Robot Navigation using Beacon Tracking

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1.1 Components

https://github.com/ka-raja-babu/
Beacon-Tracking-for-Robot-Navigation/blob/
main/Component%20list.pdf

1.2 Wiring Diagram

https://github.com/ka-raja-babu/
Beacon-Tracking-for-Robot-Navigation/blob/
main/Wiring%20Diagram.pdf

1.3 Codes

1.3.1 ESP32 code:

1) Connect the ESP32 board to Laptop/PC using Type-B USB cable.
2) Open the ESP32 Code in Arduino IDE.
3) From Tools menu, select suitable "Board" and "Port" for your ESP32 board.
4) Compile the code by clicking on "Verify" option.
5) Upload the code to ESP32 using the "Upload" option.

1.3.2 Arduino code::

1) Connect the Arduino uno board to Laptop/PC using USB cable.
2) Open the Arduino Code in Arduino IDE.
3) From Tools menu, select Board as "Arduino Uno" and suitable "Port" on which the Arduino board is connected.

4) Compile the code by clicking on "Verify" option.
5) Upload the code to ESP32 using the "Upload" option.

1.4 Working

1) Initially, ESP32 mounted on the robot will read RSSI (Radio Signal Strength Indicator) levels in forward, right and left direction by suitable in-place rotation.
2) Average of 20 RSSI values are taken while measuring RSSI level in a particular direction. This is done in order to read accurate RSSI levels.
3) The robot then rotates towards the direction having the highest RSSI level.
4) Further, It moves forward with a distance depending on the free space available in front of it. The free space in front of the robot is measured using ultrasonic sensor.
5) By repeating above steps again and again, the robot navigates towards the beacon.

1.5 Observaion / Conclusion

1) This algorithm based on beacon tracking is successful in navigation of arduino based robot. This technology makes robot navigation quite easy to use as well as power efficient.
2) However,this algorithm is not fully efficient.Frequent left and right rotations are required to identity the direction having the maximum RSSI level.
3) Using this algorithm, only 60-70 percent of the time (i.e. 60-70% Accuracy), the robot rotates and moves towards the correct direction. Due to low accuracy,the robot may take time to reach till the beacon.
4) This algorithm can be further optimized using any optimisation technique to increase accuracy level for navigation .
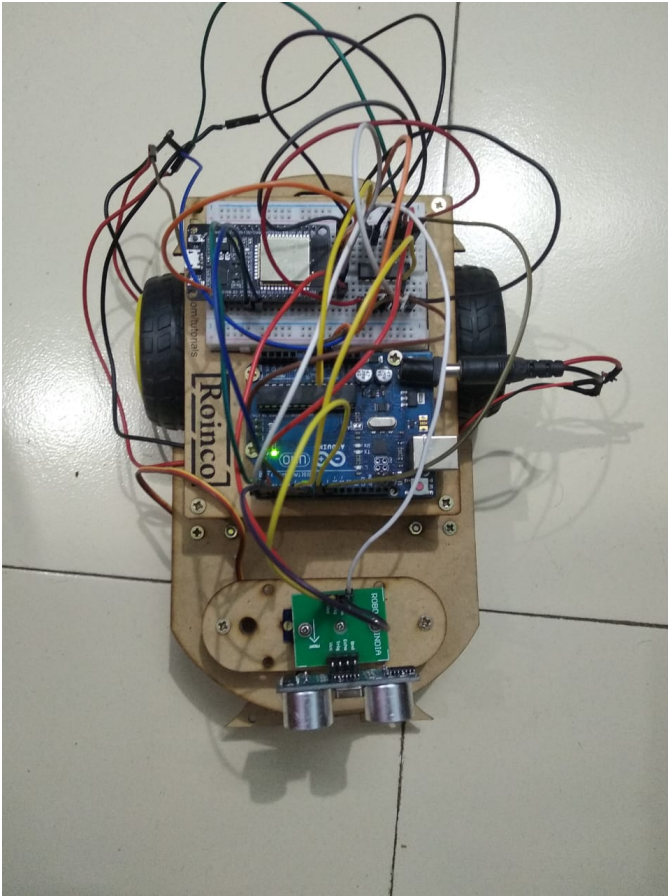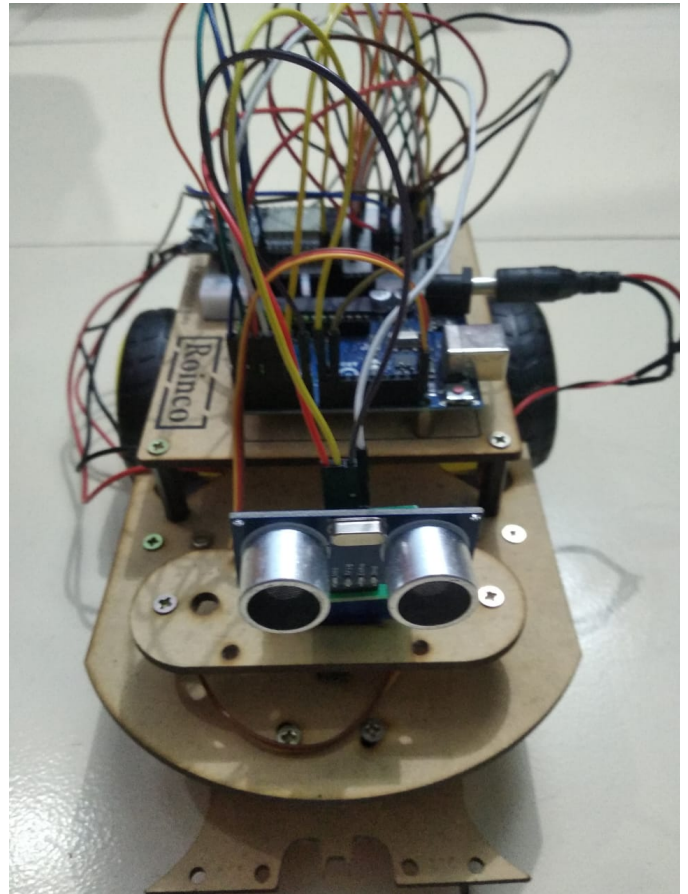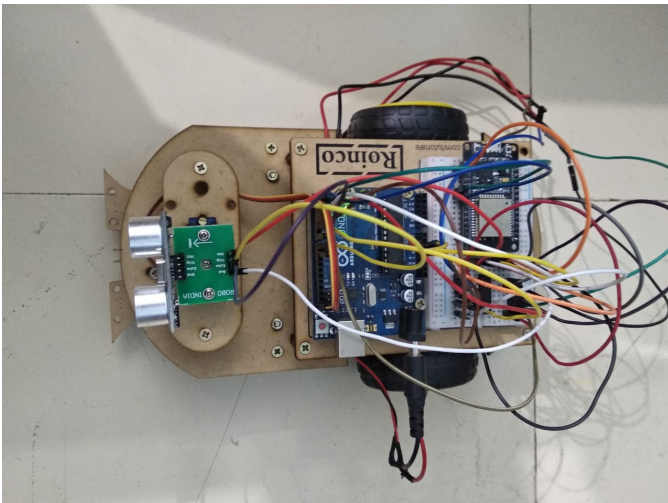
1.6 *Images*

Fig. 1.1: Image 1

Fig. 1.2: Image2

Fig. 1.3: Image3