

## Serving Robot For Restaurants Using Node MCU

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**Abstract** - Hygiene is nowadays considered as a main concern for health by many peoples. Food is the main factor that causes the diseases if not handled in a good way. Many of people do not maintain hygiene and clean hands while serving to customers. These is the serious concern for the health of the customers. So with the help of mechanism, we can make robots that can be used to serve people with proper hygiene. This study represents a systematic literature review of the . Robot that serves people in restaurant. The system consist of the QR code which includes the food menu for the restaurant, which can help patrons to place the order with the help of the smart devices.

**Key Words:** Node MCU, IR sensor, QR code, Rf id Reader.

### 1. INTRODUCTION

The serving robot in a restaurant is programmed to autonomously navigate by following a line on the floor, allowing customers to select their food and drinks using a keypad and displaying order details and status on an LCD screen. Additionally, an RFID reader is used to identify the correct table for order delivery. The robot's motor system enables it to move between the kitchen and customer tables for order pickup and delivery. Powered by a battery, it operates cordlessly and has the potential to revolutionize the service industry, offering advantages such as increased efficiency, cost reduction, enhanced customer satisfaction, and data collection capabilities. This restaurant-serving robot is controlled by a NodeMCU microcontroller, employs IR sensors for line detection, and integrates a keypad, LCD screen, RFID reader, and motor driver for its functions. In recent years, robotic technology has been focused to develop on wide range of applications from military to civil and industrial. Among them, wheeled mobile robot is the most common type of robot that is developed for consumer purpose. The mobile robot is maximized its efficiency by integrating smart sensors, image processing technology, GPS, and so on. However, when the mobile robot operates in a flat and narrow space, the robot moving by following the marked line on the floor has been the best solution so far. These robots can perform a variety of tasks, including: transport and sorting robots, medical robots, navigation robots for the visually impaired. Robots have appeared in a number of restaurants in Japan, China or advanced countries around the world as chefs or waitresses. In Vietnam, the first robot which is made by composite structure and put on a wheeled base structure was developed with a purpose of serving as a waiter in a coffee shop in 2017. This robot named Mortar is developed by a young engineer team including Do Trung Thanh, Nguyen Quoc

Phi and Pham Quang Viet with an idea starting from their experience in a Japanese sushi restaurant that is completely served by a robot. Thus, three young men have the idea of opening a fantasy style coffee shop using the robots as the serving staffs For consumer application, wheeled mobile robot is often chosen for its advantages such as simple structure, availability of robot's parts, cost in manufacturing, easy to operate and so on. Thus, the author comes up with an idea of using wheeled mobile robot as waiter serving robot in a restaurant. The controller to drive the robot speed is very important because if it is accelerated or decelerated too fast, the food or drink putting on it may have spilled out. Traditional line following robot uses the ON / OFF method which means the robot switches off one of the motor if it moves off the path. This is a very simple robot control method that helps the robot return to the target path.

### 2. LITERATURE SURVEY

F.A. A. Razak et al., 2022, Design and Implementation of a Serving Robot for Restaurant. Using Node MCU This paper proposes a design and implementation of a serving robot for a restaurant using Node MCU. The robot is equipped with. This paper proposes a design and implementation of a serving robot for a restaurant using Node MCU. The robot is equipped with a keypad, motor driver, motor, IR sensor, display, RFID reader, and battery. The robot can be controlled by the user using the keypad to select the table where the food should be served

E. R. Yulianto et al 2021 Development of a Serving Robot for Restaurant Using Node MCU This paper describes the development of a serving robot for restaurant using Node MCU. The robot is equipped with a keypad, motor driver, motor, IR sensor, display, RFID reader, and battery. The robot can be controlled by the user using the keypad to select the table where the food should be served. The robot will then navigate to the table using the IR sensor and deliver the food.

M. F. Ramli et al. 2020 Design and Implementation of a Serving Robot for Restaurant Using Node MCU This paper presents a design and implementation of a serving robot for restaurant using Node MCU. The robot is equipped with a keypad, motor driver, motor, IR sensor, display, RFID reader, and battery.

The development of robotics Robots are made to help humans in a variety of tasks and professions. They can assist people who have special requirements, increase workplace operational competency, complete tasks or goals that people find difficult to complete ,and provide convenience and enjoyment to people's daily lives Robots are divided into six categories by Warwick (2013):

industrial (such as assembly robots), mobility (such as autonomous guided vehicles), service (such as disability robots), educational (such as learning support robots), modular robots<sup>13</sup> (cleaning robots, etc.), collaborative robots (iRobot, etc.). Robotics has been used in a variety of industries along with technological advancements, including industry, agriculture, domestic work, healthcare, the military, and home Technology in customer interactions has been researched from a variety of angles.

