

CSE / CIT – 480 Project Ideas

We keep this year's senior design project open for students to design and develop their creative ideas on AI, cloud, mobile, desktop, IoT, Raspberry Pie etc. While it is open, we have received some exciting projects from our partnering businesses, some are multi-disciplinary OU projects while others are proposed by me. I highly encourage each group to select the projects from the list provided.

Each design team shall not have less than 5 members in the team. We have total 29 students. This will lead to 5 teams with 5 members while one more team with 4 members. If we cannot form 6 teams, there will be six members in each team. The scope of the project shall be significantly large that justifies close to 700 to 900 man-hours work. List below outlines project ideas that can be considered for your senior design project competition. If you wish to develop one of your creative idea, project or products feel free to discuss with me during this class.

Sponsored Projects

Project #1 & 2

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Background: The United States Department of Defense has many devices and systems that require interoperability. This project will allow students to experience first-hand how to write software that takes information from multiple sources, consolidate that data, and then report that data to users.

Project#1

This is a continuation of previous semester work in which Students build a robotic vehicle system that implemented a leader / follower concept. The vehicle controls and a rudimentary algorithm was developed to follow leader vehicle. Our goal of the project is to extend the algorithm and make follower vehicle more robust vehicles. The project should consider incorporating one or more of the following:

1. A system in place to handle the situation where the "following" vehicle(s) lose line of sight.
2. Any vehicle in the system can be the lead vehicle.
3. A system in place to handle obstructions in the "following" vehicle(s) path that do not cause loss of line of sight but could still interrupt vehicle operations.
4. Vehicles communicate directly with one another, sharing navigational data

Minimum Requirements:

1. At least two robotic vehicles (one to lead and one to follow)
2. Vehicles must not collide with each other

I will provide previous year two vehicle system and their code base to get started.

Project#2

This is a new project to build a House Recon Drone. The idea still needs to be flushed out with TARDEC engineering team, but a high level the goal is to build a UAV drone that uses Image recognition to detect and identify moving objects around the outside of a house. The project would include –

- Use of off the shelf Drone
- Use of the Drone for various surveillance conditions which may include
 - People recognition
 - Activity recognition
 - Object recognition etc.
- The data channel between Drone and server must be established. Drones must register with servers prior collecting the data.

Project # 3

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The product name will be Golf Player Time Manager (GPTM). This software will have two components a cloud based player management application and mobile phone application. The cloud app will do the following:

- Track players position on a virtual golf course utilizing an application on the players phones that transmits GPS location information.
- It will utilize AI queuing algorithm to optimize playing time by calculating wait times, playing speed and send messages to players to advise of playing time and the need to allow players to play through.
- Players devices application will be able to notify cloud applications for services or assistance.
- Provide helpful hints about the course based on the location of the player.
- System shall allow players to login and register their device
- System shall monitor player behavior and provide player dashboard.

Mobile phone application (IOS, Android)

- Downloadable application from standard stores
- Players login and register at golf ranges
- Players enables GPS and secure connection with cloud based app
- Players app displays progress on the course, playing time, Warnings about playing speed, and request to allow playthrough.
- Players app displays helpful hints based on location, and allows for notification to the cloud for services and assistance.
- Players app display player history and dashboard

Project # 4

Interdisciplinary project with ME and ECE

OU Immersive VR Experience

A group of faculty and students from across campus (Art/Art History, SECS, others), supported by industry partners Rave Computers, MackeVision and Nabtesco Motion Control, has committed to design and build a two-seat mechanical motion-controlled platform that will interface with visual triggers supplied by an interactive movie, creating a VR immersive experience. This platform is to be a portable, flexible test bed for a VR experience that will be a proof of concept for the Dodge Museum when it opens at the OU campus in the next few years.

During the Fall 2018 semester, a large team of ECE and ME seniors designed the actuator base using input from Nabtesco engineers. As a proof of concept, they also produced a small-scale model and implemented rudimentary control system based on the Robotic Operation System (ROS)

ECE/ME Senior Design:

Construction of an Actuator Base for the OU Immersive VR Experience

There will be an engineering senior design group that will thoroughly review the design from last semester, attempt to identify motors and/or power sources that will allow the system to run on conventional 110 V power without significant loss of performance, and to construct/test the resulting system.

CSE/CIT Senior Design:

Initial Programming of an Actuator Base for the OU Immersive VR Experience will be performed by CSE /CIT engineering team. The team will take the small-scale system developed last semester and incorporate the necessary software to take visual clues from a video (to be determined) and, using open-source ROS, appropriately move the small-scale system to sync with the video. The goal is to add 4th dimension to the virtual reality system, which will react to camera or user motion and provide a immersive experience.

Project # 5

Prof. Nilesh Patel

Passenger and driver safety continue to be a challenging problem in transit systems. With increased threat of terrorism, probability of such occurrences is rapidly growing. While there are many in bus camera systems available for monitoring the passenger activities in the bus, due to large cost of associated cellular charges, such solutions are cost prohibitive. As an alternate, bus systems may implement multi camera stream recording for post event evaluation.

Goal of this project is to build an intelligent event detection system and trigger an alarm when such event occurs. Such system also provide enhanced security when it monitors passengers board the bus/train with set of luggage and depart the bus with same set of artifacts. In a nutshell, you will be a data collection system simulating bus entry and exit points using video camera. You will also build

camera system for continuously monitoring the inside activity of the bus. We are interested in detecting four types of events –

- Boarding and exiting passenger baggage discrepancy
- Normal passenger behavior in bus
- Rowdy passenger behavior in the bus
- Quarrel or physical abusive behavior of passengers in the bus

Deep learning intelligent system can model such behavior. You will be working with my research assistant to build such advanced intelligent models and integrate in your application. When system automatically detects such unusual events through deep learning model, your system will upload those events data to cloud for on line monitoring staff. Your system must implement device registration and other required functionality to be useful.

Project # 6

Prof. Nilesh Patel

Software quality assurance is an integral part of software engineering. As new software development architecture and design practices emerge, new testing tools emerge to support the architecture. Modern cloud applications utilizing REST or Web APIs as their application end points. While endpoints are called by client applications separately, their sequential execution can lead to testing of specific application workflows. Karate from intuit provides an endpoint testing framework. Your goal as part of this project is to build a SaaS application that utilizes Karate framework and builds functionality for organizations to manage their end-point tests, schedule various test cycles, get pass/fail statistics etc.

Project # 7

Prof. Nilesh Patel

Stock market is becoming more and more unpredictable due to large number of predictive and computerized trading. There are many trading systems and architectures exist that help developers build their strategies and predictive algorithms. Our goal through this project is to build unified model using known strategies and provide guidance about its investment return in next coming weeks or months. The system shall also display various measures and historical return of the given stock based on various buy and sell points predicted by the system.

Project # 8

Prof. Nilesh Patel

Navigating through large building continues to be a challenge, especially when you are infrequently visiting such buildings. Hospitals and Government facilities, libraries, museums often fall under this category. Your goal is to build a beacon based in building navigation system, which can help guide the visitor in the building using the mobile phone. To prototype the concept, you will model of Engineering complex in the system and install beacons at various locations in the building. You will construct building map with locations of various entry, exit, elevators, floors and offices. Once the map is constructed, you will use graph based traversal (Dijkstra) algorithm to find the closest path to destination from a given user location based in visible beacon readings. You will then implement a mobile guidance system to guide the visitor in the building.

