



Trinity College Fire-Fighting Robot Competition

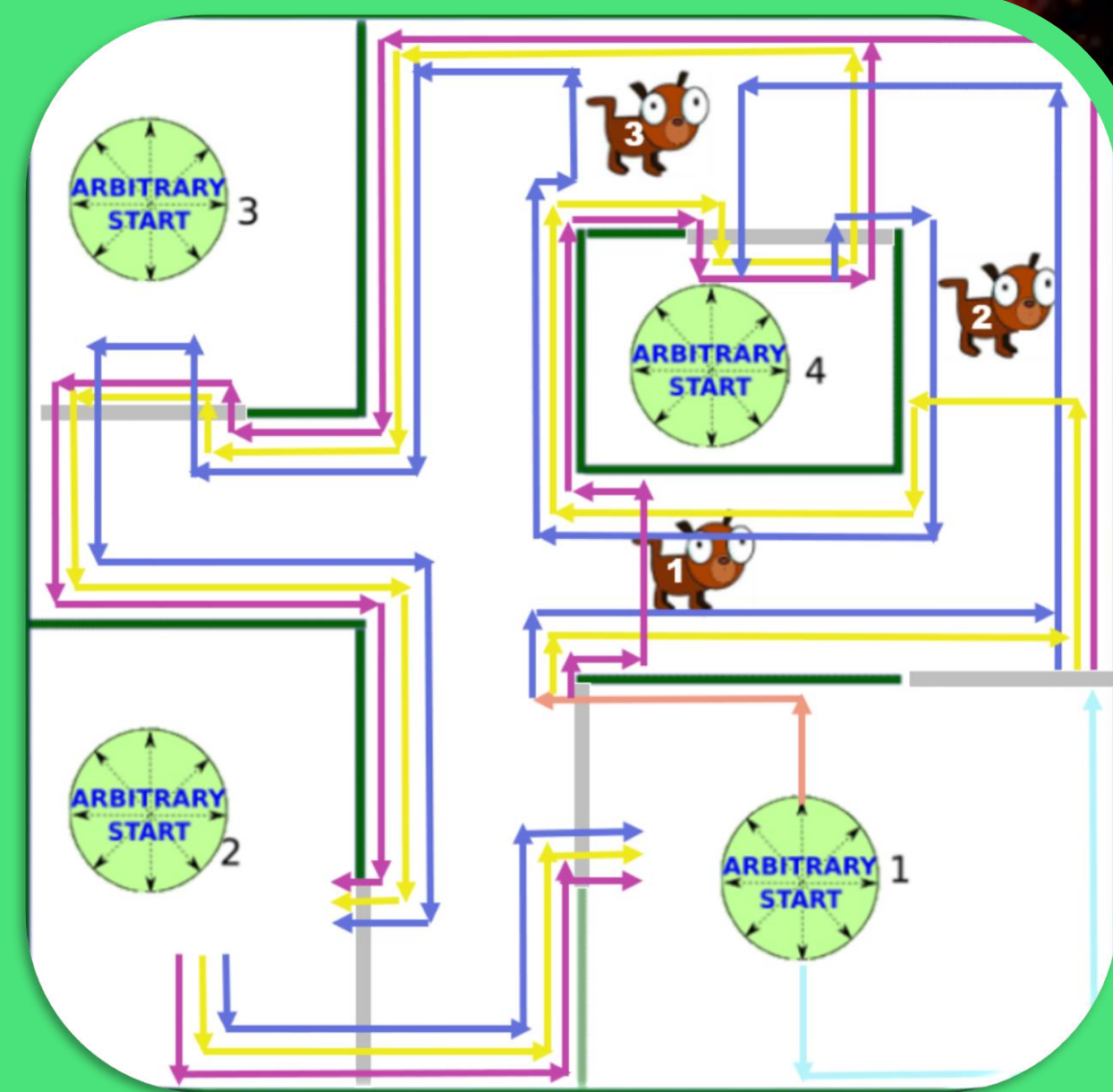
Conner Sheets, Electrical Engineer

Jared Sutphin, Electrical Engineer



Abstract

The Trinity College Fire-Fighting Robot Competition requires robots to be autonomous with a goal of reducing the risk of lives when putting out fires. The competition tests each robot by requiring them to be adaptable to different maze layouts that are house replicas. The trials are started upon detection of a 3.8 kHz tone intended to resemble a fire alarm. The robot must then maneuver through the maze, searching for the flame, and extinguish it for a successful trial.

