Kennesaw State University
DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION SYSTEMS
Fall 2010
CS 8678 Robotics and A.I.
Dr. Ken Hoganson

Course Description:	This is a introductory course on robotics including some needed concepts from Artificial Intelligence. A survey of AI methods and approaches from search methods to neural networks. A robotics kit will be included to allow students to analyze, design, build, and test simple robotic systems.
Prerequisites:	Permission of program director
Textbook:	The Robotics Primer, Mataric, MIT press. This is an excellent introduction and a very good read.
Instructor:	**Dr. Ken Hoganson,** Professor, Ph.D. in **Computer Science** from Auburn University College of Engineering, with doctoral minor in **Information Systems** from the College of Business. Also master's and bachelors in Computer Science, and bachelors in Business Administration. Industry experience as Manager of Information Systems, Database Administrator, Information Systems Officer. Served as an officer in U.S. Army Infantry and Signal Corp.
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Course Objectives:	- To introduce robotics. - To develop student understanding of AI methods and approaches from search methods to neural networks. - To highlight the connection between embedded systems and artificial intelligence that is robotics. Robotics integrates embedded systems and device control and interfacing with knowledge of complex systems and mechanical problem solving. - Enhance learning in a specialized area of interest to the graduate student. - Understand and be able to implement fundamental robotic control and sensor systems.
Learning Outcomes:	- As a result of completing this course, students will understand the robotics area and problem domain. - Students will understand some basic ideas from A.I. - Students will design and construct a simple robot that successfully interacts with the real world to perform limited tasks.

Assessment:

	3 hours
Midterm Exam on Robotics foundations and A.I.	40%
Assignments	10%
Robot Analysis & Design Document	10%
Robot Demonstration	10%
Final Robot Project Demonstration & Report	30%

Grade Evaluation

A	90% - 100%
B	75% - 89%
C	60% - 75%
F	59% or below

Week	Topic	Chapters
1	Course intro, syllabus, begin overview of robotics, A.I. Problem Domains, Intelligent Agents	1 2-3
2	Actuators and Motors	4
	Stability	5
3	Control	10
4	Building blocks of control	11
	Mapping and State	12
5	Robotics Project 1	
	Robotics Project 1	
6	Project 1 Demonstration	
	Project 1 Demonstration	
7	Midterm	
	Robotics Project 2 Design	
8	Control Models	13-15
	Control Models	13-15
-	**Spring Break**	
9	Distributed planning and representation	16
10	Robotics Project 2 Design	
11	Robotics Design Document Due	
12	AI Topics	
13	Robotics Project 2	
14	Robotics Applications	22
15	Robotics Trials	
16	Robotics Project 2 Final Demonstration	

Special Dates:

Holidays/No Class: Labor Day	Sept 4-6
Fall Break	Nov 24-26
Last day to withdrawal without penalty	Oct 11
Last day for this class	Dec 2
Final Exam=Final Robot Demo	Dec 3 - 9

Class Format: Lecture & discussion, with lab assignments. Lectures will be recorded and available for review throughout the semester

Lecture Notes: on class web site

Assignments: on class web site

Project Requirements: on class web site, will include one formal presentation

Additional Resources: on the class web site

Attendance Policy:
Attendance at all classes is highly encouraged. Concepts and ideas discussed in one class are used as building blocks for more concepts and ideas in the next class. A student can get behind very easily by skipping classes, resulting in a poor understanding of the material.

Withdrawal Policy:
Ceasing to attend class or oral notice thereof DOES NOT constitute official withdrawal and will result in the rendering of a grade of "F" for the class. Students wishing to withdrawal after the scheduled change period (add/drop) must obtain and complete a withdrawal form from the Academic Services Department in the Registrar's Office.

Enrollment Policy:
Only those students who are enrolled in the class may attend lectures, view recorded lectures, receive assignments, take quizzes and exams, and receive a grade in the class.

Electronic Devices
In order to minimize the level of distraction, all beepers and cellular phones must be on quiet mode during "in-class" meetings. Students who wish to use a computer/PDA for note taking need prior approval of the instructor since key clicks and other noises can distract other students.

Computer Labs:

Please be aware of and follow all [computer lab user policies](#).
Burruss Building
The labs on the fourth floor of the Burruss Building are open 7 days each week as
follows:
M-Th 7:45am - 11pm
Friday 7:45am - 5pm
Sat 10am - 6pm
Sun noon - 8pm
The Burruss labs are open most holidays. Be prepared to show your current student ID
card upon entering the lab. The telephone number of the Burruss Building lab is 770-
423-6110.

