually pursue a PhD related to robotics.



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NASA Content and Resources Used:

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2019 IMPACTS SUMMARY

STUDENT IMPACT

- ✓ **Internships:** 3 students; summer internships Jet Propulsion Laboratory & NASA Ames
- ✓ **Fellowships:** 6 graduate students funded at a significant level for a full academic year
- ✓ **Scholarships:** 5 undergraduate students funded at a significant level for a full academic year
- ✓ **Community College Scholarships:** 24 undergraduate students, 6 each at the 4 colleges

STEM EDUCATION IMPACT

- ✓ **Higher Education:** 3 faculty received awards to improve curriculum development and hands-on-training in NASA relevant STEM
- ✓ **Informal Education:** 4 faculty received awards to provide STEM hands-on-training to pre-college students
- ✓ **Research Infrastructure:** 9 faculty received seed grant awards to improve NV research infrastructure

TOTAL STUDENT IMPACT THROUGH ALL NV SPACE GRANT AWARDS:

APPROXIMATELY 5245 COLLEGE AND PRE-COLLEGE STUDENTS AND 65 TEACHERS BENEFITED DIRECTLY OR INDIRECTLY FROM NV SPACE GRANT PROGRAMS DURING THE 2018-2019 SCHOOL YEAR.



PROJECT HIGHLIGHT

DR. ELISABETH "LIBBY"
HAUSRATH EXCELS WITH NASA

Dr. Elisabeth Hausrath at the University of Nevada, Las Vegas (UNLV) has recently been selected to serve as a participating scientist on the Mars 2020 mission. She will specifically be working with the rest of the science team to help select samples to be returned to Earth from Mars.



Dr. Elisabeth Hausrath, UNLV

Additionally, Dr. Hausrath was awarded two NASA EPSCoR Rapid Research Response projects. The first was entitled "Rock, H₂O and H₂: Energy from Water-Rock Interactions on Mars" and this project has already detected hydrogen gas production from the interaction of water and a Mars-relevant mineral (provided by Johnson Space Center) magnetite. The second project, which was initiated more recently, is entitled "Life on Mars: Algae Cultivation for Long-Term Food and Oxygen Production". Even though the experiments for this project are in their primary phases, Dr. Hausrath and her team have promising initial results.

Dr Hausrath says: "I am an aqueous geochemist with a background in weathering on Earth, and being selected for the Mars 2020 mission as well as the Rapid Response EPSCoR grants is allowing me to work directly with a Mars mission, as well as preparing for human exploration. I am very excited about these opportunities!"



2019 IMPACTS SUMMARY

RESEARCH INFRASTRUCTURE



Research CAN: 1 ongoing award and 1 new award both funded for 3 years at a total of \$1,125,000 each (\$750K Federal and \$375K State Match)



Research Infrastructure Development Seed Grant: 2 awards for one year at a total of \$50,000 each (\$25K Federal and \$25K State Match)



Travel: 4 awards for multiple faculty to travel to NASA Centers (Ames and Jet Propulsion Laboratory) resulting in a minimum of three new proposals under development with NASA collaboration



Rapid Research Response: This is the first full year of this program. NV has been awarded five proposals, each for one year of funding at \$100,000 (all Federal funding). This program promotes close collaboration between EPSCoR jurisdictions and NASA scientists to solve a current NASA research priority.

TOTAL RETURN ON INVESTMENT:

- NEW PROPOSALS: 12 SUBMITTED; 6 FUNDED AND 2 RECOMMENDED FOR FUNDING. \$862,000+ (ROI = 1.5 TO 1 THUS FAR)
- PATENTS: 1 PATENT APPLICATION IN PREPARATION
- PUBLICATIONS: 10 PEER REVIEW AND 5 IN PREPARATION
- PRESENTATIONS: 15
- STUDENTS RECEIVING RESEARCH EXPERIENCE: 18 UNDERGRADUATE AND GRADUATE STUDENTS

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