EE/S E Senior Design: sddec20-28

Micro-Mouse Maze Runner Showcase
Week 1&2 Report
Client: Dr. Jones
Advisor: Dr. Jones

Team Members:
Richard Anderson
Austin Chesmore
Tyler Fuchs
Jorge Gomez
Aaron Walter
Joshua Wooi

Bi-weekly Summary

Over the last two weeks, the team has decided on meeting times and locations, met with our advisor once, and started individually researching different components of the project. We have started researching different motors, PCBs, microcontrollers, sensors, as well as researching maze solving and pathfinding softwares. Being early in the project, the team is still very much in the research and planning phase, and may still be during the next reporting cycle, as we will likely be learning how to use the parts we order.

Past Weeks Accomplishments:

Settled on a weekly meeting time and location - Everyone
- Taken everyone's availability into consideration to set up an ideal meeting time.
  - The team will meet on Mondays & Fridays every week, at 3pm.
- Decided that the team will meet in Marston 3118 when available, or in the atrium of Durham.

Met with our client and advisor for the project - Everyone
- Met with our client and advisor, Dr. Phillip Jones.
- Established the needs and expectations of the project.
  - Expected to have a working prototype by the end of the semester.
- Established method of communication with Dr. Jones.

Started the research for parts and other project necessities - Everyone
- PCB - Jorge
  - The final prototype is expected to be built on a PCB.
  - Process is decided to be somewhat complicated, and the team won't focus on this until later stages.
  - Learning to use software to create a PCB
- Sensors - Austin

- ○ Prototypes will utilize IR sensors to return information to the users
  - ■ Will be implemented for autonomous functions.
- Microcontrollers - Joshua
  - ○ Research some uControllers for the use of this project.
    - ■ TM4C123GH6PMI (**$10.64**)
      - ● Similar to the Tiva C uController on the CprE288 Roombas.
      - ● Likely the best option, but might be too costly.
  - ○ Found some affordable alternatives
    - ■ STM32L433RCT6P (**$6.34**)
      - ● MCU, ARM CORTEX-M4, 80MHZ, LQFP-64
    - ■ STM32L433CBT6 (**$5.14**)
      - ● MCU, ARM CORTEX-M4, 80MHZ, LQFP-48
  - ○ Cheaper alternatives exist, but may not be powerful enough to support the purposes of this project
    - ■ Pathfinding Algorithms - Richard
      - ● Started researching some
- Wheels - Tyler
  - ○ For our prototype we will be using two wheel on an axle powered by a battery. To balance the device a front ski will be used in place of a wheel which will make turning easier.
  - ○ Size will be the main concern when developing the prototype, a few different sizes are listed
    - ■ Pololu Wheel 42×19mm Pair ($**6.98)**
    - ■ Pololu Wheel 60 x 8mm ($**4.25)**
    - ■ Solarbotics Hard Plastic Wheels (**$1.00)**
      - ● 30 mm x 7 mm
- Communication - AJ
  - ○ Most micromouse hardware do not have built in communication to a computer, but this project requires it.
    - ■ A communication protocol like Bluetooth would be low energy enough to run directly on the micromouse, but is generally much harder to work with.
    - ■ WiFi is fast and robust and is easier to use. The SoC/uController should be WiFi, or at the least, bluetooth compatible for sending map data back to the host PC.
    - ■ Arduino Uno/Feather? Alternate SoC like Pi Zero?
- Motors
  - ○ DC motors
  - ○ Stepper motors

Started researching micromouse software, and software-hardware communication.
- Shortest path algorithm - Richard
  - ○ Research and try out some algorithms that could potentially be used in the micromouse (breadth-first, A*).

Pending Issues:
- The team has yet to receive confirmation for a scheduled time for a bi-weekly meeting with Dr. jones.
- The team is considering the use of a Raspberry Pi on a prototype.
- The team is in the process of finalizing a parts list to be submitted to the ETG.
- The material used to build the maze is tentatively decided to be Cardboard.
    - Will need to look into more durable alternatives that would be fit for transportation while also being modular (plexi glass, wood, aluminum)

Individual Contributions:

Team Member	Contribution	Weekly Hours	Total Hours
Richard Anderson	Researched pathfinding algorithms	2+4	6
Austin Chesmore	Researched sensors, batteries, and motors	2+7	9
Tyler Fuchs	Researched Wheels	2+1	3
Jorge Gomez	Researched PCB	2+1	3
Aaron Walter	Researched prototype uControllers and communication protocols	2+4	6
Joshua Wooi	Researched uControllers	2+2	4

Plans for Coming Week:
- Finalize a decision on which parts is best suited for the purposes of this project.
- Finalize the parts list to be submitted to the ETG.
    - Will start building Prototype 1 when parts arrive.
- Consult Dr. Jones on the use of a Raspberry Pi or Arduino Feather on Prototype 1.
    - A Raspberry Pi is a small computer and may defeat the purposes of the project.
    - Also note that a Pi might be too big, so a smaller all in one microcontroller or SoC may be required
- Decide on algorithms based on parts selected.
- Start researching / learning how to communicate with hardware components.

http://seniord.ece.iastate.edu/resources/weekly_report_example.pdf