Introduction to Robotics (Hatchling)

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Number of Members (Hatchlings) : 128

TEXAS A&M UNIVERSITY Engineering

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ROBOTICS TEAM & LEADERSHIP EXPERIENCE

Problem Definition

Students in engineering don't always have experience with building things, and many are very interested in building robots but don't really know where to start. Thus we have Hatchling, where we students can learn basic engineering skills and utilize what they've learned by building a robot.

Methodology

Hatchling is a one semester project, in that one semester students gain experience with Solidworks, 3D printing, programming with python and/or arduino IDE for electronics,soldering and power tools.

Students are taught/guided by the Hatchling Directors.

How?

- First half of the semester we cover the project and teach engineering skills through practice examples and physical demonstrations (such as showing a fully built robot example). This is meant to give our Hatchlings hands on experience with the material.

- Hatchling directors will prep slides on the material and present them at the meeting, students will follow along with some examples, such as during our Solidworks sessions or take notes of the material such as when we covered basic electronic components.

- Second half of the semester we make our Hatchlings put their knowledge to the test by having them build a small robot. This robot will be used to compete against other Hatchlings in a game that's been defined by the Hatchling Directors, this semester we've called our game Mothership Turtle.

Figure 1. Mothership Turtle early CAD model

Why Introduce a Game?

We think that by introducing a challenge, i.e. the game, we give our Hatchlings motivation to make and complete a robot. Not only that but it also makes it easier for our Hatchlings by giving them guidelines for what their robot should be able to accomplish. We believe it's important to have a goal and work towards it. Plus we also incentivise our hatchlings with the fact that they get to keep their robot after they are finished.

What is the Game?

Mothership Turtle - A moving, turtle shaped goal called Mothership is controlled by the Hatchling directors and will be moving around a 6ft x 6ft field.

- Hatchlings will form teams and have to make robots capable of picking up foam balls laid across the field and get them in the Mothership in order to score points.
- Bonus Points if the robots are non-wheeled (use legs), have a sensor, or is very creative/impressive.

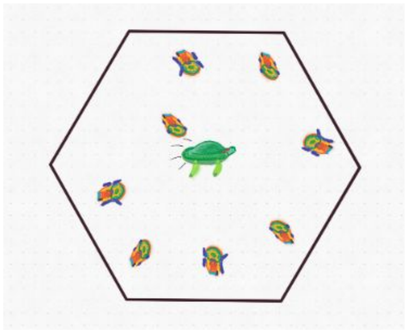

Figure 2. First illustration of the field and Mothership Turtle

Software

This semester we are using Raspberry Pi Zero W's as the brain of the Hatchling robots, they are programmed using python and are extremely versatile in their uses. Plus engineering students already have to use python for their classes so this offers more experience with the coding language.

Hardware

Each Hatchling group is given the following:

- 2x TT motors
- 2x micro servos
- 1x Raspberry Pi Zero W
- 1x L298n Motor Driver
- 1x Buck Converter
- 2x 9v Batteries

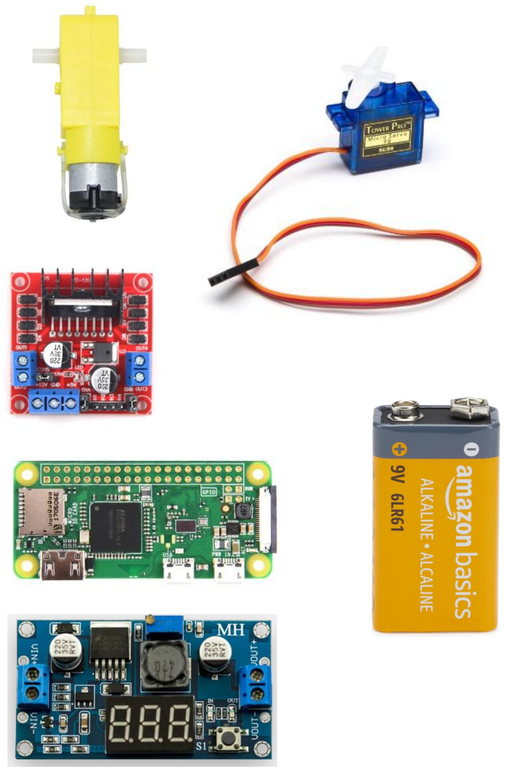

Figure 3. Images of the Hardware used this semester

Figure 4. Hatchlings prepping their robots for the Hatchling Games - Spring 2024

Next Steps:

After completing Hatchling, our members get to apply to join our advanced projects since now they have the skills to become an asset to the teams they join.

The skills learned in Hatchling are also very marketable and look very good on a resume; many of our members have been hired for internships after completing Hatchling and especially after joining an advanced project.

Hatchling has always been something we've wanted to grow and develop and in the last 3 semesters we have seen exponential growth from 16 members to our now 128 members in Hatchling alone. This semester was the first time we've had multiple Hatchling Directors, but even with 4 directors we find ourselves needing a few extra hands, so in the future we aim have at least 6 directors since it seems like our numbers are only going to go up, hopefully.