Self-Localization Program Robot for Indoor Environment In Real Time

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Abstract- Due to technology development, the usage of robot has become a major form of reducing human intervention in day to day activities. This emerging technology is used in this paper. This paper mainly deals with the transportation of goods from warehouse to another place as required. The input to the robot is given by using four different buttons with corresponding operation. The direction of robot is controlled using motor1 and motor 2, which also enable the robot to turn its direction when it faces any obstacles. The advanced technology RFID is used as a tracker. Based on the unique I'd of the goods, the location of goods is tracked. Wireless charger is used to charge the robot.GSM technology is used to transmit and receive information the user in mobile. These overall information is also displayed on LCD.

Keywords- Line Follower Robot ,UART, GEAR Motor ,lcd, gsm, wireless charger.

I. INTRODUCTION

The autonomous mobile robot must be able to complete its relationship to the environment. To measurements with its sensors and then using those measured signals. if its Sensor measurements may have error, therefore, concern associated with them, in this place sensor inputs must be used in a way that enables the robot to cooperate with its environment successfully in spite of measurement uncertainty. Two method for using uncertain sensor input to guide the robot's behaviour. First method is to use each sensor measurement as a raw and individual value. second method is to select information from one or more sensor readings first, generating a higher-level percept that can be used to inform the robot's model and the robot's actions directly. Robots will interpret sensors to changing degrees, depending on each specific functionality. example, In order to security emergency stops in the face of immediate obstacles. The robot may generate direct use of raw forward facing range readings to stop its drive motors. local obstacle avoidance of raw ranging sensor strikes may be connected in an occupancy grid model, enabling smooth avoidance of obstacles meters away for being subjected to feature extraction followed by scene interpretation to minimize the impact of individual sensor trouble on the robustness of the navigation skills. The pattern that thus develop is that, as one move into more experienced, long-term perceptual tasks. The article extraction and scene description aspects of the perceptual pipeline become essential. Features of this RFID robot. A Data Collection is the main job of an RFID system. The use of tags and transponders in it help acquire the purpose of data storage and repossession is done with use of Tags, Readers, Antenna and Software span the four major parts of an RFID system. This grouping of a Robot and RFID will transport a important key to warehouse administration..the RFID robot is he mainly used for the purpose of classify and allocating goods in a warehouse will be served.

The following the features of this RFID robot:

1. Controller board, motor driver and RFID is used for reader module are included in the circuit design.
2. Microcontroller programming achieve the software expansion of the Robot.
3. establishment of goods and their locations is done by RFID tags..

Line follower robot

Line follower robot using for warehouse management and industries stores etc, it followed dedicated path of proposed system to be fulfil the desired functionality and determine the working of it, Its usage of pair of sensor and comprising of transmitter and photo diode. It's specified path of switching transistors that drives and motors. in this place further project can be boost up by using a microcontroller to add intelligence to the robot

II. PLATFORM SETUP

1. LCD DISPLAY

A 16x2 LCD display is very basic module which displays 16 characters in 2 lines A liquid crystal display is a special thin flat board which let light go through it, or block the light. The panel is made upon of several blocks. each block is of any shape. Liquid crystal displays are repeatedly abbreviated as lcd Liquid crystal displays are used in

battery-powered devices, such as digital watches, because they uses very little electricity.

2. GSM MODEM:

A GSM modem is one which accepts a SIM card, and operates over a subscription to a mobile operator, similar to that of the mobile phone. A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection. It's operates on various frequency like 850MHz, 900MHz, 1800MHz, 1900MHz. In this project using 900MHz frequency band.

3. SIGNAL CONDITIONING UNIT:

The signal conditioning unit accept input signal from the sensor and gives a conditioned output to the entire range of each parameter. A signal conditioning unit which provides necessary interface between a sensor and a controller unit.

4. INFRA-RED SENSOR

It is reflective photoelectric sensor repose of a standard infra-red LED and a photoelectric transistor has been suited in the vehicle.. Infra-red sensor production current at the output which is proportional to the amount of light it receives.

III. METHODOLOGY

1. RFID

It's a system for save and remotely retrieving data using wireless technology operating with 50 KHz to 2.5 GHz. It comprises of 3 basic elements: RFID tag, recruiter and a host line of business system. Data is encoded on the tag contains a different of information about the object including item description through EPC. The utilization of RFID technology is unique and might expand the existed automation system. The arudino Microcontroller is used for controlling prospective autonomous mobile robot and communicate with the RFID reader. Due to the singularity of RFID tag, the moving is controlled by commands such as turn left, turn right, speed up and speed down etc. The mobile robot is capable of reading the moving force commands from the tag and accomplish the proper actions.

