

Spider Robot

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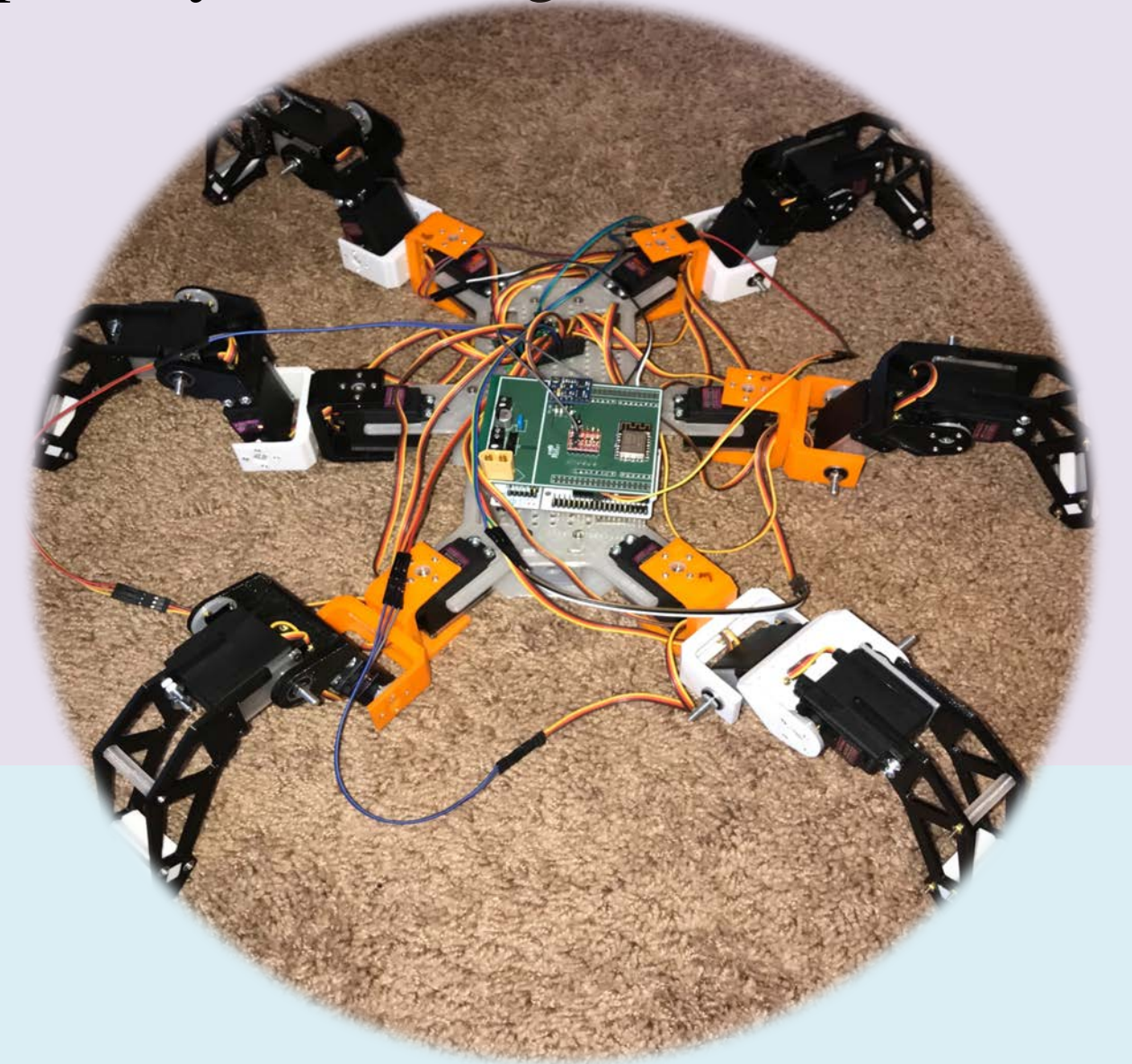
Advisor: Dr. Blandford

Abstract:

The goal of this project is to create a robot that has the ability to navigate terrain that is impassable for most other land vehicles. Spider robot style was chosen due to the natural of spider movements and its capability of moving around regardless of the terrain it's facing.