The impact of technology acceptance on customer experience and customer incentives to use technology are central to the study of technology in the social sciences. Recent studies have examined the characteristics of robotics. The first distinguishing feature concerns the existence and realization of service robots. For example, the user's mental response as if the robot were a real human being is an example of a social presence, and embodying is the robot's verbal and non-verbal behavior and the way it interacts to create a face-to-face experience. It refers to dynamic interaction with humans. Service Robots in the Hospitality Sector Recently, service robots with social intelligence have been introduced in the service sector. According to the International Federation of Robotics, service robots are robots that "perform operations useful to humans or equipment, except in industrial automation applications."

4 Providing information or social assistance to users is one of the social and practical goals of service robots. The idea of "human-robot interaction" has been often used to emphasize the social aspect of service robots. The publisher defines "robot ticket" as "social guidelines for comfortable and acceptable robot behavior", which it describes as "human-robot interaction". The concept of human-robot interaction has dominated robotics research ever since academics have increasingly incorporated it into the study of service robots. Robotics research has grown significantly over the last few decades and has experienced a paradigm shift in industries other than hospitality. Most of the early robotics research is in the fields of engineering and information technology, with a particular focus on the technical aspects of robot design, architecture, and performance. Since the late 2000s, there has been a paradigm shift from purely manipulative robots to more service-oriented robots in the fields of healthcare, marketing, home/assistance services, education, sociology/social psychology, and robotics. Service Robots in Hospitality Various types of service robots have been deployed in many hotel operations sectors such as reception, concierge, room service and house keeping. The use of humanoid service robots in hotels can change the physical design, atmosphere and service levels. Hoteliers, on the other hand, are using robots to offer convenience and unique experiences to their customers, while increasing operational efficiency at lower costs. His six studies on robots in the hotel and tourism industry are summed up by the laws of science. 1) Customer experience with robots. 2) The impact of robots on tourist decision-making processes. 3) Diversity of tourism experiences. 4) More use of qualitative methods in social contexts 5) The use of cloud robotics in hospitality and tourism is encouraged.

The proposed system contains both hardware and software tools as components. Here the Raspberry Pi is used to establish the connection with the software and hardware components. It also contains a Node MCU device which will be used to establish the connection between the Robot and the tables. So that the robot will exactly know to reach the respective table which is requesting for the service. Raspberry pi and Node MCU communicates through http request and response procedure with help of Wi-Fi.

Node MCU: Node MCU is less expensive open-source IOT platform. Node MCU is used to establish the connection with the tables. It uses Wi-Fi modules for connection. In the project the robots will be trained to serve food as well as to do the Waiter job.

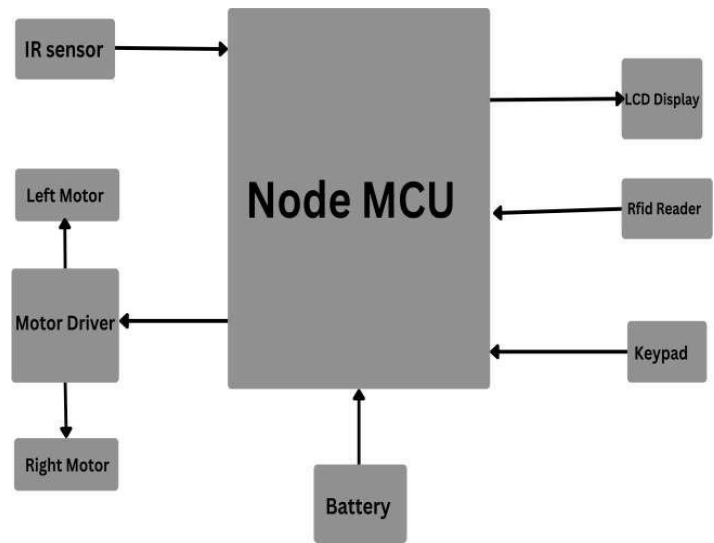


Figure 1: Block diagram

The system comprises of the Node MCU, IR sensor, Motor driver, battery, LCD Display, Rfid reader, and Keypad.

In this proposed systems we have designed the system for serving the food in the restaurant. In these projects we have used the Node MCU for control the whole system by using the software Arduino Uno. The lithium battery are been used to give the power supply. The IR sensor is been used to follow the path we reach to the table .The motor driver is used for the motion for the robot. The LCD screen is used to display the number of table which is entered by keypad. Rfid reader is used to start the robot.