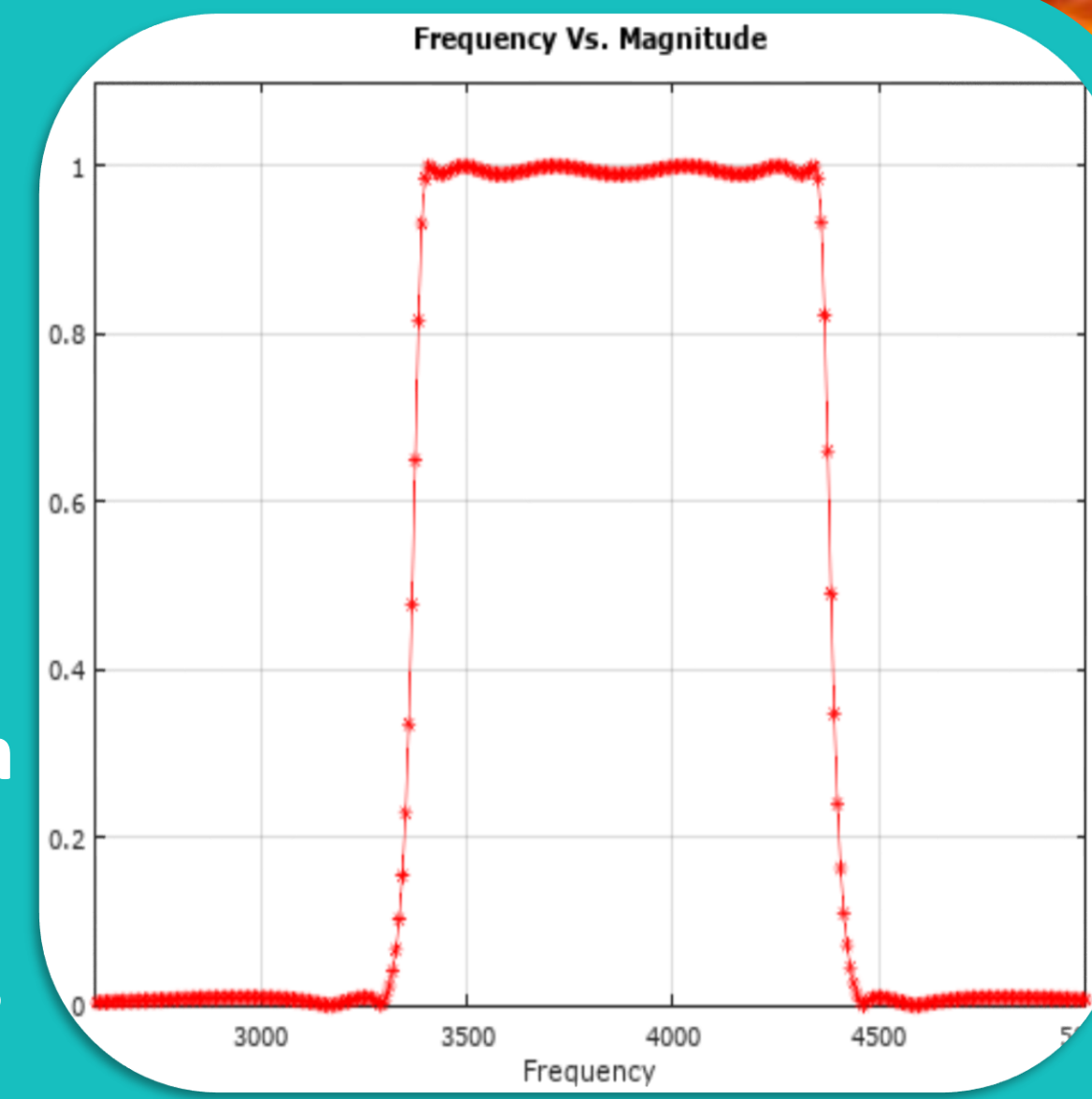


Maze Layout with Paths

