SD Projects List 2022-23 from Faculty

Mixed Reality UI for First Responders (AR/VR)

Faculty contact for details: Dr Hurriyet Ok

Design and implement holograms for incident command perspective and heads-up displays (HUD) for first responders using VR headset with eye tracking feature and video passthrough AR capabilities. The project will require the use of AR/VR equipment (headsets or Glass), provided by the department. It expands on some of the solutions provided by the NIST Chariot Challenge by expanding the UI design using eye tracking capable headsets, video passthrough etc.

High Performance Remote Procedure Calls

Faculty contact for details: Prof Tim Wood

Every time you submit a search request on Google, it is transformed into 100s to 1000s of queries sent to many different servers for processing. These requests are performed using Remote Procedure Calls (RPC), which allow one piece of software to easily invoke functionality in another. This project will design and implement a RPC protocol focused on low latency processing of requests, and will be built to work with the OpenNetVM project created by students in Prof. Tim Wood's lab. You will learn about the design of networking protocols, get practice with writing high performance C code, and learn about shared memory communication.

CS Experimenter's Notebook

Faculty contact for details: Prof Tim Wood

Computer Science researchers often need to run experiments to test the performance of different algorithms or pieces of software. This project will design a web-based tool to help researchers design experiments, run tests, gather data, and analyze/visualize results. The primary challenge with this project is designing a system which is flexible to support many different types of experiments -- an OS designer might want to run experiments to evaluate the impact of different schedulers, while a ML researcher may need to evaluate the impact of different neural network parameters on multiple data sets. How can you design a tool that can easily run these diverse workloads and gather the data in a consistent way so that it can be easily analyzed and reproduced?

The Gap App

Faculty contact for details: Prof Heller

Created to support military women and spouses in their search for an effective and challenging career once they leave the service, GapApp provides a guided pathway to the field of cybersecurity. Using the Military Occupation Specialty (MOS) of the user, it computes a crosswalk to the most aligned job roles within the NIST/NICE framework currently used as the foundational workforce role descriptor by industry and government job seekers alike. In addition, GapApp will provide videos of military cyber experts talking about their individual journeys to cyber, troves of documents to make cybersecurity more accessible, and training suggestions offered by recognized organizations. The project to date has collected extensive

data on both MOS listings and NIST frameworks (and additional data will be forthcoming. A proof of concept version if GapApp has been designed. The research and development to be done includes refining and implementing the MOS-NIST connections algorithm, expanding the GapApp design and capabilities, moving the GapApp from demonstration to deliverable app on at least iOS systems.

PeopleFinder: Embedded IoT platform for finding missing persons

Faculty contact for details: Profs Bulusu and Narahari

Crowd source the problem of finding missing persons (from amber alerts, missing persons database, etc.) by deploying low-cost platform agnostic IoT devices across geographically distributed locations. This project will design a single-box solution that can be deployed in various physical settings. For example: in cars to monitor amber alerts; in shopping malls to recognize missing/wanted persons; in hospitals, etc. The single box device would consist of an embedded platform (such as RaspberryPi) with cameras, running lightweight ML libraries, and connected to other edge devices and to a central server (to receive amber alerts and missing person info, and to send detection signal containing GPS location, time and a "Possible Identification", etc.). Each IoT device can communicate with other devices (peer to peer network) to collaboratively track the object (amber alert car, missing person image, etc.).

Computer Vision

Faculty contact for details: Prof Robert Pless