

UAB CIS Summer Robotics Camp 2005

Introduction

We are excited to have you on our campus and to work with you over the next month! This is the second time that we have conducted this internship session and we look forward to the experience of helping you to learn more about computer science. Because this camp is still in its infancy, we would request your input and suggestion on any aspect of the experience. Please let us know the positive things that you liked about the internship, but do not feel like you need to hold back if you would like to suggest changes or negative aspects of the internship that would have improved your time here.

In this experience, you will be treated very much like a PhD (doctoral student) in our department. You will be given your own office space and key, as well as your own assigned lab computer and robot (the computer remains the property of UAB at the end of the camp, but you may keep the robot for future projects that you may want to explore, perhaps as science fair projects).

Overview of the Summer Activities

We have an exciting collection of projects for you to investigate during your internship. The brief descriptions below offer a teaser for the things that you will be working on this summer.

Single Robot Projects

Balloon Buster: A set of 10 balloons will be placed in a circle with the robot starting in the middle of the circle. The robot will know the diameter of the circle and location of the robot in the center. The winner is the robot that can burst the most balloons in 3 minutes. The robots can use a needle pin attached to the robot to aid in the bursting. This idea was borrowed from Southern Illinois University (Edwardsville).

Line Tracer: This project is rather simple. A large/thick black line is drawn on white paper and the robot should follow the line. The line may actually return back to the starting position such that the traversal is infinite. The line can have a lot of interesting turns and curves.

Kick the Can: This game is played on a white circular rink demarked by a thick black line at the circumference. Seven 12 oz. Cans of soda are placed in marked positions, arranged radially from the center. The goal is to remove soda cans from inside the rink as quickly as possible. This project was described by Cen Li (from MTSU) who adopted it from F. Martin's "Robot Explorations" book.

Homing Pigeon: This is a very simple project in concept, but can be surprisingly difficult. The robot is asked to drive past a line that is 10 feet away from the start position. After passing the line, the robot must make a 180 degree turn, and then return as close as possible to the initial start marker. The winner is the robot which gets closest to the starting point. It is much harder than it sounds! This project was suggested by Lewis Patterson of Birmingham Southern.

Multiple Robot Projects

Sumo Wrestler: This project simulates a Sumo wrestling event. You must write code that keeps your robot within a circle, but tries to push the other robot out of the circle. The winner is the robot that remains in the circle after the other goes past the line. No holds barred (that is, anything goes in the code - all moves are legal but the robot hardware cannot be altered!) This idea was borrowed from Southern Illinois University (Edwardsville).

Simon Says: This is a “Simon says” project that is similar to synchronized swimming. One robot is a master and sends commands to the infrared of the other robot. Both robots then perform the action in synchrony and return back to a state where the infrared sensors point to each other for another command to be issued. You must collaborate with another student and work on this project together. This project was suggested by Tivadar Szemethy of Vanderbilt.

Term Projects

Project 1: In this initial project, your robot will be programmed to know the mapping of a simple maze. The robot does not know the location, however, of a piece of treasure that it must find. The robot must find the coordinates of the treasure and display the location on the LCD panel of the robot. It then must safely return back to the start position. The treasure is a large black dot. The maze hallways are on white paper. The maze walls are denoted by large black lines. In this project, only one robot traverses the maze at a time. An additional constraint is that you may not hit a wall. If you bump into a wall, the robot must immediately halt execution.

Project 2: This project is a variation of Project 1, but with a few twists: there are unknown obstacles in the maze that you must be able to maneuver around. In this case, your robot is allowed to bump into walls, obstacles, and even the other robot. This second project is also a race – there will be two robots in the maze and the first to retrieve the coordinates of the treasure, and safely return home, is the winner!

Project 3: This is also a single robot project that is a variation of Project 1. In this project, the map of the maze is contained in a text file (“1” represents a wall, and “0” an open space). You must read in the configuration of the maze from the file and be able to traverse the maze without hitting any walls to find the treasure. This is a more dynamic project that requires the navigation commands to be generated by analyzing the maze configuration, which may change by importing different configuration files.