Problem Description

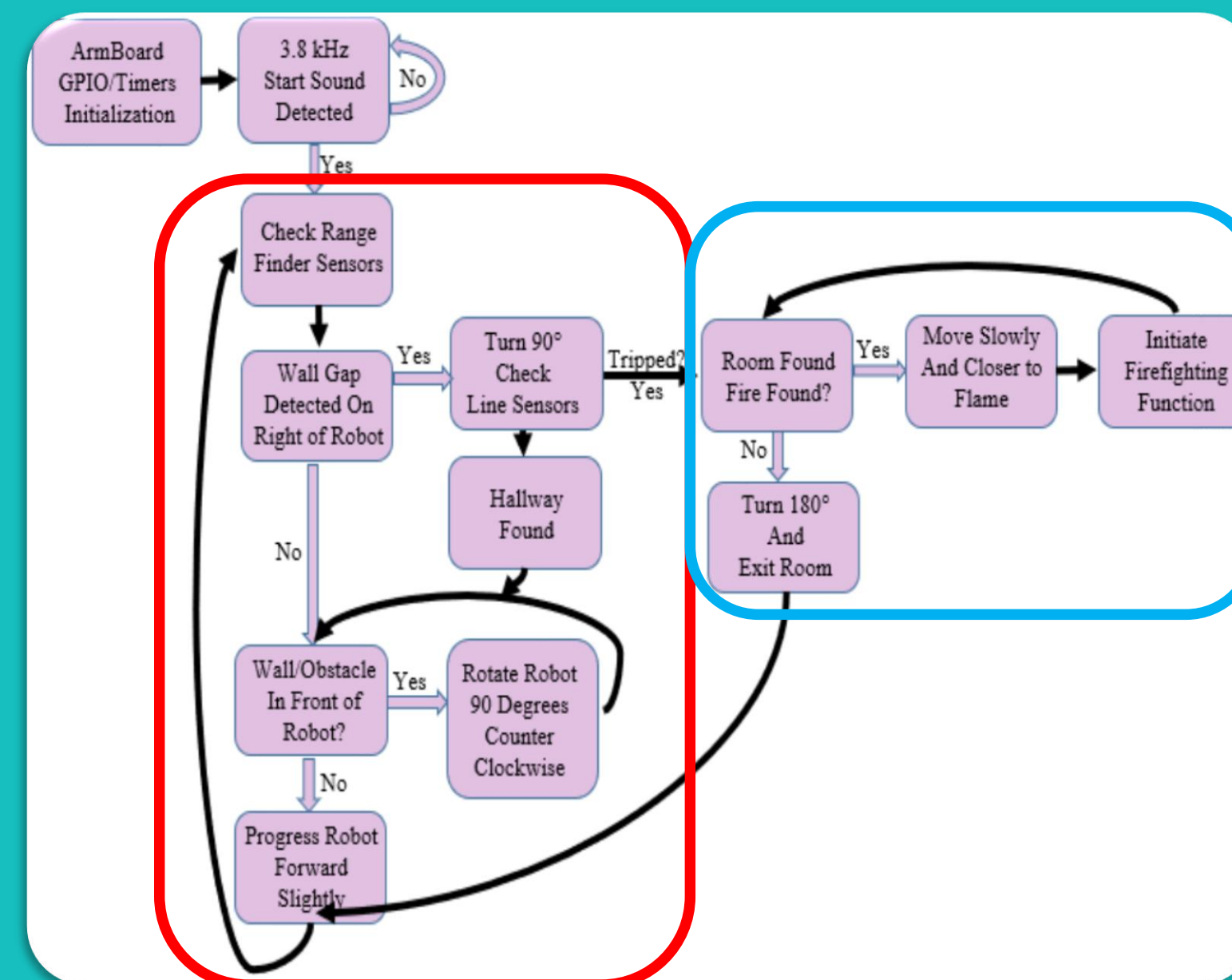
