Beacon Tracking Using ESP32

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***Abstract*—This document is a report which demonstrates the use of machine learning in beacon tracking using an unmanned ground vehicle (UGV) and a WiFi-enabled microcontroller such as the ESP32.**

1 Assets

1) UGV chassis with DC motors
2) ESP32 microcontroller with Type-B USB cable
3) L293D Motor Driver IC
4) Breadboard and Jumper Wires
5) Android phone
6) (Optional) USB 2.0/3.0 Hub

2 Procedure

1) Make the connections as per the wiring diagram in Fig. 1.
2) Connect the ESP32 board to your Android Phone.
3) Generate the firmware by entering the following commands.

```
$ cd codes
$ pio run
```

4) Go to ArduinoDroid and select

```
Actions → Upload → Upload Precompiled
```

and choose the firmware file at

```
codes/.pio/build/firmware.hex
```

5) Now put the phone at a reasonable distance from the UGV with no obstacles in the way and then turn on the hotspot. The UGV should travel towards the phone and stop near it.

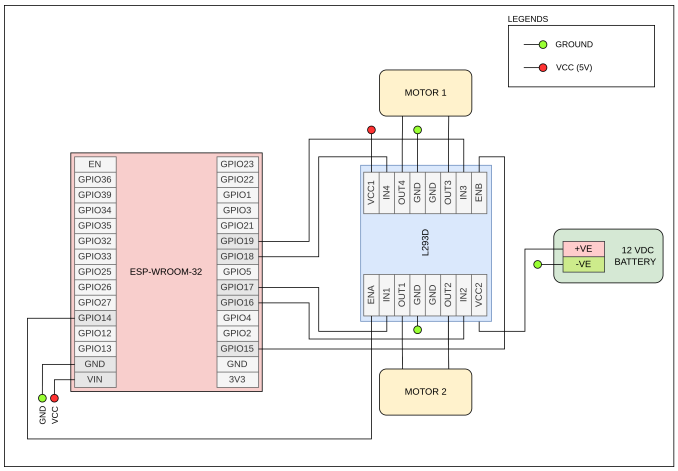

Fig. 1: Wiring Diagram for Beacon Tracking.

3 Observations

1) The UGV eventually converges close to the beacon (here, the hotspot).
2) However, if there are a lot of nearby obstacles, the UGV may not converge close to the location of the beacon. It may either get physically blocked by the beacon or the signal interference may be too high.