

Line Following Food Serving Robot

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Abstract: Line Following is one of the most important aspects of robotics. A Line Following Robot is an autonomous robot which is able to follow either a black or white line that is drawn on the surface consisting of a contrasting color. It is designed to move automatically and follow the made plot line. The robot uses several sensors to identify the line thus assisting the robot to stay on the track. The array of four sensor make sits movement precise and flexible. The robot is driven by DC gear motors to control the movement of the wheels. The Arduino Uno interface is used to perform and implement algorithms to control the speed of the motors, steering the robot to travel along the line smoothly. This project aims to implement the algorithm and control the movement of the robot by proper tuning of the control parameters and thus achieve better performance. In addition the LCD interface is added in order to display the distance travelled by the robot. It can be used industrial automated equipment carriers, small household applications, tour guides in museums and other similar applications, etc. It is a mobile machine that can detect and follow the line drawn on the floor.

Keywords: Line following, Arduino Uno, LCD interface, serving robot

I. INTRODUCTION

In today's restaurant Digital multi-touch menu cards and other forms of digital facility are replacing old fashioned services like-waiters can take order from customer and serve them. Intelligent Restaurant system delivers almost infinite flexibility in promoting meal and snack options. Intelligent Restaurant system uses technologies innovatively in a modern restaurant such as multi-touch LCD with Arduino mega, RF module, database & line following Robot to enhance quality of services and to enrich customer's dining experience. A line following robot is designed using sensor operated motors to keep track the line path predetermined for meal serving. PayPal is used for online payment. In this paper we demonstrate the idea of automatic menu serving robot. In this paper we have made a robot which provides proper service to customer in restaurant. If a person wants to give an order then he can call the robot by simply pressing a switch on his table. The whole system makes use of RF technology. Robot automatically checks the status of the person. It reaches the correct destination and person passes his order to robot. The robot sends the order by wireless technology (RF technology) to counter where a receiver is placed, this receiver receives the signal from the robot (through RF technology) and the person at the counter checks the order, prepare it and put it on the robot and robot again provides proper service to respective person automatically. The robot can take the order from multiple people by reaching near their tables on their call. The robot can serve to a customer as well as take order from another customer at the same time. Basically electromechanical machines that have the capability to perform desired functions when programmed can be termed as robots. Some of the practical applications of a line follower are industrial applications were these robots can be used as automated equipment carriers in industries replacing traditional conveyer belts in automobile. Some recent development is of line follower is seen in applications such as floor cleaning, guidance in public places, library assistance, entertainment, education etc. Using on-board hardwired control circuit , a robot can be used as a line follower which basically follows a predefined path accurately. The operation of the line follower consists of acquiring the line position using IR sensors affixed on the front end of the robot and steer it in the required direction. A good robot should satisfy the following requirements:

- It should be light weight.
- It should be able to take smooth turns.
- It should be able to carry weight without spilling it.

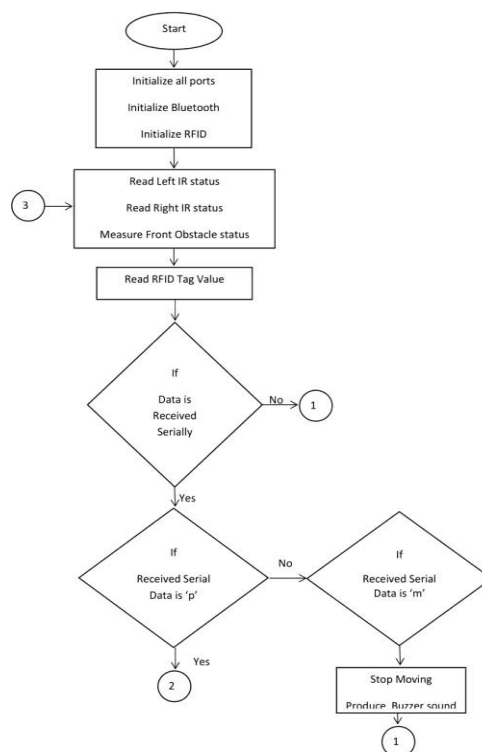
The main motivation behind the project is to relate the principles of line following robots known to improvise food serving in restaurants. The robot is responsible for transporting food from the kitchen to the customers seated on tables affixed with transmitting antennas. A keypad and LCD are used to select from possible options. This whole concept can be useful for entrepreneurs in restaurants to serve customers differently and in more.