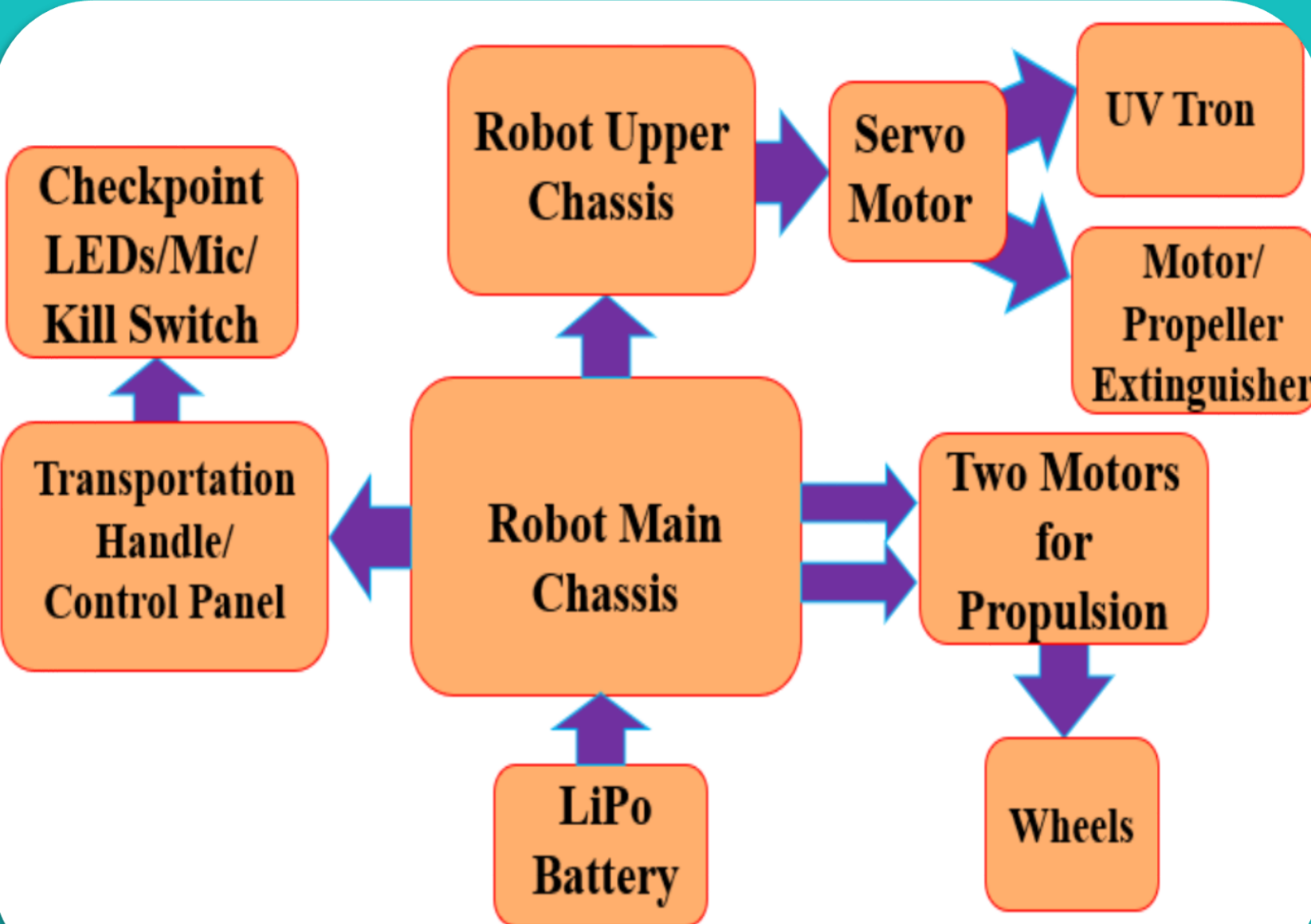
Robot must be able to accomplish the following:

