

Robot Navigation using Beacon Tracking

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1 ALGORITHM

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 car 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 car 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 car is measured using ultrasonic sensor.
- 5) By repeating above steps again and again, the car 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 identify 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

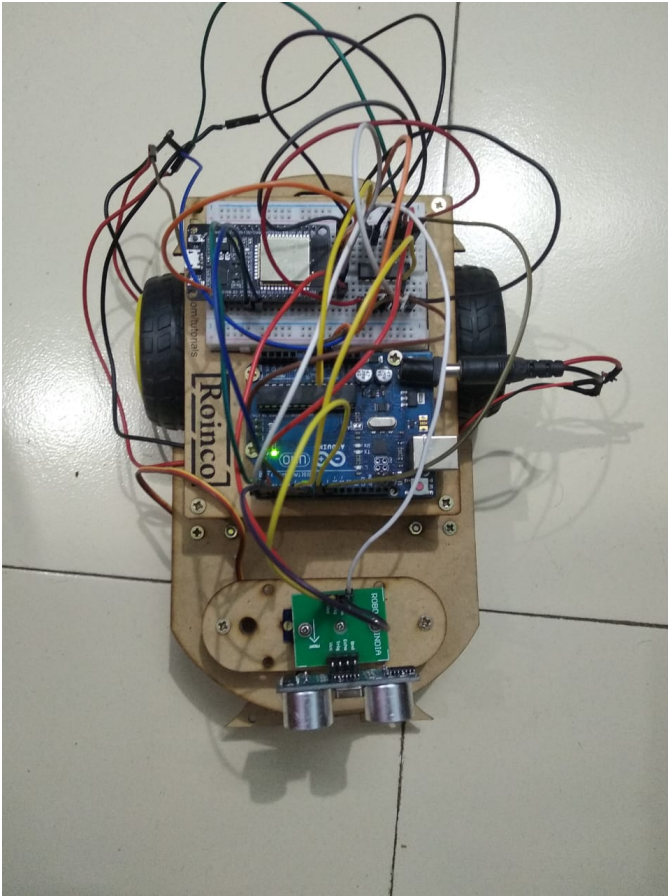


Fig. 1.1: Image 1

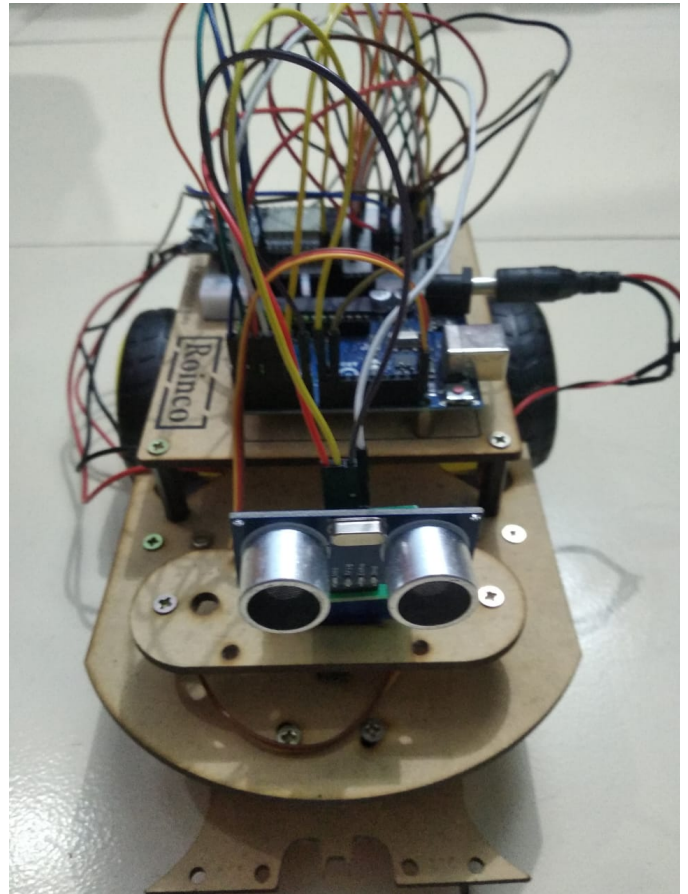


Fig. 1.3: Image3

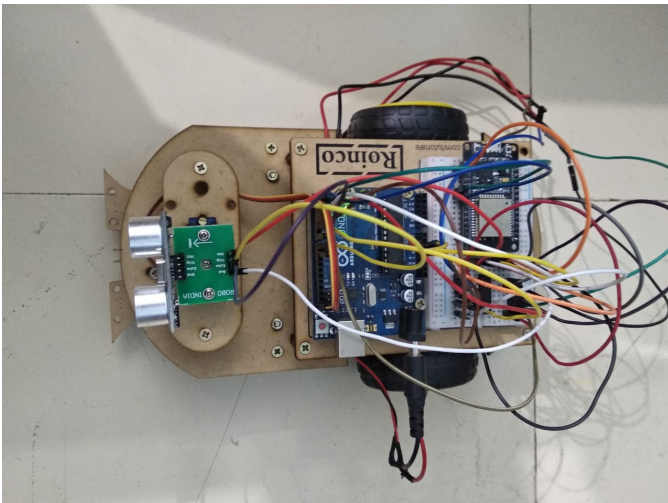


Fig. 1.2: Image2