II. LITERATURE REVIEW

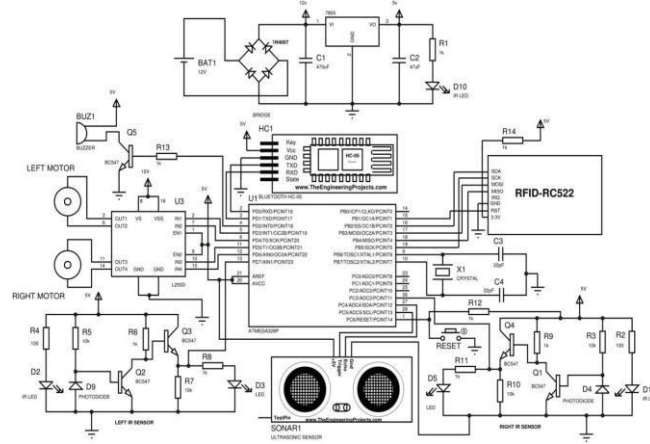
The smart and intelligent line following robot based butler is divided into the following elements- nRF transceiver, LCD, keypad, IR sensors, Motor driver. An IR sensor is used for which a robot can follow a line drawn on the floor. A transceiver is a combination of transmitter/receiver in a single package. nRF is a single chip radio transceiver for the global license free 2.4GHz ISM band. LCD is video display that utilizes the light modulating properties of Liquid crystals to display pictures or text on a screen. Keypad is a set of buttons arranged in a block or a pad which usually bear digits, symbols and usually a complete set of alphabetical letters. A. Arduino Uno: Arduino is an open-source computer hardware and software company, project and user community that designs and manufactures microcontroller-based kits for building digital devices and interactive objects that can sense and control the physical world. These systems provide sets of digital and analog I/O pins that can be interfaced to various expansion boards ("shields") and other circuits. For programming the microcontrollers, the Arduino platform provides an integrated development environment (IDE) based on the Processing project, which includes support for C, C++ and Java programming languages. B.

Sensors: IR or VISIBLE light is emitted from the emitter (IR light is mostly preferred to avoid interference from the visible light which is generally around the robot. However IR light is also present in atmosphere but its intensity is much less than that of visible light, so IR light can give much reliable output. For better accuracy of the sensors, they must be covered properly for the isolation from the surrounding.) C. nRF Transceivers: The nRF24L01 is a single chip radio transceiver for the global, license-free 2.4 GHz ISM band. The transceiver consists of a fully integrated frequency synthesizer, a power amplifier, crystal oscillator, demodulator, modulator and Enhanced Shock Burst protocol engine. In addition, then RF24L01also offers an innovative on-chip hardware solution called Multi-receiver that can support up to six simultaneously communicating wireless devices. This makes it ideal for building wireless Personal Area Networks in a wide range of applications.

III. METHODOLOGY



LINE FOLLOWING FOOD SERVING ROBOT



IV. ADVANTAGES, DISADVANTAGES AND APPLICATIONS

Advantages

- Effective and efficient work as wear using robots.
- Reduces customer waiting time
- One time investment in the system.
- Work can be faster and may reduce the cost of laboring.
- As customers place their own orders, waiter staff numbers can be reduced.
- Applications are performed with precision and high repeatability.

Disadvantages

- Line follower robot requires 2-3 inches broad line. □
- It may not move properly if the black line drawn is of low intensity. □
- The IR sensors may sometimes absorb IR rays from surroundings also. □
- As a result, robots may move in improper way. □

Application

- Line follower Robots are commonly used for automation process in industries, military applications and consumer applications. □
- They are very useful as they can work without any supervision i.e. they work as automatic guided vehicles. □

- With additional features like obstacle avoidance and other security measures, line follower robots can be used in driver less cars.□

V. CONCLUSION

As we see the robots are increasingly becoming the part of everyday life; the use of Serving Robot can be extend to various functional purposes. This system allows customers to order food by LCD module surface which is programmed by embedded c, which is wirelessly connected to the counter via RF module. A line following robot is used to carry meal from counter to customer. We have tried to implement the robot waiter from the existing appliances which could be use by elderly people or disabled people for house service. Such types of robot system can work in different areas of human societies.

The line following robot is automobile system that has ability to recognize its path, move and change the robot's position toward the line in the best way to remain in track. This project report presents a photodiode sensor based line follower robot design of 200gm weigh which always directs along the black line on white surface. The electro mechanical Robot dimension is 192×100×70mm with max rpm 180 at no load and frictionless condition.

VI. FUTURE SCOPE

In the process of development of the line follower, most of the useful feature is identified and many of them were implemented. But due to the time limitations and other factor some of these cannot be added.

So the development features in brief:

- Use of color sensor.
- Use of ccd camera for better reconisation and precise tracking the path, hospitals, libraries and restaurants with small change in programming areas.

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BIOGRAPHY

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