- Recognize and start upon detection of a 3.8kHz +/- 13% start tone
- Autonomously navigate the maze within the allotted time limits while avoiding obstacles
- Locate a fire source within the maze and extinguish
- Function with battery power
- Adapt to different scenarios and maze orientations



Digital Bandpass Filter

Hardware and Software Flow Diagrams

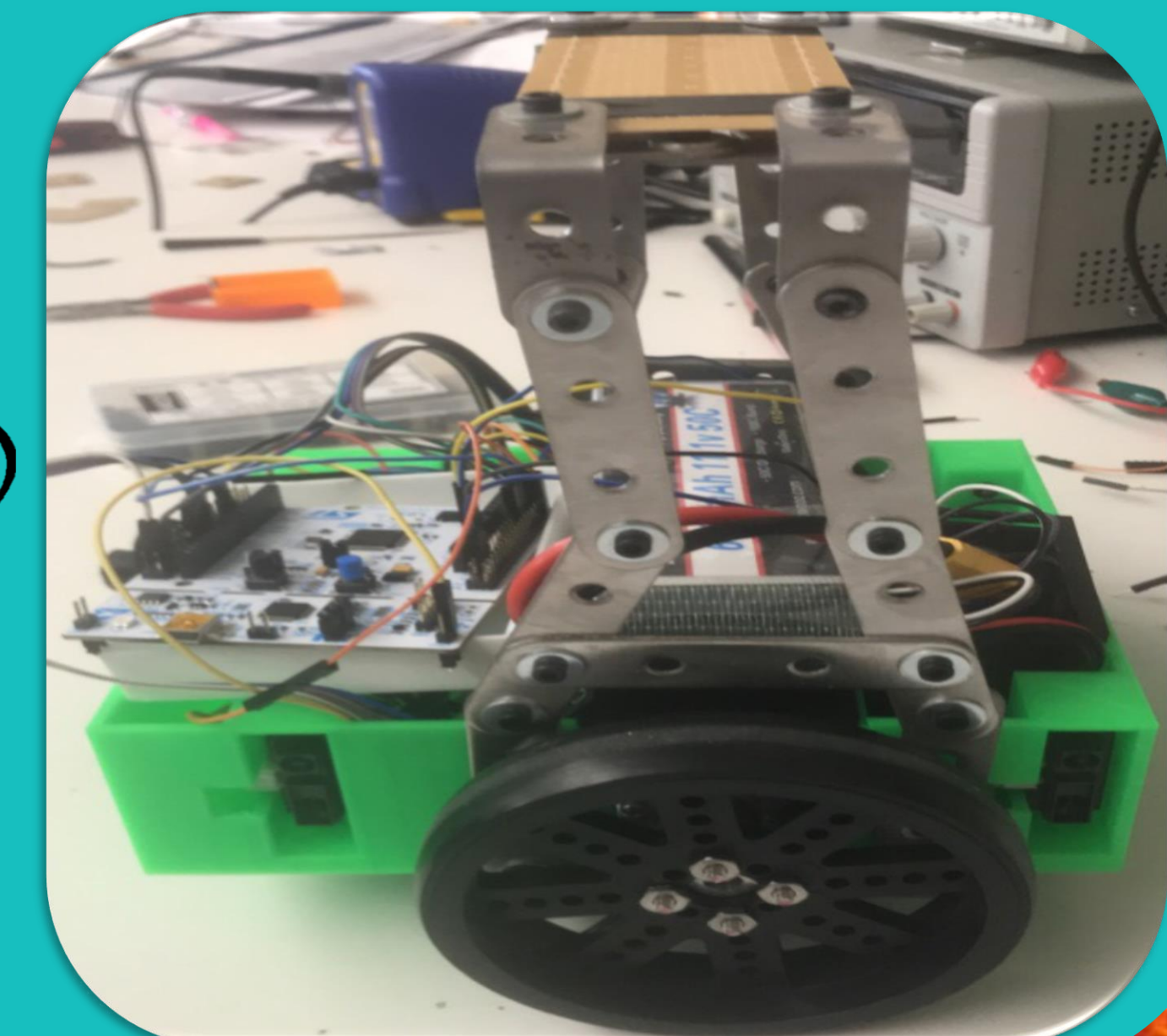
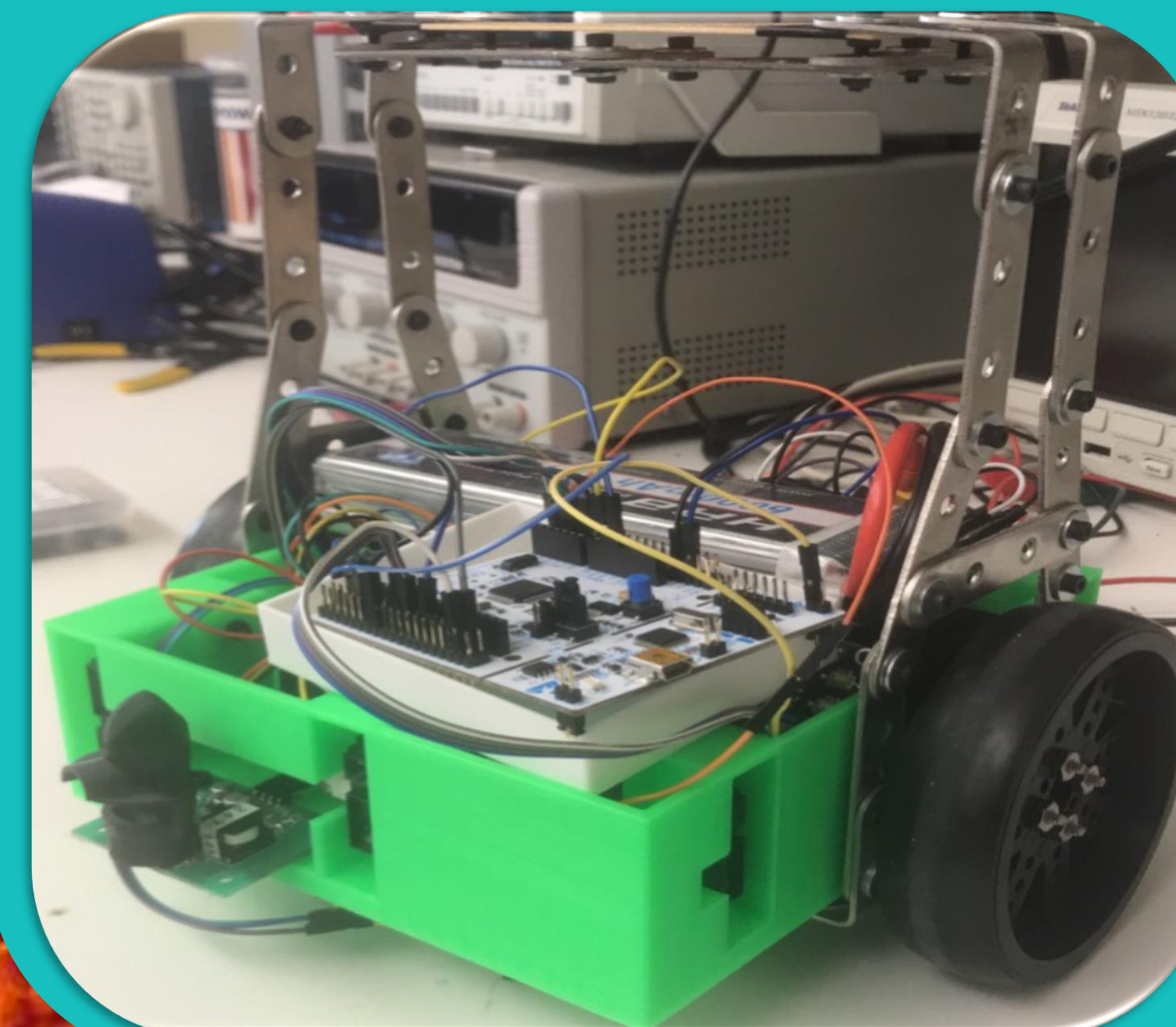


