Northwestern | BUFFETT INSTITUTE FOR GLOBAL AFFAIRS

Buffett Undergraduate Research Fellowship Opportunity

COSMIC: Creating Optimal Space Mission International Crews

Faculty Mentor: Noshir Contractor, Professor, McCormick School of Engineering and School of Communication

Project Synopsis: The COSMIC (Creating Optimal Space Mission International Crews) is an innovative project developing TEAMSTaR (Tool for Evaluating And Mitigating Space Team Risks), a sophisticated decision support system for international space missions. This research has profound implications for international collaboration in space exploration, particularly for future Mars missions where crews must function effectively across cultural boundaries in isolated, confined environments.

The Research Fellow will be directly involved in developing and validating computational models that predict how crew members from different cultural backgrounds interact and form effective teams during extended missions. This work has profound implications for international collaboration in space exploration, particularly for future Mars missions where crews must function effectively across cultural boundaries in isolated, confined environments. The student will gain hands-on experience with cross-cultural team dynamics, advanced modeling techniques, and human factors research while contributing to the future of global space exploration.

Project Term: Summer and Academic Year

Project Location: Hybrid with potential international conference travel

Job Description: The Research Fellows will engage in the following activities:

Primary Responsibilities

- Analyze interaction data from international space station missions and analog environments

- Study how different cultural backgrounds influence team dynamics and performance

- Document research findings and contribute to technical reports

- Support the validation of models using data from isolation studies with international crew members

- Participate in weekly research team meetings

Technical Tasks

- Implementation of social network analysis algorithms for multinational crews

- Database management for crew attribute data, including cultural variables

- Statistical analysis of model validation results across crews with different cultural composition

Required Skills

- Basic understanding of statistics and data analysis

- Excellent attention to detail and documentation abilities

- Strong written and verbal communication skills

- Interest in cross-cultural communication and global collaboration

Desired Skills

- Strong interest in social science research of team dynamics

- Strong programming skills in Python or R

- Experience with social network analysis

- Familiarity with user interface design

- Knowledge of human factors engineering

- Interest in international space programs and multinational team dynamics

Time Commitment (up to a total of 250 hours)

- 10-15 hours per week during academic terms

- Up to 40 hours per week during summer (if desired)

- Flexible scheduling around classes

Mentorship Plan

The Research Fellows will receive:

- Weekly meetings with Professor Noshir Contractor

- Integration into a research team's activities, which includes PhD students

- Opportunities to contribute to publications and presentations at international conferences

Learning Outcomes

The Research Fellows will gain:

- Understanding of space collaboration and multicultural team dynamics

- Experience working with research teams

- Knowledge of cross-cultural factors in team performance

- Expertise in analyzing multinational crew interactions

- Publication and presentation opportunities in international venues

Global Impact

This research addresses one of the most critical challenges in modern space exploration: the effective composition and management of international crews for long-duration missions. As space exploration becomes increasingly collaborative across nations, understanding how to optimize multinational team composition becomes crucial for mission success. The TEAMSTaR project will contribute to:

- Enhancing international collaboration in space exploration

- Improving cross-cultural team dynamics in isolated environments

- Advancing global understanding of multicultural team performance

- Supporting the international scientific community's space exploration goals

This position offers an exceptional opportunity for two undergraduate students to contribute to groundbreaking research in international space exploration while developing valuable technical and cross-cultural research skills. The selected fellows will be integral members of our research team and receive comprehensive mentoring throughout the project.

Time Commitment: The core commitment involves 15-25 hours per week (up to 250 hours), with flexible pathways available to match student preferences and availability. Those eager to immerse themselves in an intensive summer research experience can work up to 25 hours per week. Alternatively, students can opt for a more distributed engagement of 15 hours weekly extending into the academic year.

The research experience begins with carefully crafted 2-hour training and onboarding sessions. These critical sessions provide the foundation for understanding the project's scope and the methodological tools needed for successful contribution. Following this initial preparation, students will participate in weekly research meetings as forums for knowledge exchange, progress updates, and collaborative problem-solving.

Beyond these structured interactions, students will have the autonomy to manage their remaining hours independently, applying their growing expertise to advance our research objectives.

Number of available positions: Two