Faculty Member Contact Information

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Contact Info	
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1 Funded, Unfunded URCA Assistant

	This position is **ONLY** open to students who have declared a major in this discipline.	**M**
	This project deals with social justice issues.	💙
X	This project deals with sustainability (green) issues.	🍃
	This project deals with human health and wellness issues.	➕
	This project deals with community outreach.	✋
	This mentor's project is interdisciplinary in nature.	**I**

Are you willing to work with students from outside of your discipline? If yes, which other disciplines?

- Yes, my project is truly interdisciplinary, please also mark me as interested in taking students from these areas: Plant Science, other Engineering

How many hours per week will your student(s) be required to work in this position? (Minimum is 6 hours per week; typical is 9)

- 9

Will it be possible for your student(s) to earn course credit?

- Yes; 3 credit hours of CS 400

Location of research/creative activities:

- Remote

Brief description of the nature of the research/creative activity?

Students are invited to explore research opportunities in one or a combination of the following fields:

Computer Vision: Investigate how computers interpret and analyze visual (i.e., imagery) data. Research areas may include image recognition, object detection, video analysis, and the development of algorithms for autonomous systems that rely on vision-based inputs. Target objects can vary on your choice between vehicles, crops, people, etc.

Resilience: Focus on building systems that are robust, adaptive, and can recover from disruptions. This field may cover fault-tolerant computing, resilient software systems, and strategies for maintaining operations under adverse conditions, whether in critical infrastructure or autonomous systems.

Multi-Agent Systems: Study how multiple intelligent agents (software, robots, etc.) can interact and collaborate to solve complex problems. Research topics could involve decentralized decision-making, coordination, communication protocols, and applications in areas like swarm robotics or distributed computing.

Students can tailor their research to combine these areas, such as exploring resilience in multi-agent systems or applying computer vision in autonomous collaborative systems.

Brief description of student responsibilities?

As part of the research team, students will be expected to:

1) Literature Review: Conduct thorough reviews of existing research to identify gaps and understand the current state of knowledge in their chosen field(s).

2) Experimentation and Data Analysis: Design and execute experiments, collect data, and analyze results to validate or refine hypotheses, using appropriate methodologies and tools.

3) Algorithm Development: Depending on the research focus, students may be responsible for developing and implementing algorithms, especially in fields like computer vision and multi-agent systems.

4) Collaboration: Work collaboratively with other team members, share insights, and contribute to joint projects. This may include working with multi-disciplinary teams or interacting with external collaborators.

5) Documentation: Maintain clear, organized records of research activities, including experimental designs, code, and data, ensuring reproducibility and traceability.

6) Progress Reports and Presentations: Regularly communicate progress through meetings at weekly intervals.

URCA Assistant positions are designed to provide students with *research or creative activities* experience. As such, there should be measurable, appropriate outcome goals. What exactly should your student(s) have learned by the end of this experience?

By the end of this research experience, students should have developed and demonstrated the following key competencies:

1) Deep Knowledge in Selected Field(s): Students should have a strong grasp of core concepts, methodologies, and challenges in their chosen research areas (e.g., computer vision, resilience, multi-agent systems), as well as awareness of the latest developments and trends in these fields.

2) Research Methodology: They should understand how to formulate research questions, design experiments, collect and analyze data, and draw conclusions based on evidence. This includes proficiency in critical thinking, problem-solving, and troubleshooting in the context of research.

3) Technical Proficiency: Students should have gained hands-on experience with relevant tools, technologies, and frameworks. For example:

- In computer vision, they should know how to work with image processing libraries, neural networks, and datasets.

- In resilience, they should have explored models for fault tolerance, system recovery strategies, and reliability metrics.

- In multi-agent systems, they should understand agent communication, coordination algorithms, and distributed decision-making processes.

4) Algorithm Development and Implementation: They should have the skills to develop, implement, and refine algorithms based on theoretical concepts, test them rigorously, and optimize their performance.

5) Project Management and Independence: They should be able to manage their own research progress, setting goals, meeting deadlines, and adjusting plans based on results. This should prepare them for more independent research in the future, whether in academia or industry.

6) Ethical Research Practices: Students should have an appreciation for the ethical considerations in AI and related fields, including data privacy, fairness, and safety. They should understand how to apply ethical frameworks when conducting their research.

Requirements of Students

If the position(s) require students to be available at certain times each week (as opposed to them being able to set their own hours) please indicate all required days and times:

- N/A

If the location of the research/creative activities involves off campus work, must students provide their own transportation?

- N/A

Must students have taken any prerequisite classes? Please list classes and preferred grades:

- I require my students to have taken:
- 1) CS 340 Data Structures and heave earned at least a B

Other requirements or notes to applicants:

- None