#### 4.MODELING AND ANALYSIS

Two separate food trays to meet the amount of food needed on the table. Based on that, after many designs and discussions, the author has chosen the suitable design as shown in Figure 2. As the requirement from the owner of a local restaurant where the robot will be tested in reality, the robot would look not too big and has friendly and unique appearance, thus, it has two trays to increase the amount of foods and drinks that can be delivered at a time.. The proposed design is a

two-wheel drive robot that consists of two- actuated wheels and two passive caster wheels. The lower tray must be put on the robot at a height equal to the height of the restaurant table of 750 mm. The robot has three separated parts which are the base for moving the whole robot, the body with two trays for carrying the food, and the controller panels for inputting the command for robot's operation. The base takes up the majority of the robot mass, thus, when the robot moving with low speed and acceleration, the foods and drinks would stay in their way. The proposed system contains both hardware and software tools as components. Here the Raspberry Pi is used to establish the connection with the software and hardware components. It also contains a Node MCU device which will be used to establish the connection between the Robot and the tables. So that the robot will exactly know to reach the respective table which is requesting for the service

**Cost reduction:** Data serving robots can help restaurants to reduce labor costs, as they can automate the task of serving food and drinks to customers.

**Improved efficiency:** Data serving robots can help restaurants to improve efficiency by automating repetitive tasks. This can free up staff to focus on other tasks, such as cooking and interacting with customers.

**Enhanced customer experience:** Data serving robots can provide a unique and memorable dining experience for customers. They can also be used to improve the accuracy and speed of order fulfillment.

**Data collection:** Data serving robots can collect data on customer orders and preferences, which can be used to improve the restaurant's menu, pricing, and service.

In addition, data serving robots can help restaurants to improve their safety and hygiene standards. For example, data serving robots can be used to deliver food and drinks to customers without the need for human contact. This can help to reduce the risk of the spread of foodborne illnesses.

Overall, data serving robots have the potential to revolutionize the restaurant industry. They can help restaurants to reduce costs, improve efficiency, enhance the customer experience, and collect valuable data.

Here are some specific examples of how data serving robots are being used in the restaurant industry today:

**Bellabot:** Bellabot: is a data serving robot that is used in a number of restaurants in China. Bellabot can navigate autonomously around the restaurant, deliver food and drinks to customers, and collect data on customer orders and preferences.

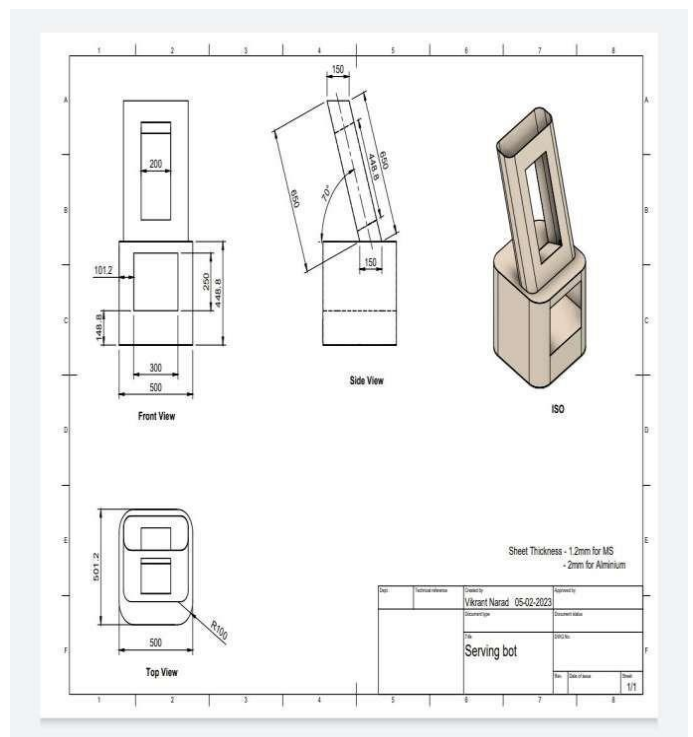
**Sally the Robot:** Sally the Robot is a data serving robot that is used in a number of restaurants in the United States. Sally the Robot can navigate autonomously around the restaurant, deliver food and drinks to

**Jibo:** Jibo is a social robot that is being used in a number of restaurants as a data serving robot. Jibo can interact with customers, take orders, and deliver food and drinks.

These are just a few examples of how data serving robots are being used in the restaurant industry today. As technology continues to develop, we can expect to see data serving robots become more common in restaurants and other businesses.

customers, and collect data on customer orders and preferences.

**Figure:** Structural Design Serving Robot



## 5. RESULTS AND DISCUSSION

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## Structural Design Serving Robot:



## 6. CONCLUSION

Our project focuses on the maintaining the hygiene in the restaurant. On successful implementation of our project, cost reduction of the human labor can be reduced. Using robot mechanism, we enable safe delivery service to customer. Hence our motive is to provide neat and clean service that is been caused by the human labor. With the help these mechanism we also promote the cashless payment system.

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