Faculty Member Contact Information

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Contact Info	
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Department	Industrial Engineering

1 Funded 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.	💙
	This project deals with sustainability (green) issues.	🌿
X	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?

- No

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?

- No

Location of research/creative activities:

- EB 0011

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

This research focuses on the use of 2D video-based gait analysis to examine and differentiate gait patterns between children diagnosed with Autism Spectrum Disorder (ASD) and neurotypical children. Gait abnormalities are known to be associated with ASD, but current diagnostic tools, such as 3D motion capture systems, though highly accurate, are costly and less accessible. Our goal is to explore whether 2D video analysis, a more affordable and accessible method, can effectively identify key differences in gait kinematics between these two groups.

The study measures eight key kinematic parameters—such as stride length, step width, and hip rotation—by analyzing gait data from video recordings. These parameters are compared between autistic and neurotypical children to identify statistically significant differences. Furthermore, the results of the 2D analysis are compared to existing studies that use 3D motion capture, which is the gold standard for gait analysis, to assess the efficacy and limitations of 2D video-based approaches.

This research has the potential to expand access to early ASD screening by providing a simpler and cost-effective method for gait analysis. By comparing the results with those obtained through 3D motion capture systems, the study aims to highlight the benefits and challenges of using 2D video as a diagnostic tool for motor deficits in children with ASD.

Brief description of student responsibilities?

Students involved in this research project will play a critical role in both data collection and analysis. Their responsibilities will include:

Data Collection:

Assist in setting up and operating the 2D video recording equipment during gait analysis sessions.

Ensure that the video captures meet the necessary quality standards for accurate kinematic analysis.

Help manage participant recruitment, including scheduling sessions and communicating with parents or caregivers of both autistic and neurotypical children.

Data Processing and Analysis:

Assist in extracting gait parameters (e.g., stride length, step width, hip rotation) from the recorded 2D video data using specialized software tools such as OpenPose.

Perform preliminary data cleaning and preparation, ensuring that the data is ready for further statistical analysis.

Participate in the comparison of the 2D video-based results with established 3D motion capture data, identifying consistencies and discrepancies.

Literature Review and Research Support:

Conduct a literature review on existing studies related to gait analysis in children with ASD, with a particular focus on 2D and 3D motion capture comparisons.

Help compile and organize references for manuscript preparation and presentations.

Presentation and Dissemination:

Assist in the preparation of research findings for presentations at conferences or other academic settings.

Contribute to writing sections of manuscripts or reports, summarizing key findings from the data.

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?

Develop Proficiency in 2D Video-Based Gait Analysis:

By the end of the project, students will have gained hands-on experience with 2D video analysis tools, including capturing high-quality data and extracting kinematic parameters using software like OpenPose.

Measurable Goal: Students will successfully process and analyze at least 20 full sets of gait data, extracting all eight key parameters for both autistic and neurotypical children.

Gain Experience in Comparative Data Analysis:

Students will learn to compare gait data collected via 2D video analysis with existing 3D motion capture data, critically assessing the strengths and limitations of each method.

Measurable Goal: Students will contribute to the statistical analysis of the data, preparing a report that compares 2D and 3D data for at least three key gait parameters, with statistical evidence of agreement or discrepancies.

Conduct a Comprehensive Literature Review:

Students will become familiar with current research on gait analysis in children with ASD, particularly in the use of both 2D and 3D methods.

Measurable Goal: Students will complete a literature review summary of at least 10 peer-reviewed studies on gait kinematics in ASD and contribute to the introduction section of a research manuscript or presentation.

Enhance Communication and Presentation Skills:

Students will actively participate in disseminating the research findings, gaining experience in presenting scientific data in a clear and organized manner.

Measurable Goal: Students will prepare and deliver at least one presentation (poster or oral) summarizing their contributions to the project at a research symposium or conference.

Foster Research Writing Skills:

Students will contribute to the preparation of a manuscript or research report, honing their scientific writing abilities.

Measurable Goal: Students will draft at least one section of a manuscript, such as the methods or results, for submission to a journal or conference proceeding.

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:

- No

Other requirements or notes to applicants:

- N/A