Conclusion/Results

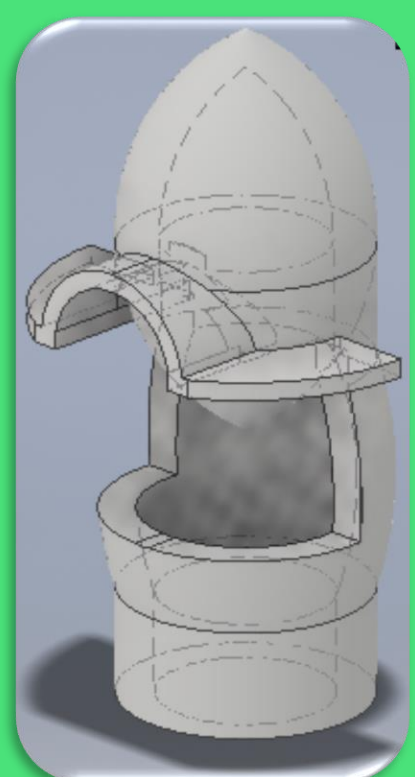
The Firefighting Robot is able to accomplish the following:

- Start within a room and exit earning the arbitrary start multiplier
- Detect a 3.8 kHz tone using a 6th order elliptic bandpass filter
- Navigate the maze utilizing a right wall following algorithm
- Detect when a room has been found
- Recognize if a fire has been found within the room
- Home in on fire location within room and extinguish

