Doge Pinball

Custom Project Final Report

Winter 2017

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Introduction

Doge Pinball is a custom arcade game that simulates a cross-over between the classic arcade games pinball and skee-ball. On one side of the playing field, there is a drain partially protected by player-controlled bats called flippers. On the other side of the playing field, there is the doghouse (goal). The player starts the game by dropping a pinball into the start hole and onto the playing field. The aim is for the player to bat the ball, using the flippers, into the doghouse before time runs out. The player loses if the ball rolls down the drain. The player's score is equal to the time remaining after the player manages to get the treat into the doghouse. The player who does so in the least amount of time holds the high score.

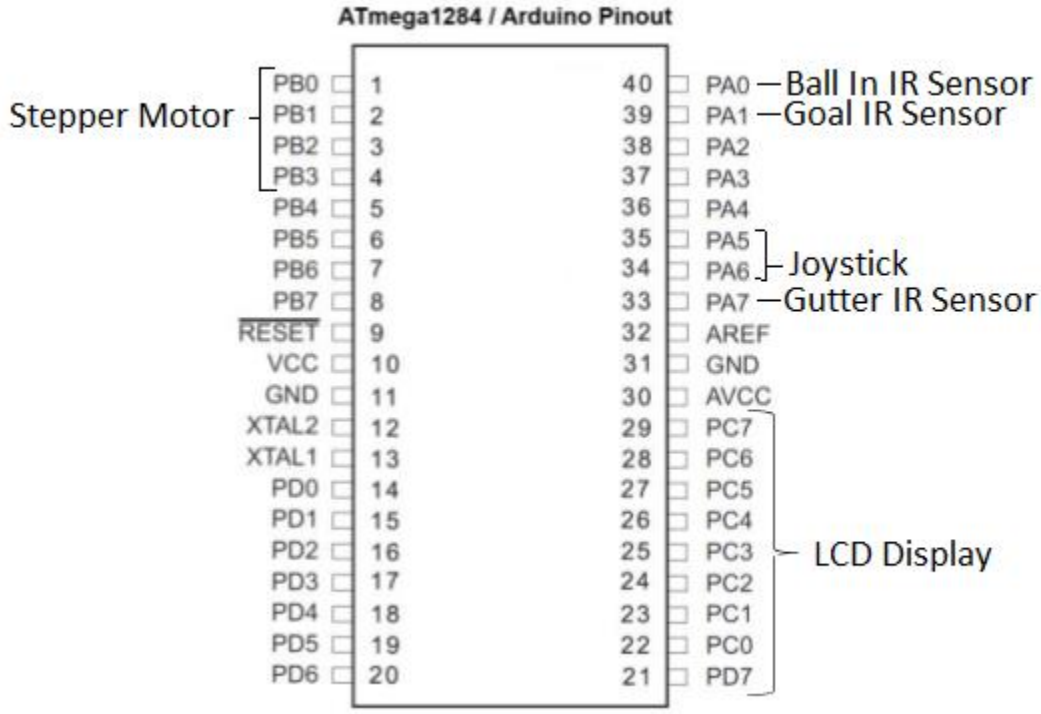
Hardware

Parts List

The hardware that was used in this design is listed below. The equipment that was not taught in this course has been bolded.

