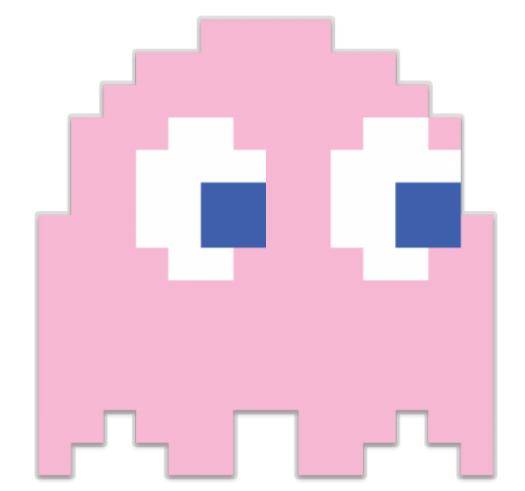


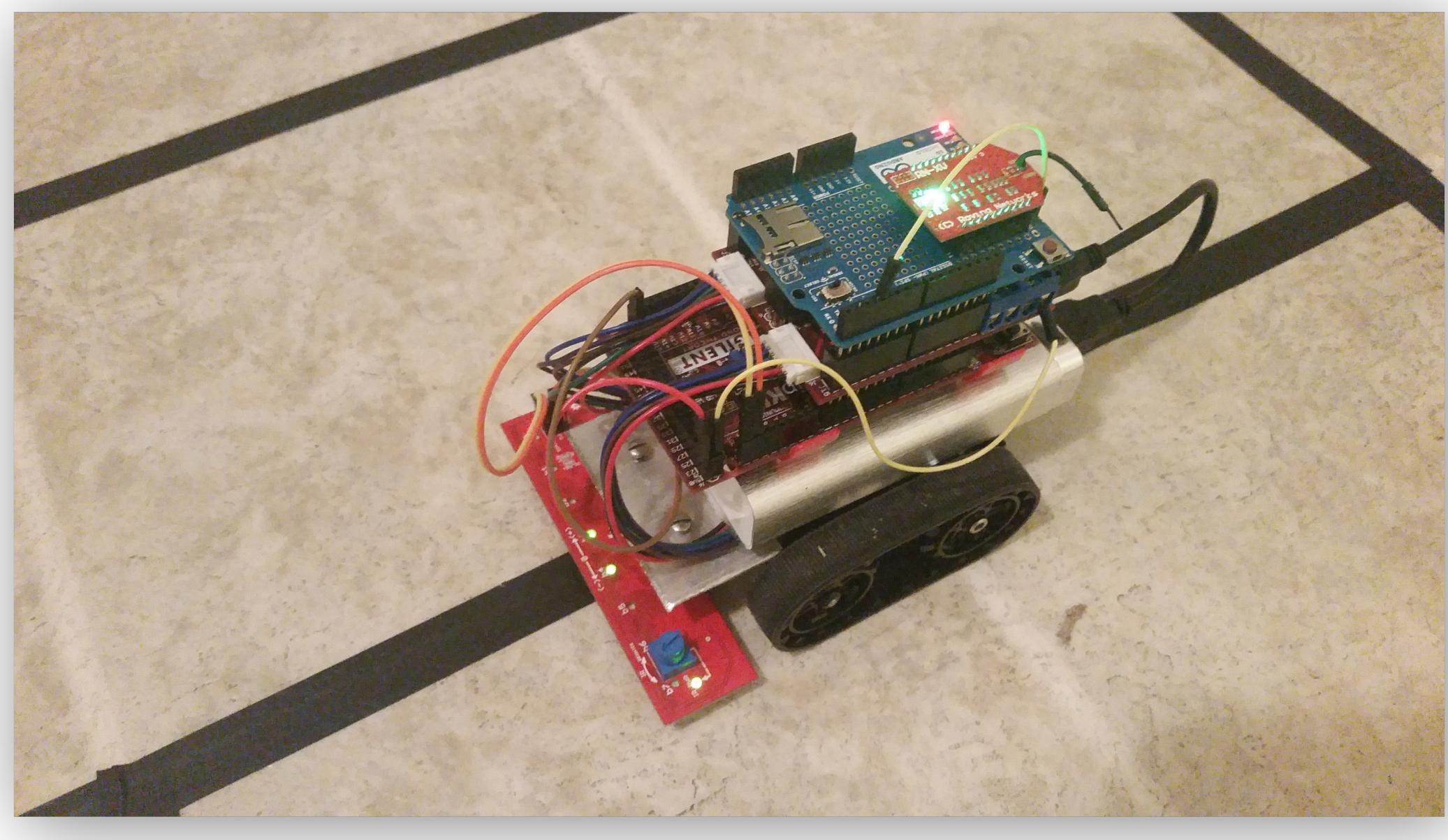
PACMAN v. GHOST

By: Andrew Bryant, Danny Dutton, Ben Singleton, John Spataro

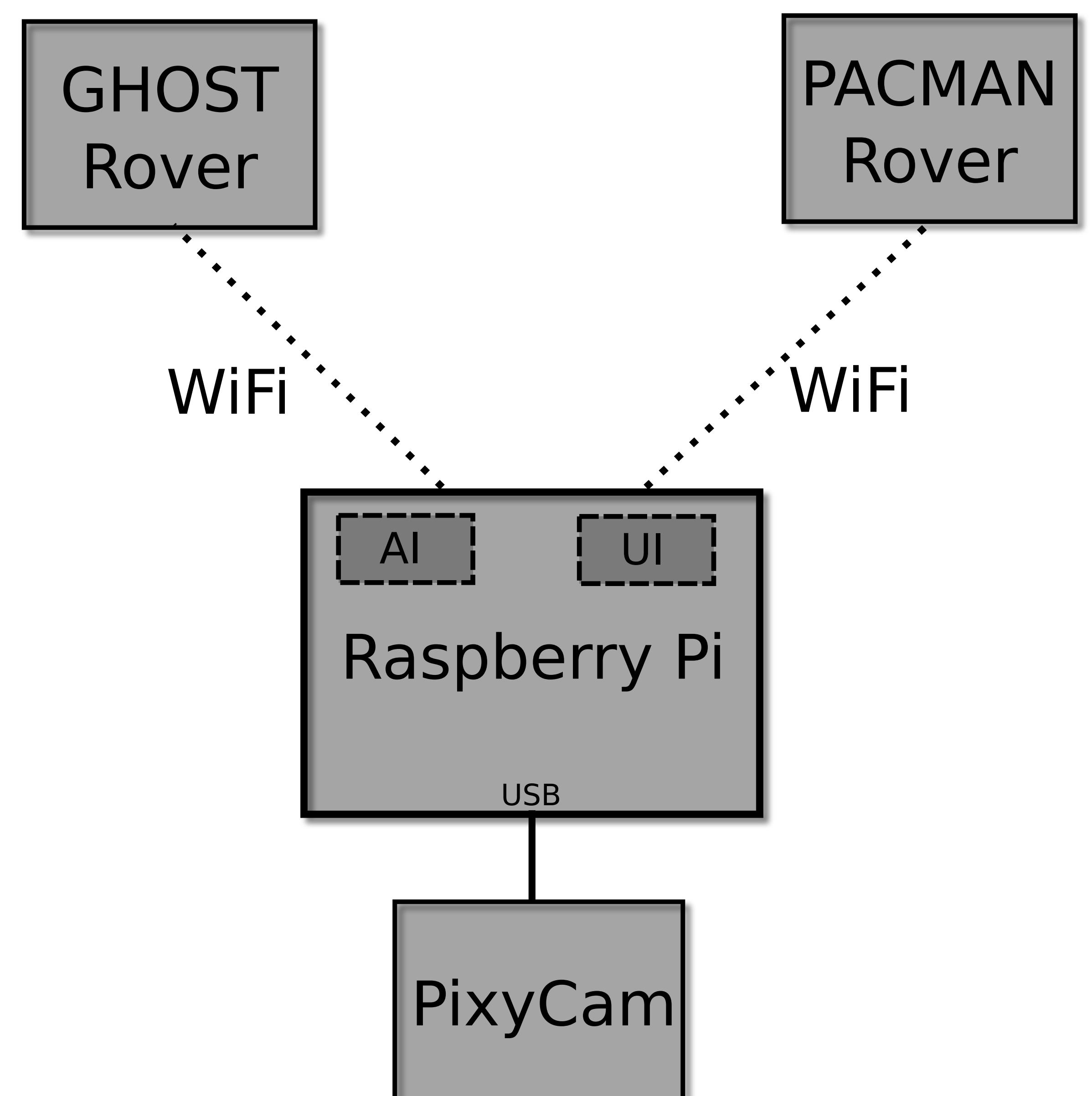


Project Idea

The concept behind this project was to create a playable game of Pacman using two rovers. One rover would be controlled by a user (Pacman), and the other rover controlled by an AI engine (Ghost). A player would begin the game and control the direction of Pacman as it followed a pre-determined line-based maze. The Ghost would attempt to find and intercept Pacman, thus ending the game.