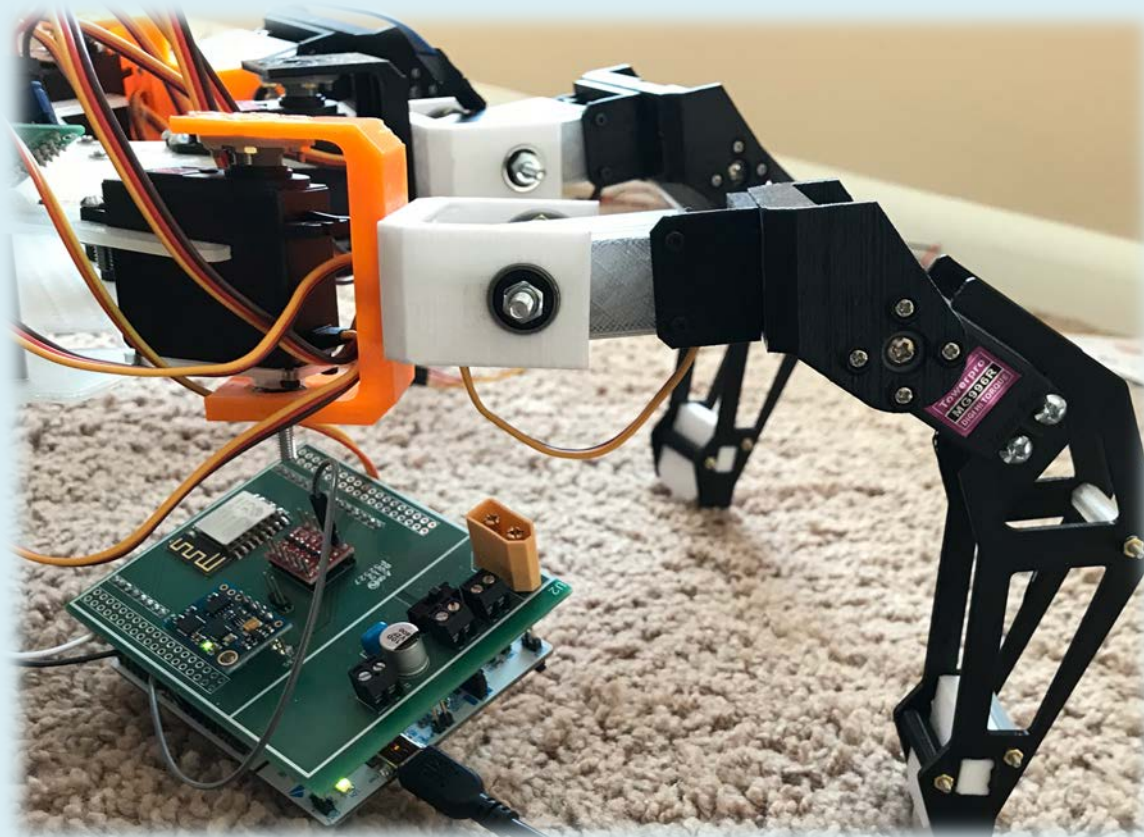
Features:

- Ability to walk and rotate smoothly
- Android app to steer the robot via Wi-Fi communication
- Able to navigate through rugged road
- Charging system built in