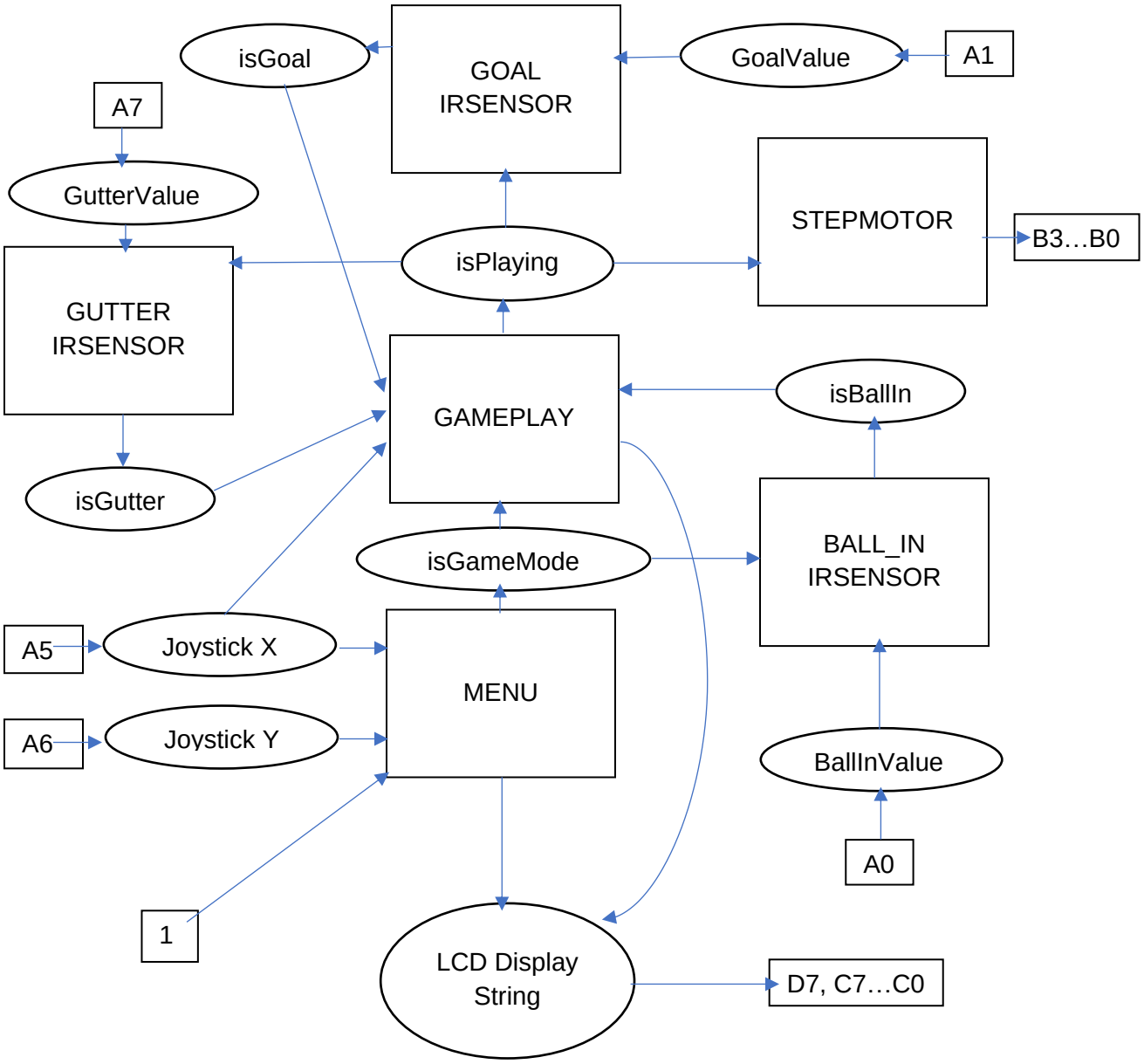
- ATMega1284p microcontroller
- **Step Motor**
- **Infrared Sensor**
- **Joystick**
- LCD Screen