2. Arduino controller

In our Project we used a microcontroller to control whole the process of system that is ARDUINO. It's an open source hardware and very useful for project developments.

There are different types of arduino using in real-time like Arduino UNO, arduino mega, arduino pro mini, Lily pad etc. available in the market. Here we have used arduino uno board. It's the best board to get started with electronics and coding.

3. Electronic Design:

The components that are need for the electronic circuit design consist of an LED, potentiometers, Phototransistor pairs, resistors, RFID Tag and Reader, DC Geared motors, Motor Driver IC's and a microcontroller. The microcontroller used here is arudino, Either L293D or ULN 2003 IC is used as motor driver because ULN2003 requires relays to provide supply to the motors.

- Light emitter: emitter on the input side and takes the incoming signal and converts it into a light signal. light emitting diode is recycled as the light emitter.

- Light detector: Light detector is used detector the light against the emitter and it converts into an electrical signal. The light detector can be a phototransistor.

4. Software Setup

Software programming is essential fo the mobile vechile to work Since the mobile vehicle to work seductively for line tracking in a smooth manner the software program is must need. As for choosing the programming language a there are options are applicable, but we prefer C for its universalize The controlling software for the testing has been developed using C sharp.

5. DC motor

It is of class of revolving electrical machines that converts direct electrical current into mechanical current. The most common types relay on the forces produced by magnetic fields. Nearly all types of DC motors have some constitutional mechanism, either electromechanical or electronic, to regularly change the direction of current flow in the part of motor. DC motors were the first type widely used, as they could be powered from existing direct-current lighting power distribution system.. DC motor's speed can be controlled over a wide range, using either a different supply voltage or by changing the strength of current its field windings. Small DC motors are used in tools, toys, and appliances.

6. Indoor positioning system:

This easy way to describe Indoor Positioning Systems (IPS) it's act as a GPS indoor environments.IPS is

used to locating the people or objects inside buildings, typically via a mobile device such as a smart phone or tablet. IPS relies on technology like wall- or ceiling-mounted beacons that work together in detecting a user's or object's location, deriving an exceptionally correct position. Like GPS, IPS systems can then detect the commend in which the device is travelling, it can predict the user's pathway based on that information so the positioning remains exact as the space is traversed.
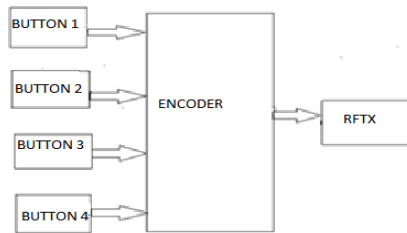
TRANSMITTER:

Figure 1. Transmitter Block Diagram

In the above diagram the input is given via four buttons which perform their corresponding operation.
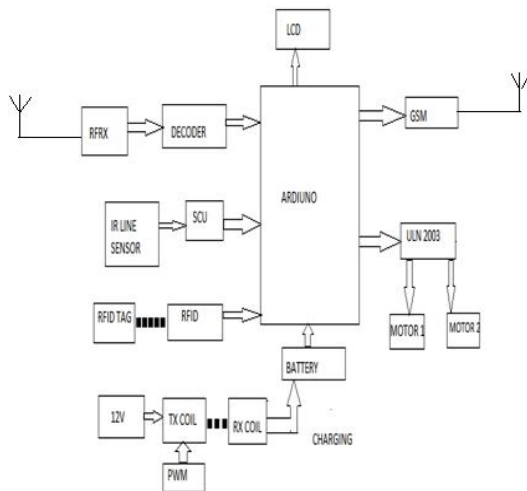
RECEIVER:

Figure 2. Receiver block diagram

The overall operation of this block is that the input from the transmitter via encoder is given into the microcontroller. As per the command given by the input button the thing which we are going to transport from one place to another reaches that place. That information is displayed on LCD. If any obstacle is detected then motors are used to change the direction of the robot. RFID tag is used to track the location of the object by using its unique serial I'd. Wireless charger is is used to charge the robot. The overall information is delivered to the user via GSM technology.