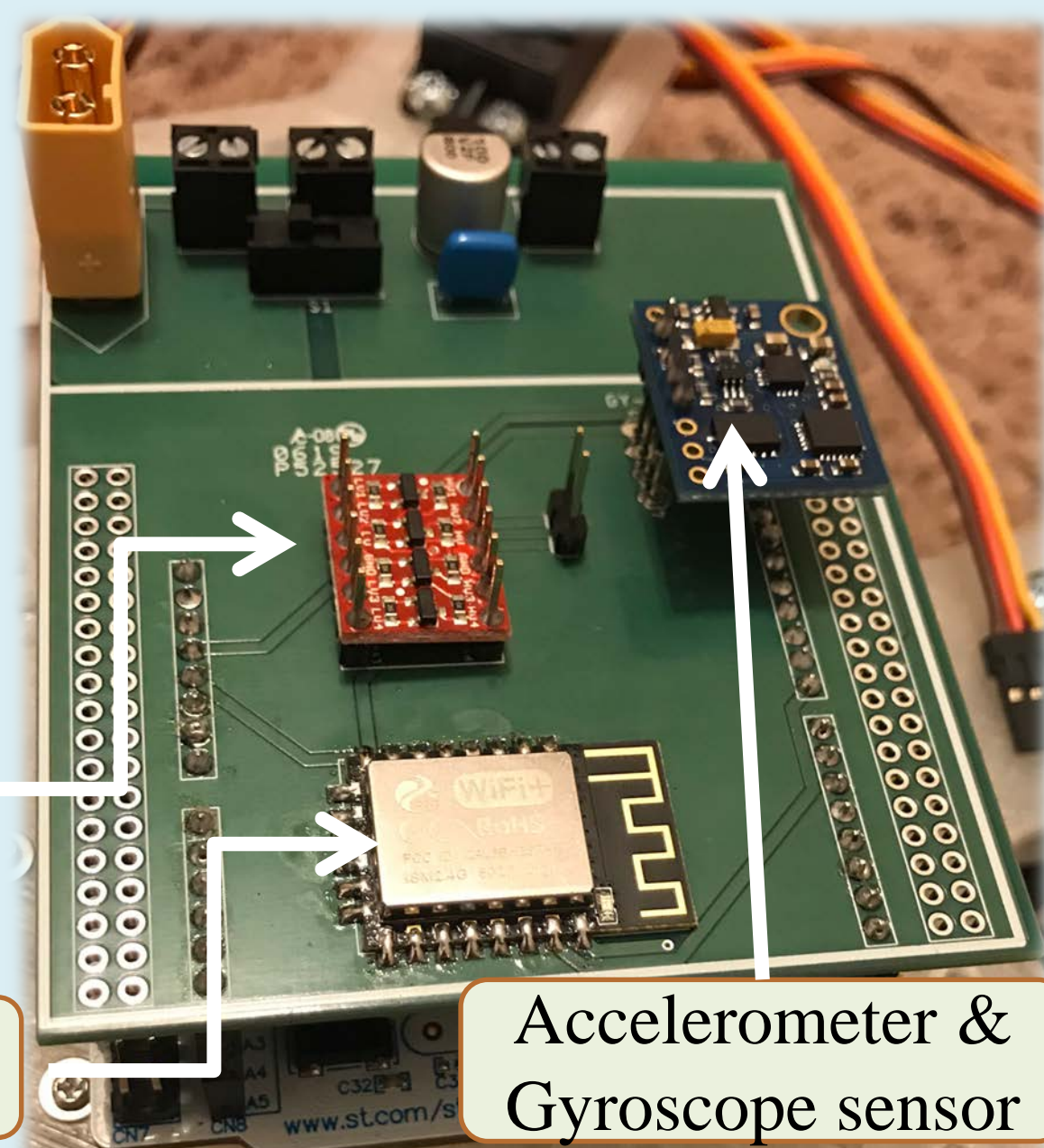
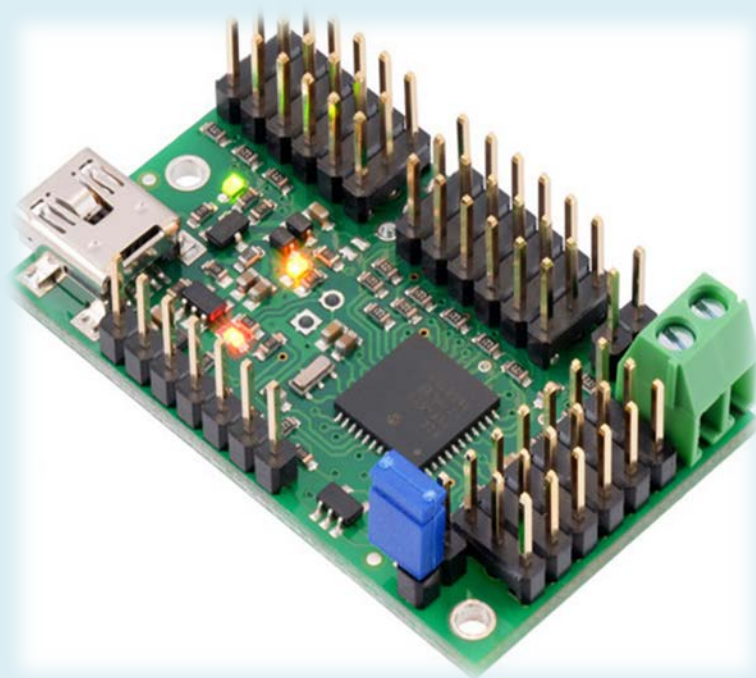


