Tennessee State University

Undergraduate Research Opportunities

Dr. Vatral is looking for a few undergraduate research assistants

Research Opportunities

- Several projects you would be working on across two main research areas
  - Human-Computer Interaction
  - Applications of AI
- Projects span a variety of technical levels
- No specific experience is required – I will train you to do research
  - Applying students will be matched to projects based on their interests and technical preparation levels
- $1000 stipend available at the end of the year if you meet the requirements (progress, presentations, etc.)
- Interested students should email me with a copy of their transcript (unofficial is fine) and a short description of why you are interested

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Human-Computer Interaction Projects

These projects may be of interest if you are interested in learning about the more human side of computer science, such as working with users to design software, performing usability testing, and understanding user psychology

XR Training of Nurses

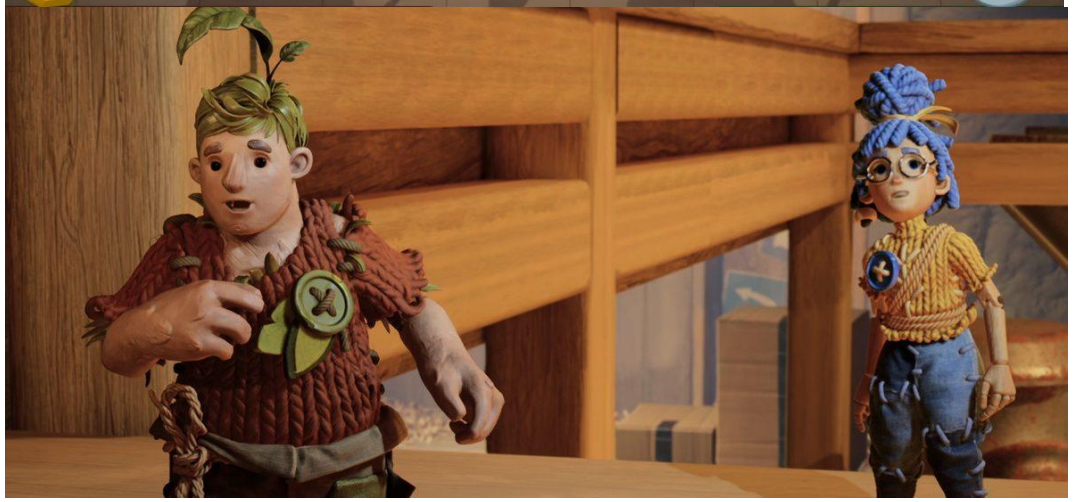
- In this project, you will build a new CAVE XR environment designed for training nurses and test it with TSU nursing students
- Focus Areas:
  - 3D / VR environment design
  - Human Subjects Studies
  - Mixed-Methods Data Analysis (Qualitative + Quantitative)
  - Learning Science
- Collaboration with the School of Health Sciences

Student-Designed Simulation

- In this project, you will help create a software application that allows non-technical students (nurses) to author simulation training scenarios
- Focus Areas:
  - Human Subjects Studies
  - Mixed-Methods Data Analysis (Qualitative + Quantitative)
  - User-centered Software Design
  - Learning Science
  - Potential design of AI agents
- Collaboration with the School of Health Sciences

Teamwork in Video Games

- In this project, you will help analyze and test how cooperative video games can be used to develop teamwork skills
- Focus Areas:
  - Qualitative Data Analysis
  - Research Theory Building
  - User Behavior Analysis
  - Organizational Psychology
  - Game Design and Development
  - Human Subjects Studies



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Applications of AI Projects

These projects may be of interest if you are interested in how AI and data science can be applied to more real-world problems. Projects will involve training and testing AI models based on the needs of interdisciplinary customers

AI for Freight Analysis

- Civil engineers create useful AI models to improve logistics. This project aims to help transition this research into useable software products that can be delivered to end users
- Focus Areas:
  - User-centered software design
  - Validation of machine learning models
  - AI explainability reporting
- Collaboration with the Department of Civil Engineering

Freight Truck Parking Detection

- In this project, you will help develop a computer vision model to automatically inventory parked trucks to assist with capacity and infastructure analysis
- Focus Areas:
  - Computer vision AI
  - Validation of machine learning models
  - Privacy considerations in AI
- Collaboration with the Department of Civil Engineering

Freight Truck Parking Forecast

- In this project, you will help develop a forecasting model for the demand at various truck parking facilities to assist with real-time recommendations
- Focus Areas:
  - Time-series AI prediction
  - Machine learning with missing data
  - Validation of machine learning models
- Collaboration with the Department of Civil Engineering

AI Training Scenario Selection

- In this project, you will develop an AI model that selects the optimal training scenario for a learner based on evaluations of their performance
- Focus Areas:
  - Data-limited AI models
  - Validation of machine learning models
  - User Behavior Analysis
  - Human Subjects Studies
  - Simulation design and development