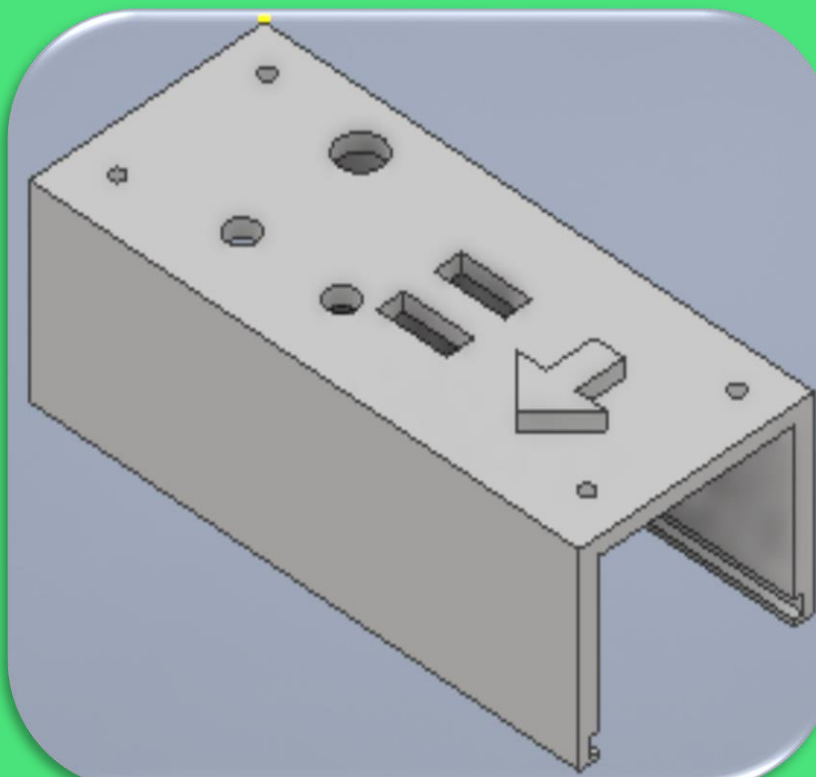
The Firefighting Robot



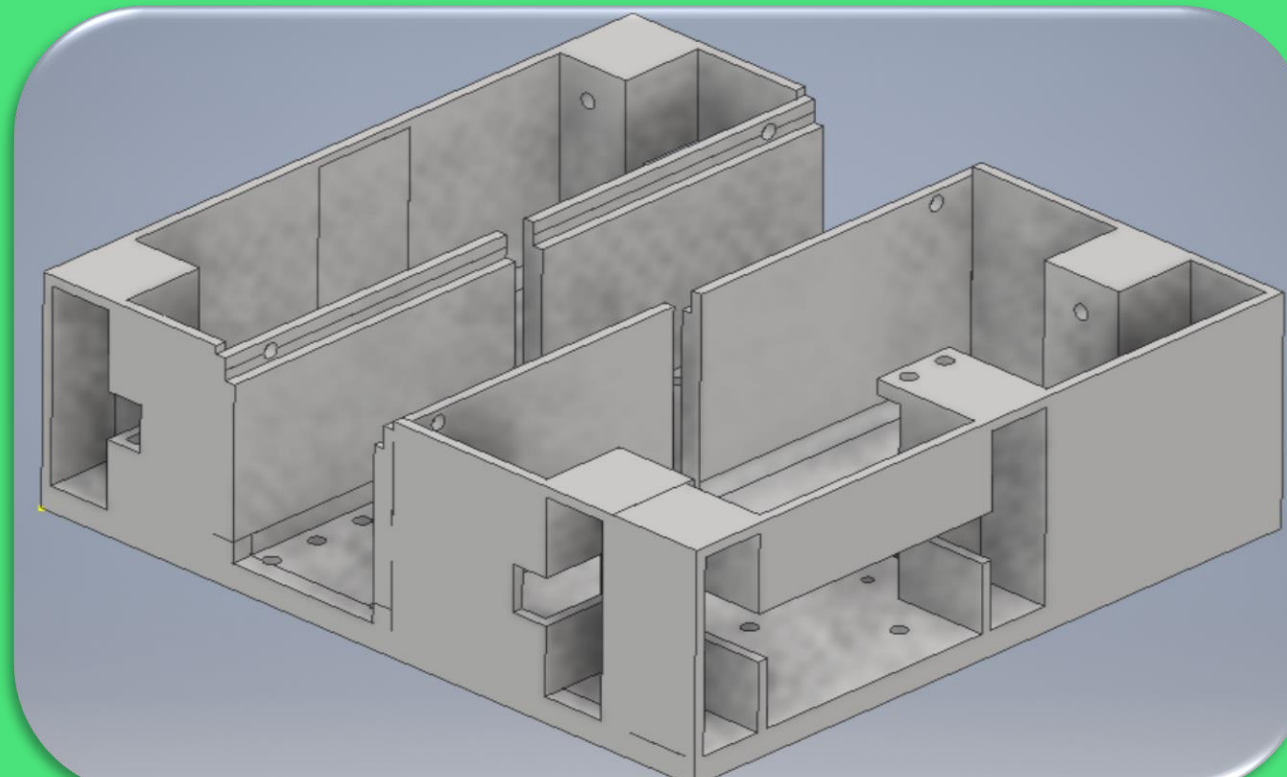
3-D Designed Components



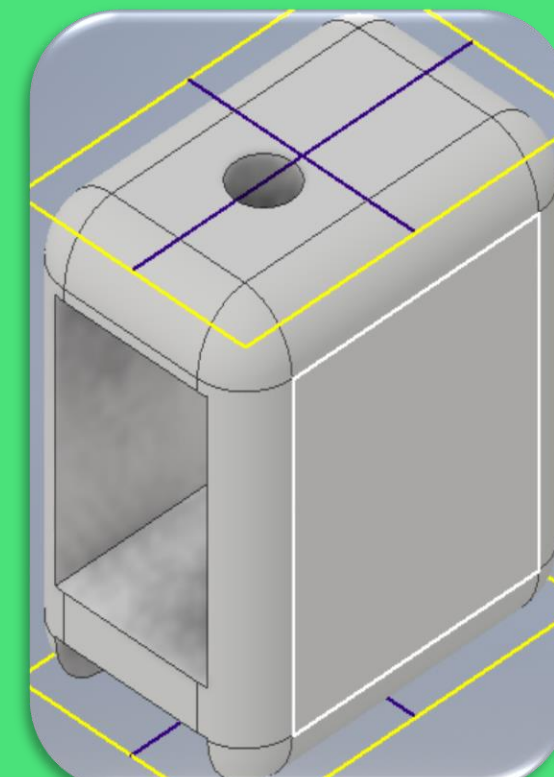
UVTron Cover



Carrying Handle Cover



Robot Chassis



Line Sensor Holder