

CS 4400 Directed Studies

Syllabus, Summer 2019

Department of Computer Science, KSU

Identifying Information:

Student's Name: xxxxxx

Course & Number: Directed Studies, CS 4400

Semester Hours Credits: 3

KSU Instructor and Title: Dr. Dan C. Lo, Professor and Dr. Kevin McFall, Associate Professor

Part of Term: Full Term 8 Weeks – Summer 2019

Summary Description of the Course:

This project aims to build a self-driving vehicle simulation environment for obstacle detection in the CARLA simulator. The first step involves developing installation instructions for the CARLA simulator and its required dependencies. Second, a test road environment will be developed, either using one freely available or something developed from scratch. The vehicle driven in the environment could be user controlled, follow a hard-coded path, or use a CARLA autonomous driving baseline. Third, a machine learning object detection algorithm for identifying obstacles, including vehicles, bicycles, and pedestrians, will be integrated into CARLA. This algorithm may be a preexisting trained architecture, but the source code must be available so that it can be modified or fine-tuned in the future. Fourth, detections from the algorithm in the image must be translated to physical positions using a stereo camera, LiDAR, or other sensor. The final results should be a video feed of the simulated driving annotated with detected obstacles and their positions.

Objective of the Course:

The primary objective of this course is to build experience with the CARLA simulator and how to use it to test obstacle detection algorithms. The primary deliverable is a working simulation environment that can generate a video feed of obstacles and their positions relative to the driving vehicle. The expectation is for the manuscript generated in this project to be submitted for publication in the [Early Career Technical Conference](#), [Kennesaw Journal of Undergraduate Research](#), or similar conference/journal.

Detailed Schedule of Activities, Readings, Projects, and/or Assignments:

The student is required to survey recent ACM/IEEE publications in this field. A weekly meeting schedule will be set up after the first week of the semester. A specific topic will be determined after the midterm of the semester. The student will work on the topic in more detail and depth toward the end of the semester. The work includes performance evaluation on existing approaches and implementation of improved methods, if any. The student will turn in a publication quality term report at the end of the semester.

Description of the expected roles of the student and KSU instructor:

The student will work on the research topic with the guidance from the KSU instructor. The student is expected to be self-motivated to finding research questions and looking for possible solutions. The KSU instructor will guide research direction and provide assistance to the student's research work.

Basis for Evaluation and Final Grade Determination:

The final letter grade will determined the quality of research work and the term report.

Academic Honesty Statement:

Every KSU student is responsible for upholding all provisions of the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. The Code of Conduct includes the following:

- Section II of the Student Code of Conduct addresses the University's policy on academic honesty, including provisions regarding plagiarism and cheating, unauthorized access to University materials, misrepresentation/falsification of University records or academic work, malicious removal, retention, or destruction of library materials, malicious/intentional misuse of computer facilities and/or services, and misuse of student identification cards. Incidents of alleged academic misconduct will be handled through the established procedures of the University Judiciary Program, which includes either an "informal" resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which may subject a student to the Code of Conduct's minimum one semester suspension requirement.
- Students involved in off-campus activities shall not act in a disorderly or disruptive fashion, nor shall they conduct any dangerous activity.
- Students involved in off-campus activities shall not take, damage or destroy or attempt to take, damage or destroy property of another.