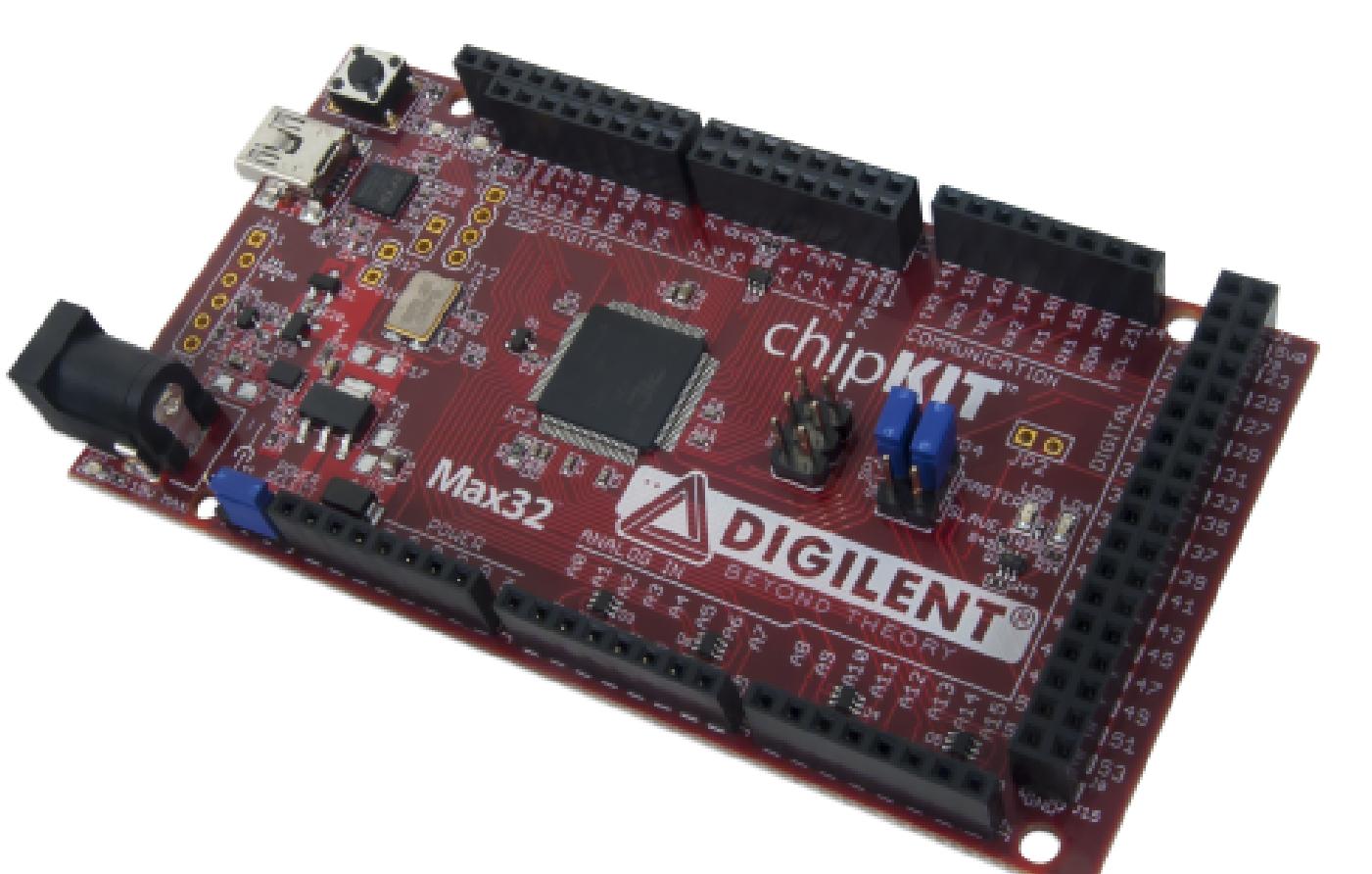
System Diagram



Technologies

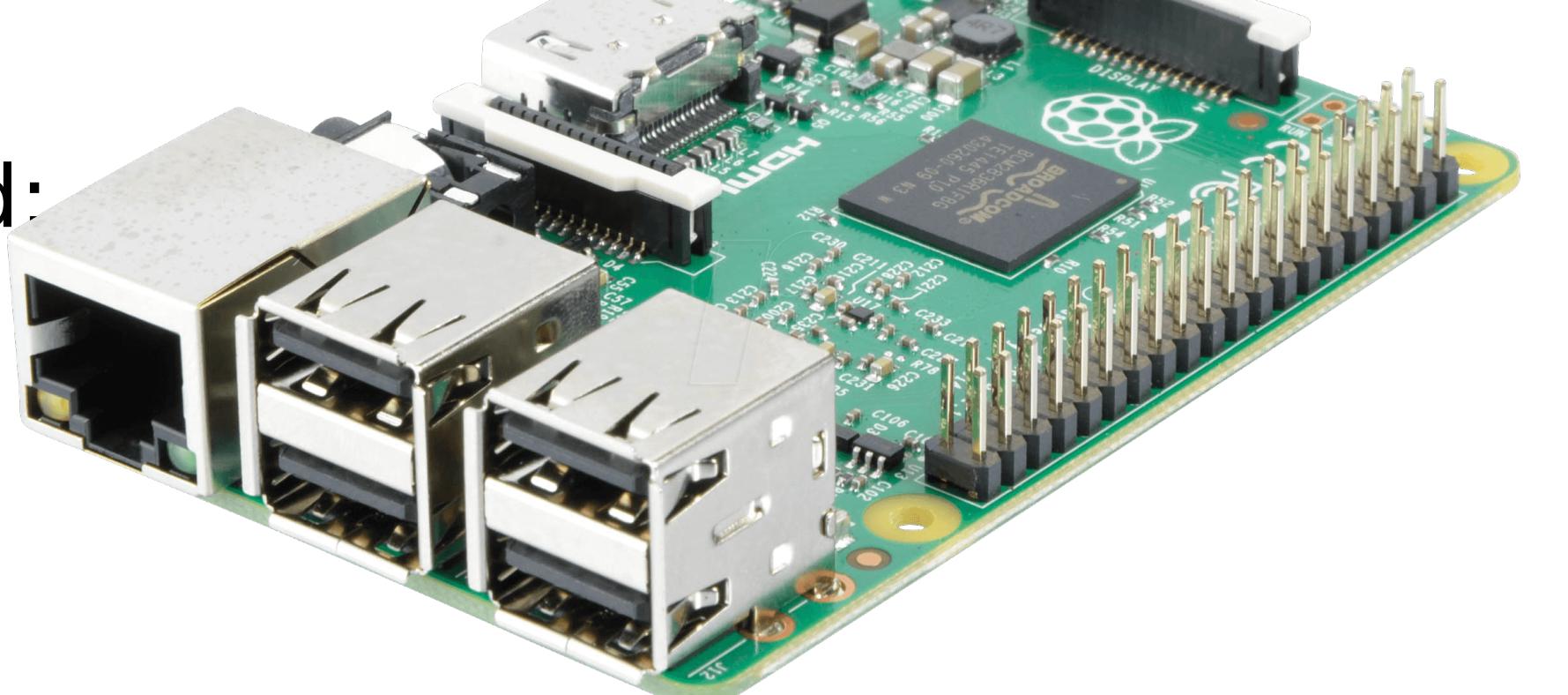
The primary physical technologies for this project included:

- 1) PIC32 Microcontroller (ChipKit Max32)
- 2) ChipKit Motor Shield and Arduino Wireless Shield
- 3) Raspberry Pi Mini-computer
- 4) WiFi Wireless UART
- 5) PixyCam DSP Color-tracking Camera



The primary software technologies for this project included:

