Erdem Murat

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Innovation-driven Computer Scientist with expertise in virtual reality, machine learning, and game development.

Education

M.S in Computer Science *January 2022 - May 2023*

- Advisor: Prof. Craig (Lap-Fai) Yu.
- Member of the Design Computing and eXtended Reality (DCXR) research group.
- Leading member and Secretary of the Computer Science Graduate Students Association (CSGSA).

B.S in Computer Science *August 2018 - Decemeber 2021*

Experience

Design Computing and eXtended Reality (DCXR) Lab **January 2022 – Present**

Student Researcher *George Mason University*

- Conducted research in virtual reality, machine learning, game design, and systems analysis with the aim of publishing in the top academic conferences.
- Collaborated with lab members on research, and attended seminars, conferences, and related events.

Global Co Lab Network **July 2022 – Present**

Virtual Reality Director *Arlington, VA*

- Created virtual reality hubs for the Co Lab to host conferences and enable remote attendees to virtually view and engage with projects and fieldwork addressing social issues.
- Instructed and mentored 3 teams towards developing innovative and educational VR environments for the UN Sustainable Development Goals Metaverse Competition.
- Presented work at the United Nations Science Technology and Innovation Forum.

Publications

Predicting Users' Difficulty Perception in Virtual Reality Games **April 2023**

***Erdem Murat**, Liuchuan Yu, Siraj Sabaj, Haikun Huang, Lap-Fai Yu* UIST 23' Under review

- Proposed a novel application of deep learning to predict users' difficulty perception in virtual reality games.
- Addressed issues in VR game design by funneling and adapting decades of existing non-VR game design research.
- Conducted 50+ user studies to collect data and train a recurrent neural network to understand recurring relationships between game parameters, user data, and gameplay data.

Understanding User Experience of Online Education in Metaverse: A Systems Perspective **November 2022**

*Ruizhi Cheng, **Erdem Murat**, Lap-Fai Yu, Songqing Chen, Bo Han* Under review

- Proposed a novel analytic method that combines qualitative and quantitative analysis with end-to-end network measurements to understand user experience in VR education and detect bottlenecks in system performance.
- Deployed a Mozilla Hubs server-client with custom JavaScript scripts to record client-side performance through an API.

Machine Learning Automation for Virtual Reality - Master's Thesis **December 2022**

- Developed a system to address a limitation in VR development research and proposed a solution that uses machine learning to understand how the manipulation of game parameters affects user perception.
- Used collected data to train a machine learning algorithm of the relations between game parameters and perceived difficulty with low prediction error.

Projects

VR Athletics - Foot Tracking VR Simulation System | *Unity, C#, Plastic SCM, VS Studio* **January 2023**

- Developed a VR foot-tracking system enabling enhanced human-computer interaction for athletes in sports research.
- Implemented a sophisticated physics system by formulating a script-based solution enhancing Unity physics to create a realistic interaction system with the foot and virtual objects like ground, sports balls, and environment objects.

Computer Vision Based Navigation Assistance for Video Game | *CUDA, YOLO, Pytorch, Tensorflow* **April 2023**

- Designed a real-time solution that detects the user's car and lanes in a video game (GTA 5) to assist in driving.
- Used YOLO and CV techniques to create a solution that is robust, fast, and efficient.

Lightweight Solution for Road Sign Detection | *Pytorch, Keras, Computer Vision, Deep Learning* **January 2023**

- Designed a lightweight solution that detects road signs and classifies them with over 98% accuracy.

Motion Planning for A Multi-Robot System | *ROS, Gazebo, Python, A.I, SLAM* **November 2022**

- In a team of 3, used Gazebo and ROS to create a multi-robot environment with obstacles and motion-planning to allow for autonomous robot movement.
- Used Continuous Conflict-Base Search to build a motion planner's pipeline for multi-robot navigation without collisions.

Virtual Reality Education | *JavaScript, Distributed Systems, AWS, Code Profiling* **October 2022**

- Utilized Amazon Web Services to deploy a private Mozilla Hubs server on an Amazon AWS EC2 instance (t3.medium) to conduct user studies. Used Glances to monitor its resource utilization and tcpdump to capture and analyze the network traffic on the server side.
- Created an API to collect client-side data sent by scripts and used collected data to detect and debug performance bottlenecks as well as devise solutions for better performance.

Why Did the Chicken Cross the Road? - Virtual Reality Game | *Unity, C#, VS Studio* **November 2021**

- Researched numerous PC, mobile, and VR games to design and develop a VR game that is addictive and fun to play.
- Implemented procedural-level design and game development techniques like 3D noise, environmental triggers, and motion sensing to create a well-rounded, and functional game.

Test the Heights - Virtual Reality Game | *Unity, C#, VS Studio* **November 2021**

- Utilized interactive systems to craft a thrilling and immersive experience.
- Performed user-testing to get feedback from 14 users in various stages of the game to make improvements continuously.

Technical Skills

Languages: Python, C#, C++, C, Java, SQL
Developer Tools: Unity, Unreal
Softwares/Tools: Visual Studio, OpenGL, Git/GitHub, Plastic SCM, Microsoft 365, Photoshop

Other Related Experiences

Reviewer **January 2023**
IEEE VR 2023

Cyber Bytes Foundation **June 2022 – July 2022**
Instructor *Stafford, VA*

- Developed a comprehensive, 5-day curriculum with 30 hours of educational content to teach virtual reality development concepts to 20 students.
- Harnessed knowledge based on emerging VR technology through attending lectures, conducting research, and attending seminars & conferences to construct content from the field of VR.