Pinout

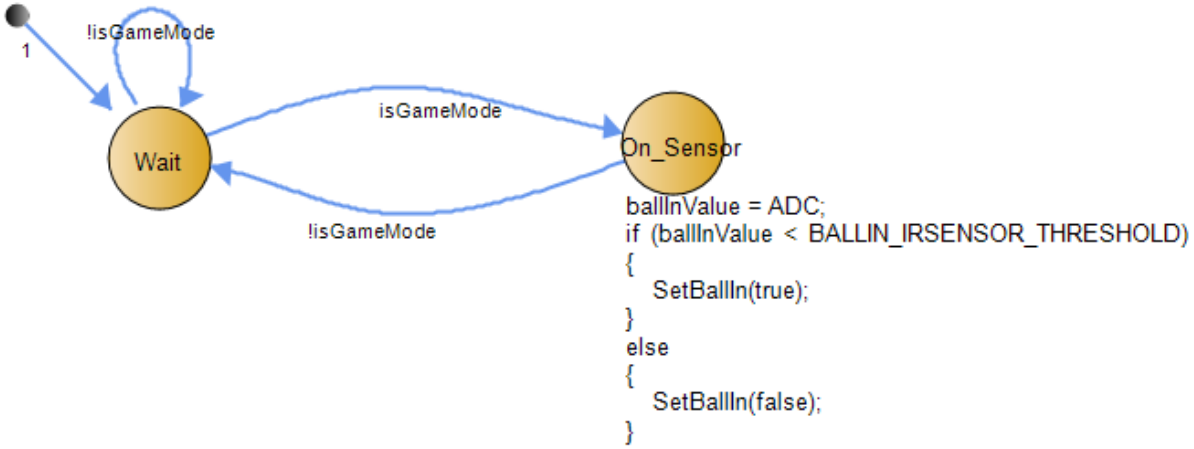


Software

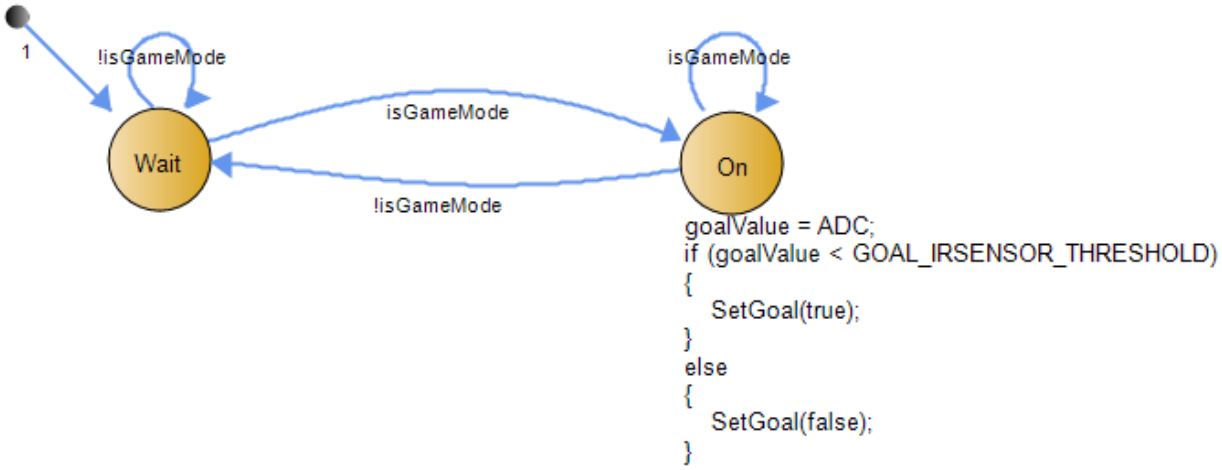
Task Diagram



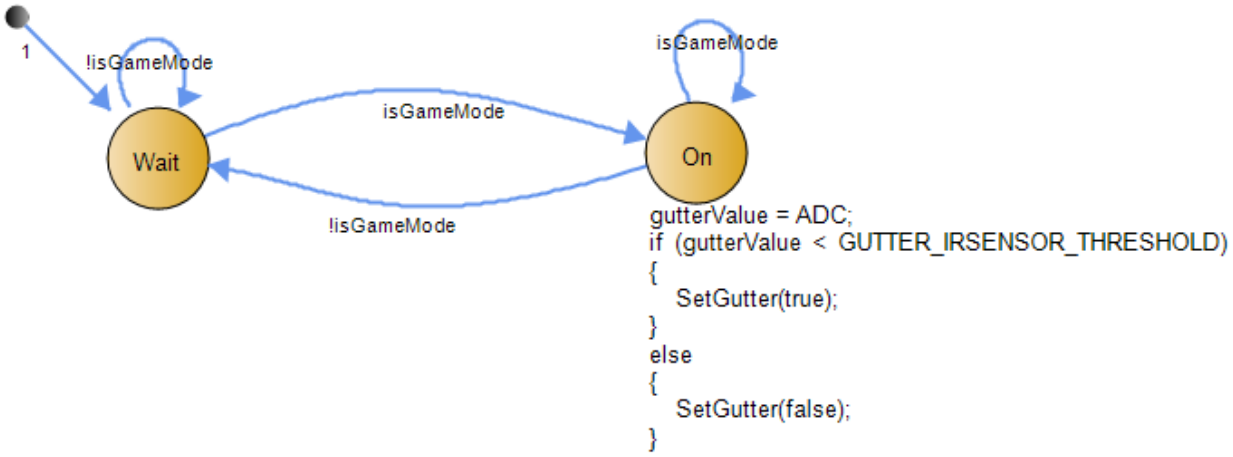
Ball In Infrared Sensor State Machine



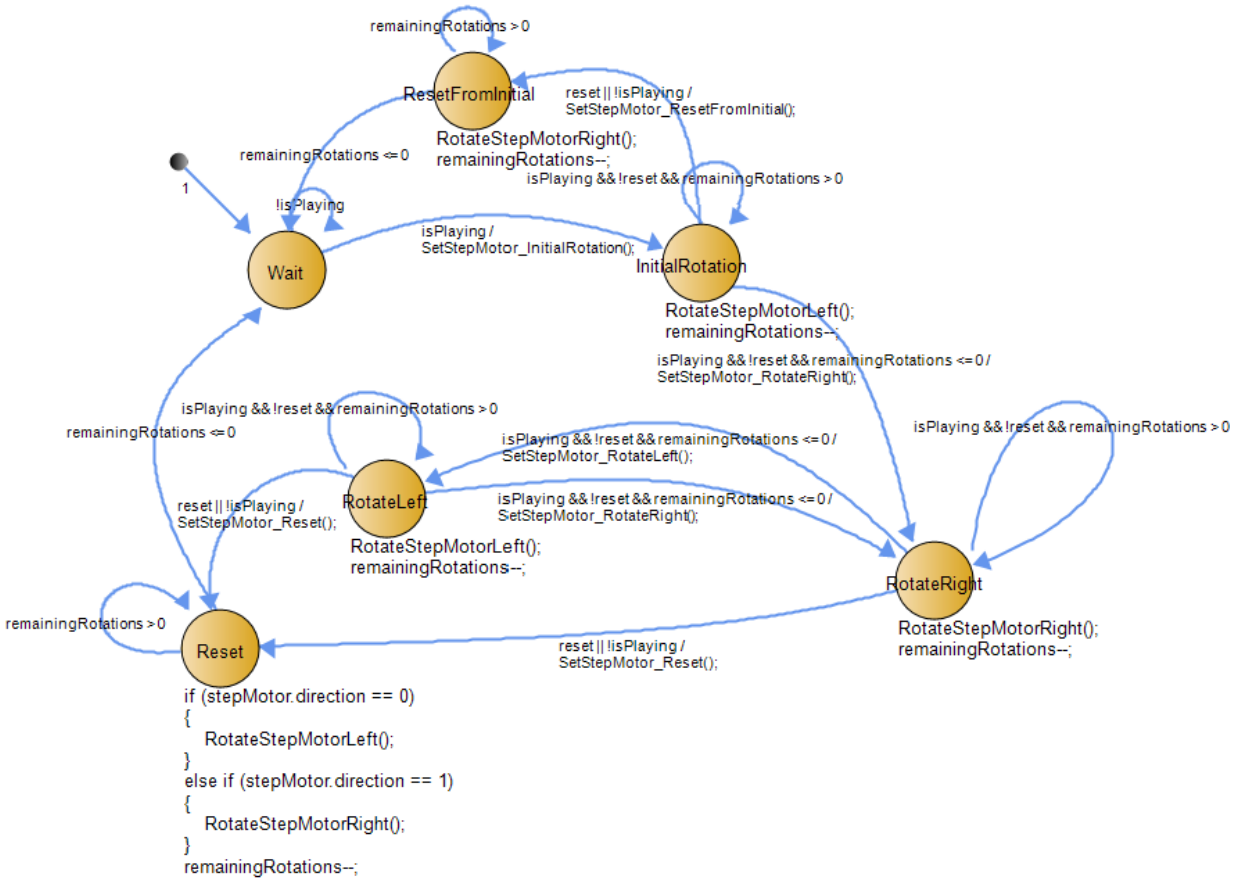
Goal Infrared Sensor State Machine



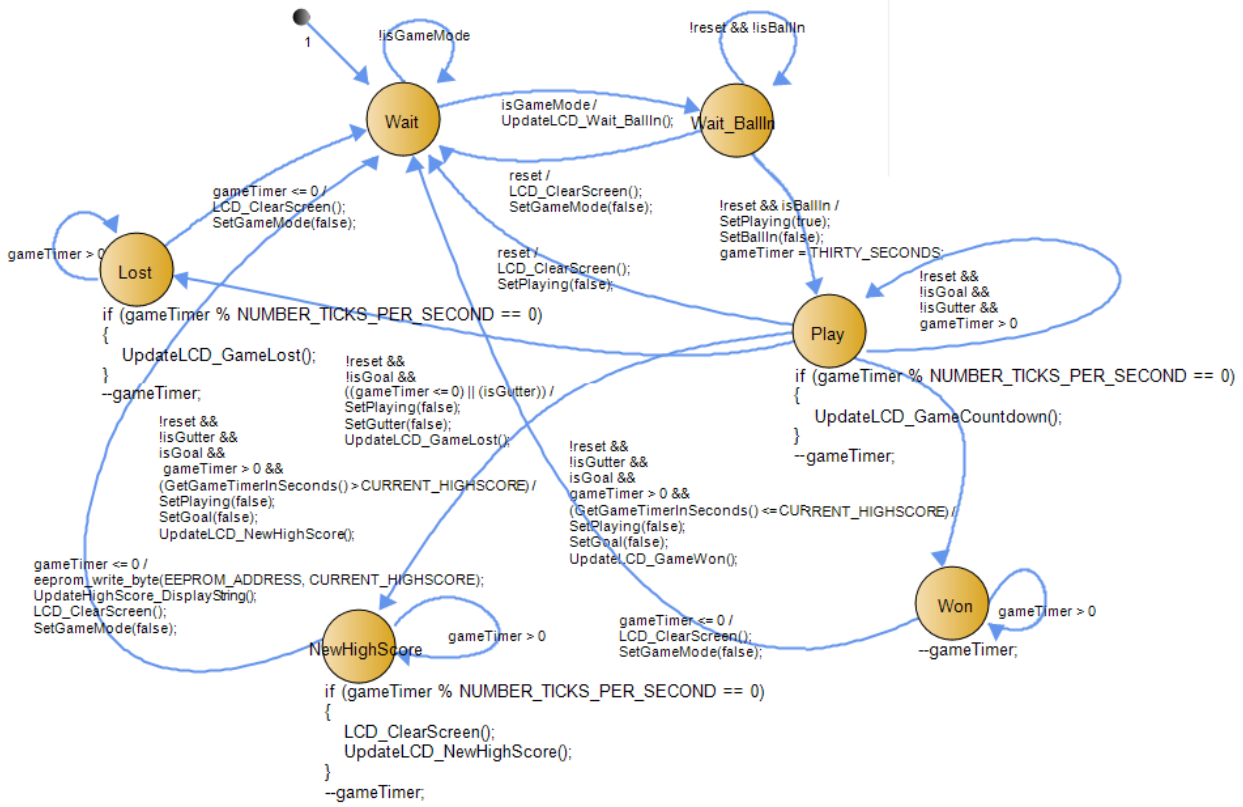
Gutter Infrared Sensor State Machine



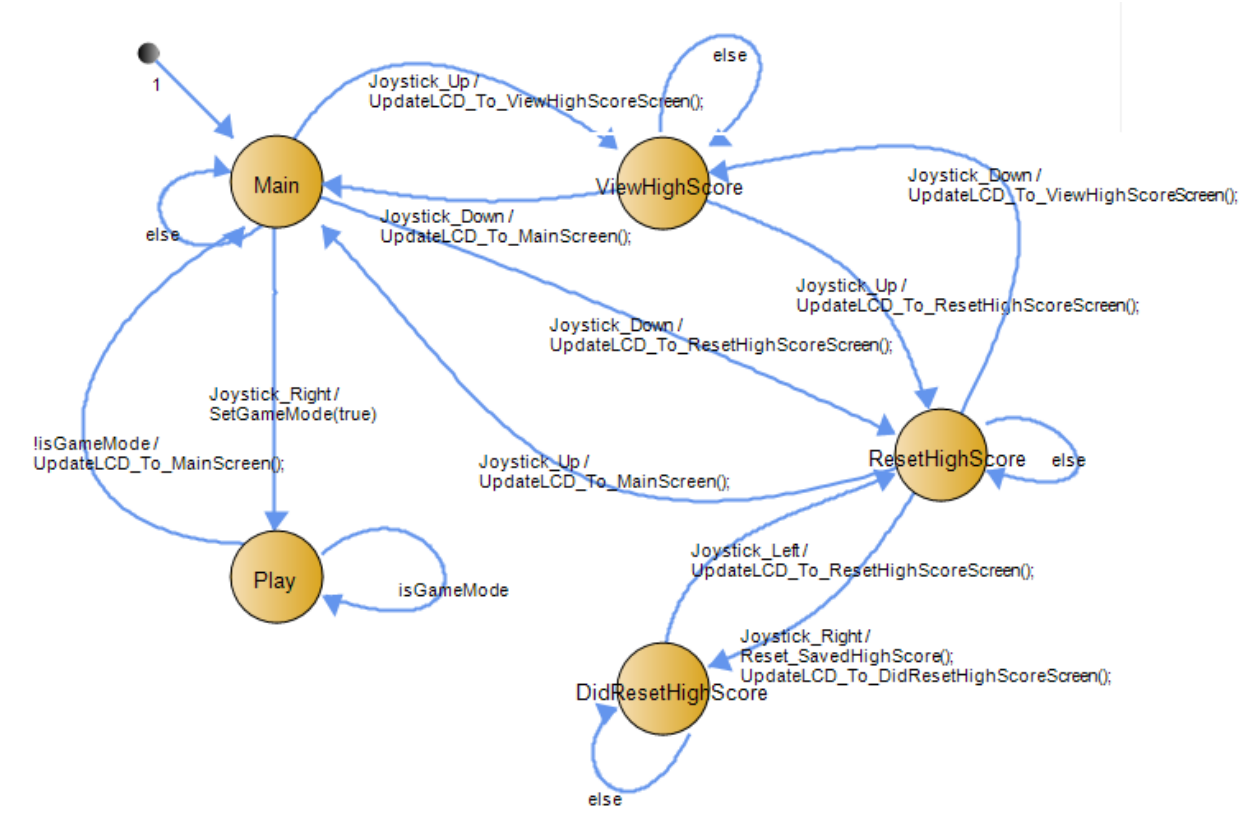
Step Motor State Machine



Gameplay State Machine



Menu State Machine



Complexities

Completed Complexities:

- Integrating and calibrating the joystick
- Integrating and calibrating the step motor
- Integrating and calibrating the infrared sensors
- Using EEPROM to save the high score (minimum time)

Incomplete complexities:

- N/A

Youtube Link

https://www.youtube.com/watch?v=cNTNUxwYy78

Known Bugs and Shortcomings

- When playing the game, sometimes the infrared sensors incorrectly detect that an object has passed in front of them. This is due to the poor construction of the pinball machine. When designing the machine, I was unaware that light affected the infrared sensors. I did not design the machine in a way that the infrared sensors would be completely shielded from outside light. Therefore, when in a well-lit area, the infrared sensors' threshold values will need to be adjusted in the code for them to behave properly. Because of this, the game is best played in a dimly lit room (I designed and built the machine inside the same dimly lit room and only at night which is why I did not catch this problem until it was too late).

Future work

In the future, there are several adjustments I would like to make to my project.

1) Re-design the machine such that the infrared sensors will be properly shielded from outside light.
2) Replace and upgrade the mechanical flippers by either changing their design to one that is more robust and durable, or using solenoids to power the flippers.