Science and Mathematics Building
The lab in SC 228 of the Science and Mathematics Building is open as follows:
M-Th 9:00 am - 8:00pm
Fri & Sat 10am - 3pm
Sun closed
The telephone number of the Science and Mathematics Building lab is 770-499-3351.

Academic Integrity Statement:

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.

Students are encouraged to study together and to work together on class assignments and
lab exercises; however, the provisions of the STUDENT CONDUCT REGULATIONS, II.
Academic Honesty, KSC Undergraduate Catalog will be strictly enforced in this class.

Frequently students will be provided with "take-home" exams or exercises. It is the
student's responsibility to ensure they fully understand to what extent they may collaborate
or discuss content with other students. No exam work may be performed with the
assistance of others or outside material unless specifically instructed as permissible. If an
exam or assignment is designated "no outside assistance" this includes, but is not limited to,

peers, books, publications, the Internet and the WWW. If a student is instructed to provide citations for sources, proper use of citation support is expected. Additional information can be found at the following locations.

http://www.apa.org/journals/webref.html
http://www.lib.duke.edu/libguide/citing.htm
http://bailiwick.lib.uiowa.edu/journalism/cite.html
http://www.cas.usf.edu/english/walker/papers/copyright/ipdummie.html

APA Documenting Examples:

When any portion of another author's work is used, whether it be from a course textbook or outside work, including the World Wide Web, in whole, in part, or paraphrased, that work must be cited. Proper citation formats are provided on the reverse of this document. Failure to do so can result in Academic Misconduct Proceedings. Acceptable Reference Formats (from North and Blade, 1998 (see below) reprinted with permission)

There are two components to a proper citation: the text citation and the reference or endnote. The text citation will usually consist of the author's or authors' last name(s) and the year of the publication. The endnote citation will read as follows:

Books
(Author. Date. <u>Book Title</u>. Publication Data.)

A reference for a single-author book:

North, M. M. (1996). <u>Virtual reality technology</u>. New York: Best Press.

A reference for a multi-author book:

North, M. M. & Blade, R. A. (1998). <u>How to build skills for research</u>. Colorado Springs: IPI Press.

<u>Journals</u>
(Author. Date. Article Title. <u>Journal Title.</u> Publication Data.)

Journal Reference

Kelly, F. G. (1997). Networking made efficient. <u>Journal of Computer Networking</u>. 45(3), 54-61.

(Here is an article in Volume 45, Issue 3, spanning pages 54-61)

Conference Proceeding

Vanner, F. D. (1996). A survey of medical issues using virtual reality. <u>Proceedings of the Virtual Reality Medical Technology</u>. 119-132. Nice, France.

APA Documenting Examples Continued:

World Wide Web (from http://www.apa.org/books/pubmant.html):

(Author. Date. Page Title. Publishing Information. Retrieval Date. WWW URL)

Entire site no specific page

Kidspsych is a wonderful interactive Web site for children (http://www.kidspsych.org).

No reference entry is needed.

Citing Specific Documents on a Web Site:

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American Psychological Association. (1995, September 15). APA public policy
action alert: Legislation would affect grant recipients [Announcement].
Washington, DC: Author. Retrieved January 25, 1996, from the World Wide Web:
http://www.apa.org/ppo/istook.html
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An independent document (no author identified): 1

Electronic reference formats recommended by the American Psychological Association. (2000, August 22). Washington, DC: American Psychological Association. Retrieved August 29, 2000, from the World Wide Web: http://www.apa.org/journals/webref.html

If the primary author is not available for the body citation, the first key word is to be used (Electronic, 2000).

STUDENT EVALUATION OF COURSE:

A standard questionnaire will be administered during the last two weeks of the semester in all classes. Additional questions developed by the college or instructor(s) may be included as well. It is important that each student provide meaningful feedback to the instructor(s) so that changes can be made in the course to continually improve its effectiveness. We value student feedback about the course, our teaching styles, and course materials, so as to improve our teaching and your learning. At a minimum, the following two questions will be asked: 1) Identify the aspects of the course that most contributed to your learning (include examples of specific materials, exercises and/or the faculty member's
approach to teaching and mentoring), and 2) Identify the aspects of the course, if any, that might be improved (include examples of specific materials, exercises and/or the faculty member's approach to teaching and mentoring).

Acquiring Final Grades:

In an effort to better utilize our technology resources, Kennesaw State University has instituted the reporting of end of term grades by phone. This is in addition to the web version of grades, which has been in effect for several terms. All Spring Semester 2001 term students may call 770-420-4315 and select Option Number 4 to secure their end of term grades. With this new development, printed grade reports will not be mailed at the end of the term. Students needing verification of grades or enrollment should request either an official transcript or an enrollment verification through the Office of the Registrar.