



## COGNITIVE ROBOTICS

Spring 2008

TU 3:30-4:50 SSL 159

TH 3:30-4:50 SST 630

Jeff Krichmar

Department of Cognitive Sciences  
University of California, Irvine



### Course Description

Cognitive Robotics is an emerging field that combines cognitive science, computer science, neuroscience, and robotics. These robots provide a tool for studying cognitive function by embedding brain models on robotic platforms. Because embodied models capture the complete system (i.e. the interaction between brain, body, and environment), cognitive robotic experiments can increase our understanding of how the brain gives rise to complex behavior.

In this course, students will learn concepts of embodiment, robot construction, and computer programming. In the lecture portion of the course, selected readings and case studies of cognitive robotics will be discussed. In the lab portion of the course, students will construct simple robots, using the LEGO Mindstorms NXT kit, and program these robots to perform different behaviors.

### Textbooks

#### Required:

1. "LEGO Mindstorms NXT Power Programming: Robotics in C", John C. Hansen.
2. "How the Body Shapes the Way We Think: A New View of Intelligence", Rolf Pfeifer, Josh Bongard

#### Suggested:

1. "Vehicles: Experiments in Synthetic Psychology", by Valentino Braitenberg
2. Selected readings

### Lego Mindstorms NXT

A Lego Mindstorms NXT education kit will be assigned to pairs of students. During non-lab hours, the students can sign out their kit with the instructor's permission. The graduate computer laboratory in SST604 will have NXT software installed. It will be the student's responsibility to replace any damaged or lost parts (See attached sheet).

### Course Schedule

The course will meet twice a week. One day of lecture and one day of programming robots in a computer lab.

### Office Hours

Thursdays, 5-7PM SST630

E-mail: [jeff.krichmar@uci.edu](mailto:jeff.krichmar@uci.edu)

### Grading

Mid-term examination	20%
Mid-term laboratory project	20%
Final examination	25%
Final laboratory project	25%
Participation	10%

### Class Size

Because of the limited number of robotics kits, the course will be restricted to 16 students (2 per robot).

## SCHEDULE

	<u>LECTURE</u>	<u>LAB</u>
WEEK1	4/1 Introduction	4/3 Robot Construction Hansen – Ch. 1-4
WEEK2	4/8 Pfeifer – Ch. 1-2	4/10 Actuators and Motors
WEEK3	4/15 Pfeifer – Ch. 3	4/17 Sensors
WEEK4	4/22 Pfeifer – Ch. 4-5	4/24 Structured programming: Loops, switches, events
WEEK5	4/29 Midterm	5/1 Midterm Project Due
WEEK6	5/6 Hansen – Ch. 7-8 C Programming on the NXT	5/8 Hansen – Ch. 10 Basic NXT Outputs
WEEK7	5/13 Pjeifer – Ch. 10	5/15 C Programming on the NXT Hansen – Ch. 11 Basic NXT Inputs
WEEK8	5/20 Pfeifer – Ch. 12	5/22 Hansen – Ch. 12-13 Advanced I/O
WEEK9	5/27 Final Project	5/29 Final Project Due
WEEK10	6/3 Final Project Due	6/5 Inventory!!!

**LEGO MINDSTORM NXT  
REPLACEMENT AGREEMENT**

I, \_\_\_\_\_, promise to return a complete LEGO Mindstorms NXT kit at the end of the quarter. I will incur the cost of replacing any damaged or lost parts.

\_\_\_\_\_  
PRINTED NAME

\_\_\_\_\_  
SIGNATURE

\_\_\_\_\_  
DATE

**To be filled out at the end of the quarter:**

LEGO Mindstorms Kit#:

Missing or Damaged Parts:

Student Name and Signature:

Instructor Name and Signature:

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