Erdem Murat

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Ph.D candidate specializing in AI and VR, with expertise in user experience and predictive modeling.

Education

- **George Mason University**
  Ph.D. in Computer Science — *August 2023 – Current*
  B.S & M.S in Computer Science — *August 2018 – May 2023*

Publications

- **Enhancing Firefighter Commander Training with AI-Driven Multimodal VR Guidance**
  ***Erdem Murat**, Yongqi Zhang, Liuchuan Yu, Siraj Sabah, Lap-Fai Yu*
  Pending — *Journal Paper*
  - Engineered an AI multimodal (text, audio, vision) real-time assistant that analyzes VR fire scenes, generates actionable incident reports, and delivers adaptive guidance to trainee firefighters.
  - Designed interactive VR menus with LLM-generated instructions and AI teammates, enhancing immersive, collaborative firefighter training.
  - Configured a local server with H200 GPU and deployed a custom server–client framework, for state-of-the-art low-latency multimodal inference.
- **GPT-Think-Alouds: Analyzing User Emotion in VR Platformer Games via LLMs**
  ***Erdem Murat**, Yongqi Zhang, Liuchuan Yu, Siraj Sabah, Lap-Fai Yu*
  [Under Review] — *Journal Paper*
  - Developed an AI-driven playtesting automation tool using multimodal capabilities (text, vision, audio) to assess human behavior in immersive experiences and quantify emotions for user experience research.
  - Used radial basis function and dynamic time warping to conduct emotion comparison between experiences.
- **Player-Centric Difficulty Prediction for Parameterized VR Platformer Gameplay**
  ***Erdem Murat**, Liuchuan Yu, Siraj Sabah, Haikun Huang, Lap-Fai Yu*
  [Under Review] — *Journal Paper*
  - Trained a recurrent neural network to predict user profiles and perceptions of difficulty over various game levels using limited gameplay and user data.
  - Applied Markov Chain Monte Carlo to optimize parameters to target difficulty predictions for rapid prototyping.
- **Predicting Users' Difficulty Perception in a VR Platformer Game**
  ***Erdem Murat**, Liuchuan Yu, Siraj Sabah, Haikun Huang, Lap-Fai Yu*
  ACM Motion, Interaction, and Games 24' — *Poster*
- **Understanding Online Education in Metaverse: Systems and User Experience Perspectives**
  *Ruizhi Cheng, **Erdem Murat**, Lap-Fai Yu, Songqing Chen, Bo Han*
  IEEE Virtual Reality and 3D User Interfaces 24' — *Conference Paper*
  - Proposed an analytic method combining qualitative & quantitative analysis with end-to-end network measurements to understand user experience in VR education and detect bottlenecks to optimize system performance.
- **Machine Learning Automation for Virtual Reality Games** — Master's Thesis
  - Machine learning solution to predict user difficulty perception and address limitations in VR game design

Experience

- **Researcher** — George Mason University, VA
  Design Computing and eXtended Reality Lab — *January 2022 – Present*
  - **Research**: Artificial Intelligence, Virtual Reality, Game Design
  - **Advisor**: Prof. Lap-Fai (Craig) Yu
  - **Awards & Funding**: Recipient of research funding from the Center for Advancing Human-Machine Partnership (CAHMP) and the National Science Foundation (NSF).

- **AI & VR for Firefighter Training and Guidance**: Lead researcher on *Enhancing Firefighter Training with AI-Driven Multimodal VR Guidance*, a CAHMP-funded project integrating AI (vision, text, speech) into VR to assist firefighters in high-risk scenarios.
- **AI & User Experience in VR**: *GPT-Think-Alouds: Analyzing User Emotion in VR Platformer Games via LLMs* and *Player-Centric Difficulty Prediction for Parameterized VR Platformer Gameplay*, supported by NSF funding.

- **Graduate Teaching Assistant** — Arlington, VA
  George Mason University — *August 2023 – Present*
  - **Courses**: Computer Networks, Game Programming I & II, Advanced Game Programming, Visual Computing

- **Virtual Reality Director** — Arlington, VA
  Global Co Lab — *July 2022 – July 2024*
  - **VR Development & Education**: Developed VR learning spaces and mentored youth teams in environmental sciences, securing $15,000 in the UN SDG Metaverse Prize and achieving top results in competitions.
  - **Tech Outreach**: Led outreach for joint United Nations Sustainable Development Goals initiatives in virtual reality and digital innovation, collaborating with Mozilla and Roblox.

- **Unity Developer Intern** — Irvine, CA
  Collimation — *May 2024 – September 2024*
  - **Mixed Reality Development**: Consulted on the design of a mixed-reality sports system using hand-tracking.

Academic Services

- **Conference Local Chair**: ACM MIG 2024
- **Conference/Journal Paper Reviewer**: ACM CHI 2026, PRESENCE: Virtual and Augmented Reality (2025), IEEE VR 2023
- **Vice President**: Computer Science Graduate Student Association at George Mason University

Projects

- **VR Sports Simulation System**: Developed and deployed a VR system with feet tracking adopted by three Fortune 500 clients, featuring custom physics, a novel interaction model, and integrated data collection for athlete performance research.
- **Computer Vision Based Lane Detection for Driving Simulator**: Using CUDA, YOLO, PyTorch, and TensorFlower libraries, developed a CV-based solution for real-time lane assistance in a driving simulator.
- **Motion Planning for A Multi-Robot System** : Used Gazebo and ROS to create a multi-robot setting with obstacles and motion-planning for autonomous movement.