Kennesaw State University
MTRE 4400 – Directed Research – Mechatronics
Course Syllabus – Spring 2017 – 4 credits

I. Identifying information
Students: xxxxxxxxxxxxxx
Course: MTRE 4400 Directed Research – Mechatronics, 4 credits
Instructor: Kevin McFall, PhD.

II. Course Description
This course intends to explore how deep learning with convolution neural networks (CNNs) can increase the capabilities of mobile robots. Doing so requires developing an appropriate robotic platform, collecting data, and evaluating performance through testing.

III. Objective of the Course
The primary goal of this course is to increase understanding of the strengths and limitations using CNNs for mobile robotics applications. This technique is promising in that it eliminates feature extraction by the human designer, but likely requires large quantities of carefully selected training data. The results of this course will provide a better understanding of how easily CNNs can be applied to mobile robotics.

IV. Detailed Schedule
- Week 1: Develop detailed plan of the task to be attempted, perform literature review
- Week 2: Design robotic platform to be used, install CNN software and test example problem
- Week 3: Build robot and test data collection software
- Week 4: Collect preliminary data
- Week 5: Continue collecting data, train CNN with preliminary data to gauge progress
- Week 6: Collect data, evaluate CNN training, write manuscript introduction section
- Week 7-8: Finalize data collection and training of CNN
- Week 9-10: Test performance of the trained CNN, collect data to quantify performance
- Week 11: Wrap up and finalize any outstanding issues
- Week 12-13: Write manuscript text and develop accompanying figures
- Week 14: Submit draft manuscript for instructor review
- Week 15: Incorporate suggestions for manuscript edits
- Week 16: Finalize manuscript and submit for external review

V. Description of Expected Roles
The students are expected to work independently on this project, of course under direction of the instructor. The team is expected to meet with the instructor at least once weekly, demonstrating completion of the week's task. A minimum total of 192 hours of time per student is required on this project. The student is expected to follow all safety guidelines when interacting with equipment as directed by instructors and laboratory technicians.

VI. Basis for Evaluation
The primary deliverable for this course is the written manuscript. Of course completing it requires successful design of the mobile robot, training of the CNN, and extensive testing. The student will be evaluated on satisfactory completion testing the trained CNN (50%), compilation of an engineering logbook documenting the progress made and time spent (20%), and submission of the research work at a venue such as the 2017 Early Career Technical Conference, Kennesaw Journal of Undergraduate Research, or the Journal of Intelligent Systems (30%). 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.