Wireless charging robot

wireless charging is usage of electromagnetic fields to safely transfer power from a transmitting source to a receiving device for the purposes of charging a battery. And as the name suggests, it does so without the use of a physical connection. It is based on the principle of magnetic resonance, or Inductive Power Transfer. This is the process of transferring an electrical current between two objects through the use of coils to induce an electromagnetic field.
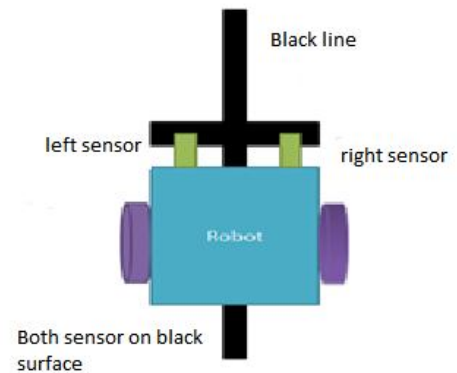
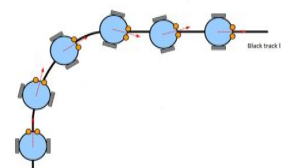

Figure 3. Both sensor on black surface

Navigation

Figure 4 Line tracking navigation principle on line Following Robot

In this diagram we show the linear movement, and is proportionally control the left and right motor speed to navigate for the black line based robot for the input sensor. The output of the sensor to be fusion is then compared with the measured position of the robot from the encoder.

Rotational Movement

A picture set-up is The orientation measured by rotary encoder on the robot's shoulder is used as the ground truth by first taking the average of the measured orientation from in sense as the initial orientation before the robot's arm starts to move. The output of the sensors fusion is then compared with the measured orientation of the robot from the encoder. this robot only follow the block line.
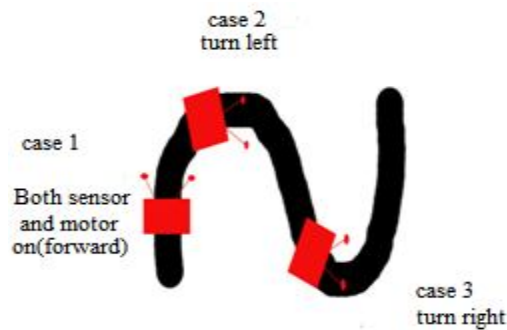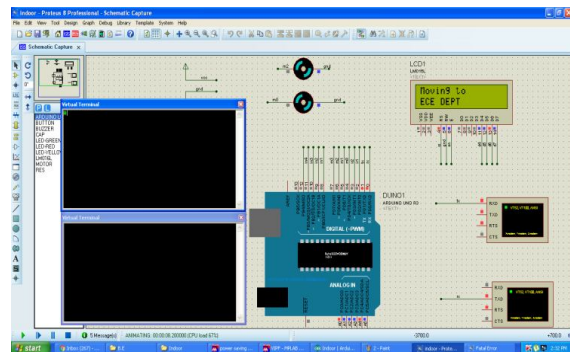
Figure 5. Rotational Moving

EXPERIMENTAL RESULTS
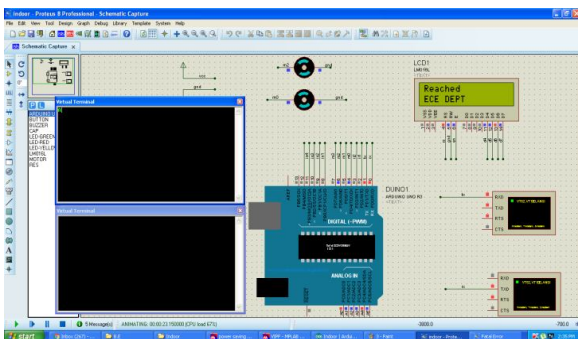

Figure 6. Goods Sending Output

Figure 7. Goods Receiving Output.

V. CONCLUSION

An autonomous robot can be controlled by using wireless technology and this robot follows the line and moves to the desired location and performs pick and place operation of item. this type robots can be configured to perform various applications. However in the prototyping stage the robot may not be able to accomplish all its tasks successfully. The application of this robot have a good potential not only in warehouse management but also in libraries, supermarkets, offices, buildings etc.This robot will manage goods positively according to the database programmed in the robot. These Robots can be arrange in vital locations and can also be used in the military for rescue missions. These Autonomous fixed robots can communicate with adhoc network and can perform even better. If we develop the robot means will save cost and time and employ's work. . Wireless charger is is used to charge the robot. The overall information is delivered to the user via GSM technology.

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