Hardware

- Uses STM32F446 which use ARM Cortex-M4
- SOLIDWORKS software used to design the 3D parts
- Each leg of the robot has 3 joints to allow 3DOF
- Total of 18 servos



PCB circuit along with Maestro servo controller board used to drive the logic and to control all 18 servos.

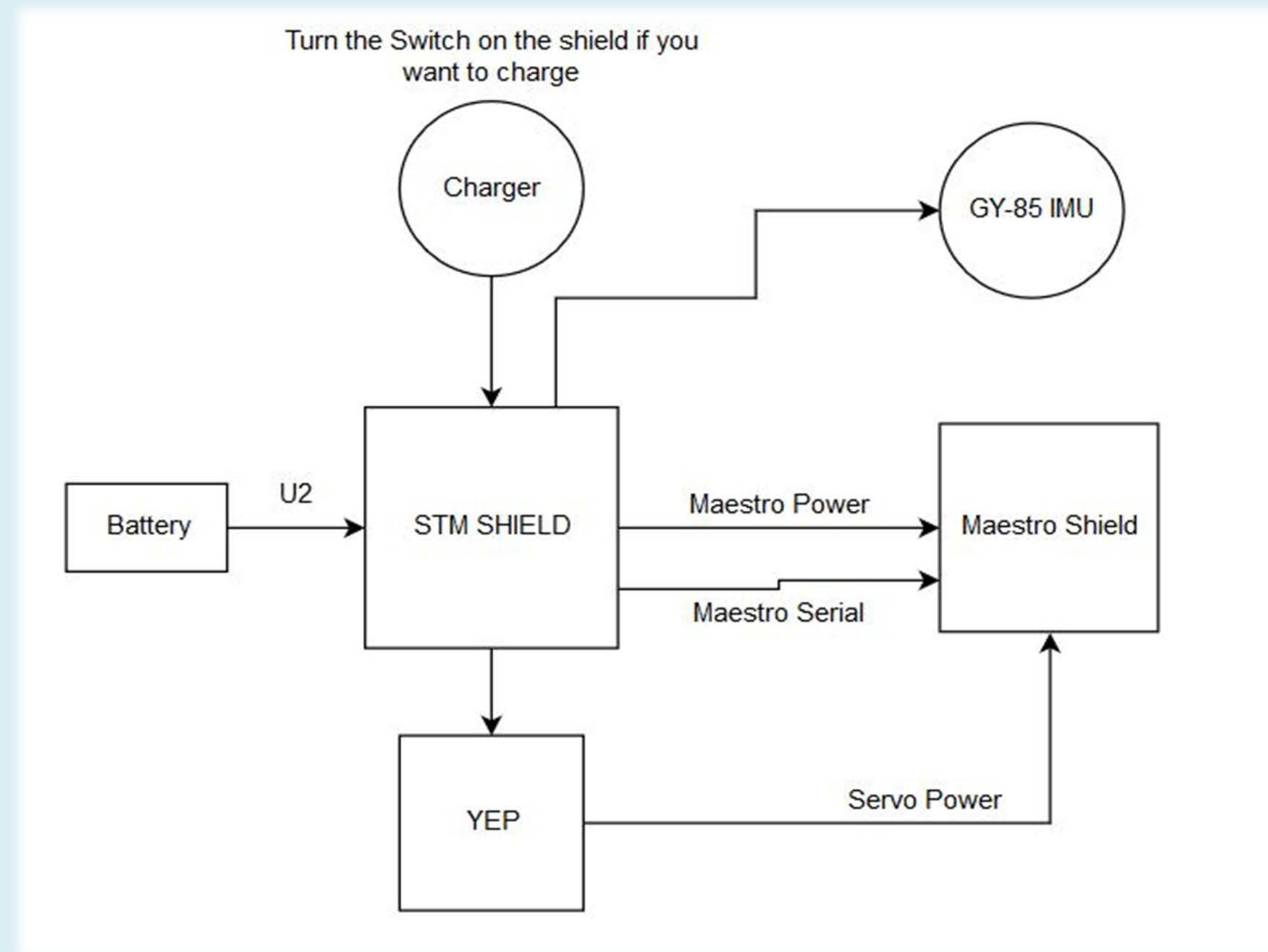


Design

Software

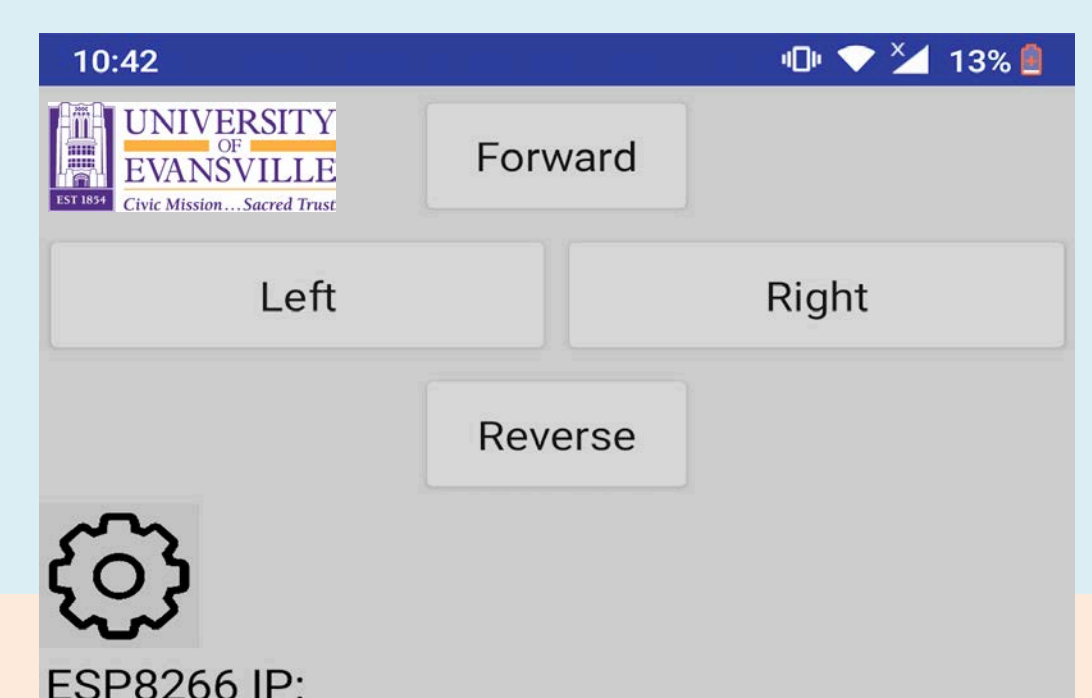
- Each servo is controlled by a PWM signal
- Each servo is connected to the servo driver board with 18 channels
- Software identifies the 0 position when each leg starts to touch the ground

Simple schematic of the software process



Android App

Inventor for Android used to make an application to steer and control the robot via Wi-Fi. ESP32 chip enables the user to integrate Wi-Fi communication in the system.



Results:

This project successfully satisfies the minimum client requirements. The android app is steering the robot via Wi-Fi communication. The PID tuning of servos is well working, and the robot is able to smoothly walk and rotate. The robot passed the test of walking through rugged road.