- 1) MPLAB-X and FreeRTOS (C)
- 2) Python 2.7 and PyQt4
- 3) Linux flavor "Raspbian" (Debian for ARM)



Major Software Components

PixyCam Monitor and AI

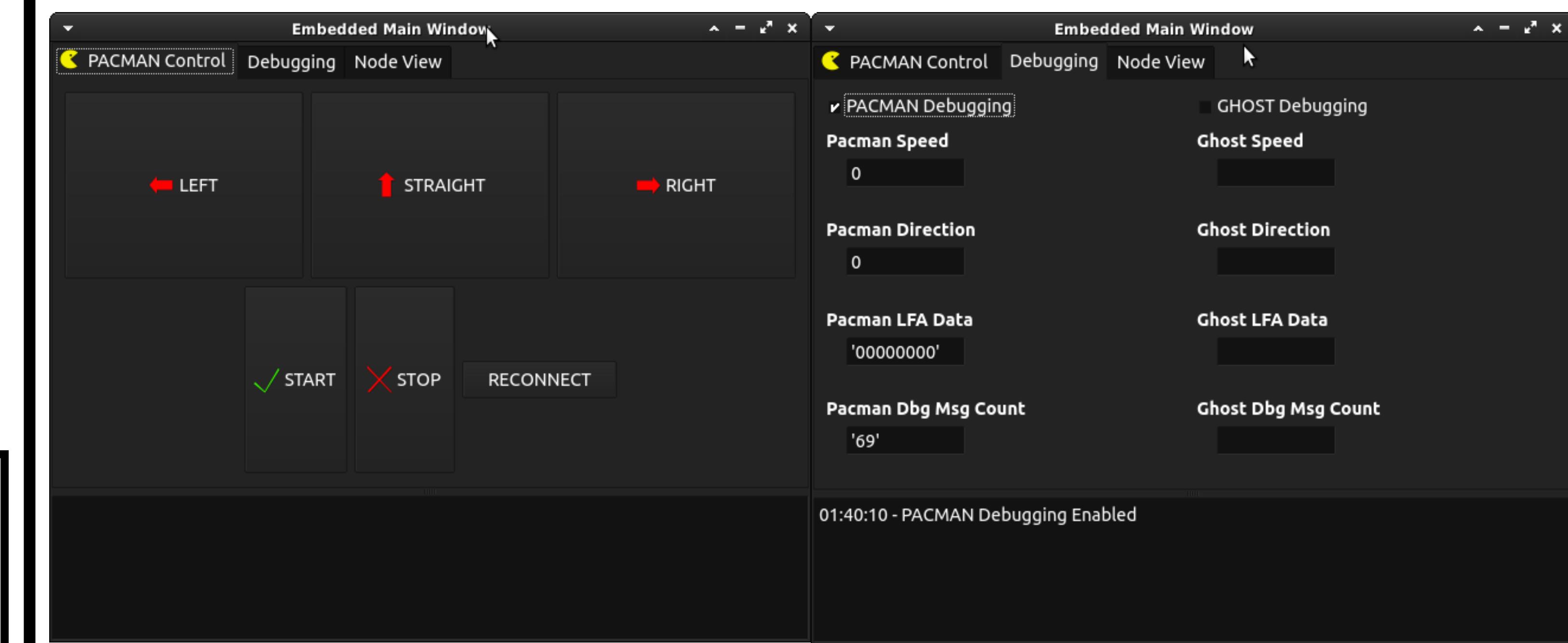
The component responsible for determining the locations of each rover on the maze/field and deciding a new route for the Ghost rover using a breadth-first search algorithm.

Rover Control

A FreeRTOS-based, task-driven control system written for the PIC32 which incorporated communication protocols and line-following algorithms providing a framework for the rover to be controlled remotely and navigate the maze.

User Interface

A simple, intuitive user interface that allows for control of the Pacman rover as well as reading debugging information from the AI engine and each rover.



Results

Operation of the Pacman rover was a success. The rover was easily controlled by a user and followed the maze without leaving the bounding area.

The AI engine was mostly able to calculate a shortest path for the Ghost rover given very specific input data. Because of the sensitivity and quirks of the PixyCam color capture, getting accurate readings proved very difficult, and affected the game performance of the Ghost rover significantly.