

**Kennesaw State University**  
**EE 4400 – Directed Study in Electrical Engineering**  
Course Syllabus – Spring 2016 – 3 credits

**I. Identifying information**

Student: xxxxxxxxxxxxxx

Course: Directed Study in Electrical Engineering – 3 credits

Instructor: Kevin McFall, Phd.

**II. Course Description**

This directed research will explore acquiring and analyzing point cloud data from a Hokuyo UBG-05LN laser range-finder. Algorithms will be developed to use range-finder data to detect road boundaries and obstacles for applications in autonomous vehicles.

**III. Objective of the Course**

The primary course objective is to design algorithms to use point cloud data to detect obstacles in the path of an autonomous vehicle and detect road boundaries for steering control. Informed by an extensive review of the existing literature on this topic, established detection algorithms will be adapted to limitations of the Hokuyo UBG-05LN laser range-finder. Point cloud data will be collected and the algorithms tested off-line. Prototype algorithms may be developed on a PC, but a successful project will result in code that can run on a single-board computer such as a Raspberry Pi or Odroid. As an extension if time permits, the range-finder can be incorporated into an autonomous vehicle and algorithm performance evaluate in real-time.

**IV. Detailed Schedule**

- Week 1: Familiarization with existing system
- Week 2-4: Research and literature review
- Week 5-6: Collection of point cloud data
- Week 8-10: Development of detection algorithms
- Week 11: Draft manuscript preparation
- Week 12: Submission to the *Kennesaw Journal of Undergraduate Research*
- Week 13-15: Exploration of extension topic(s)

**V. Description of Expected Roles**

Students are expected to work independently on this project, of course under direction of the instructor. Weekly meetings will be established for students to report progress and seek advice and guidance from the instructor on how to proceed. Students are expected to follow all safety guidelines when working in the laboratory or interacting with vehicles as directed by the instructor. Three hours of work per week per credit hour is expected.

**VI. Basis for Evaluation**

Primary deliverables for the project are validated detection algorithms (50%), submission of a manuscript for publication in the *Kennesaw Journal of Undergraduate Research* (30%), and an engineering logbook and user manual for the system (20%). Grades will be assigned for each component according to the following rubric:

- A (90-100): Exceptional deliverable quality and/or completion of extended topics
- B (80-89): Satisfactory completion of deliverables
- C (70-79): Incomplete completion of deliverables
- D (60-69): Partial completion of deliverables
- F (0-59): Little or no completion of deliverables

# University Policies

## Academic Honesty

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

## Plagiarism Policy

No student shall receive, attempt to receive, knowingly give or attempt to give unauthorized assistance in the preparation of any work required to be submitted for credit as part of a course (including examinations, laboratory reports, essays, themes, term papers, etc.). When direct quotations are used, they should be indicated, and when the ideas, theories, data, figures, graphs, programs, electronic based information or illustrations of someone other than the student are incorporated into a paper or used in a project, they should be duly acknowledged.

## Disability Statement

Kennesaw State University provides program accessibility and reasonable accommodations for persons defined as disabled under Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. Kennesaw State University does not deny admission or subject to discrimination in admission any qualified disabled student.

A number of services are available to help students with disabilities with their academic work. In order to make arrangements for special services, students must visit the Office for Student Disability Services and make an appointment to arrange an individual assistance plan. In most cases, certification of disability is required.

Special services are based on

- medical and/or psychological certification of disability,
- eligibility for services by outside agencies, and
- ability to complete tasks required in courses.

## **ADA Position Statement**

Kennesaw State University, a member of the University System of Georgia, does not discriminate on the basis of race, color, religion, age, sex, national origin or disability in employment or provision of services. Kennesaw State University does not discriminate on the basis of disability in the admission or access to, or treatment or employment in, its programs or activities.

The Americans with Disabilities Act (ADA), Public Law 101-336, gives civil rights protections to individuals with disabilities. This statute guarantees equal opportunity for this protected group in the areas of public accommodations, employment, transportation, state and local government services and telecommunications.

The following individuals have been designated by the President of the University to provide assistance and ensure compliance with the ADA. Should you require assistance or have further questions about the ADA, please contact:

- ADA Compliance Officer for Students  
470-578-6443
- ADA Compliance Officer for Facilities  
470-578-6224
- ADA Compliance Officer for Employees  
470-578-6030

For more information, go to: [http://www.kennesaw.edu/stu\\_dev/dsss](http://www.kennesaw.edu/stu_dev/dsss).