Draft Schedule of Events

The following schedule will be updated accordingly, based on progress that you make throughout each day. This is just an estimate. We may need to slow the schedule down in case you need more help with certain projects. Or, it may be the case that the schedule can be accelerated with new projects to be added later.

- Underlined dates indicate the start of a new week
- * Indicates times when Jeff will be out of town.
- + Indicates the dates of the Computer Graphics Camp.

Date	Student Helpers	Task
<u>June 7</u>		(Begin 11am) Introduction to internship; Build robots
8	Alex	Video tutorials
9	Francisco	Balloon Buster
10	Alex (long)	Sumo Wrestler; Kick the Can
<u>13</u>	Francisco	Intro to Java (9:30am-11am); Java exercises
14	Ruben (12-3)	Introduction to Eclipse and Lejos; Homing Pigeon
15	Francisco	Recreate Balloon, Kick the Can, Sumo in Lejos
16	Ruben (12-3)	Continue exercises in Lejos
17	Jing/Hui	Simon Says; Pass the Secret
<u>20</u>	Jing/Hui	Continue Simon Says and Pass the Secret
21	Ruben (12-3)	Introduce Term Project 1
22	Francisco	Continue term project 1
23	Alex	Continue term project 1
* 24	Alex	Introduce Term Project 2
+* 27-Jul 1	No one	COMPUTER GRAPHICS CAMP
<u>Jul 5</u>	Jing/Hui	Continue term project 2
6	Francisco	Continue term project 2
7		Plan for showcase, exit interview; discuss future science fair projects
8	Everyone	Final Showcase! Entire CIS department invited to watch your robots

Your Supervisors

Below are the names of the individuals who will be working with you throughout your time here. The individual emails are provided below in case you need to send a specific message to someone.

Project Mentor:

Dr. Jeff Gray (gray (at) cis.uab.edu)

Doctoral Students:

Alex Liu (liush (at) cis.uab.edu)

Francisco Hernandez (hernandf (at) cis.uab.edu)

Suman Roychoudhury (roychous (at) cis.uab.edu)

Hui Wu (wuh (at) cis.uab.edu)

Jing Zhang (zhangj (at) cis.uab.edu)

Undergraduate Student:

Ruben Vuittonet (ruben.vuittonet (at) gmail.com)

How to Contact Us

If you need to contact us outside of the normal work day, please feel free to call Dr. Jeff Gray at home (between the hours of 7am and 11pm) at 631-9910. Jeff can also be reached in his office at 934-8643 (voice mail is available on this line) and by email at gray (at) cis.uab.edu

Our administrative assistants in the department are Mrs. Kathy Baier and Mrs. Janet Sims. Kathy and Janet may also be able to help you with requests that you might have on those occasions when Dr. Gray or the other team members are away from their office. Kathy's phone number is 934-2213.

UAB Responsibilities

Our primary responsibility is to stimulate your mind in a productive environment such that you are motivated to make this a unique learning experience. We will work toward answering any question you have, either from your work on the robots, or about college experiences in general. Please don't be shy – let us know if you have a question.

We will make an effort to spend approximately 8-10 hours each week with you in person in order to teach you the skills necessary to complete the assigned projects. The other part of your time will be spent in completing the assigned project either on your own or with another student.

Your Responsibilities

You are expected to work approximately 25-30 hours per week, beginning at 9am each day through 3pm. There may be times when we will ask you to stay a little longer in order to complete a project. If you are unable to make it to work for a specific reason, you are responsible for notifying Dr. Gray about the reason for your absence that morning.

You must be responsible and keep the amount of personal phone calls and personal email/web surfing to a minimum. We request that you use a cell phone only for emergency purposes.

You are also responsible for handling UAB computer equipment and the robots in a professional and respectful manner. This would include the viewing of websites that contain objectionable materials. You should keep your work area and equipment clean and tidy.

YOU MUST ensure that the room to your office space is locked at all times. You will receive an initial warning if this rule is violated, with the second occasion resulting in a request for your key to be turned back in. It is essential that your office be secured when it is unoccupied in order to protect our equipment from theft.

Please work toward maintaining a tidy work area. The desk that you will be assigned may need to be cleaned from the previous user. Please obtain paper towels in the restroom and work toward cleaning your work area.