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IOT DELIVERY ROBOT

Gangarapu Sai Vamsi Krishna[1], R. Ramakrishna Reddy[2], Dr. D. Ravi Kanth[3]
[1]M Tech Student, Renewable Energy, Dept. of ME, KSRMCE, Kadapa, AP, India
[2]Associate Professor, 3Professor & HOD, Dept. of ME, KSRMCE, Kadapa, AP, India

Abstract
In this abstract, we introduce an IoT delivery robot that is intended to optimise last-mile delivery, enhancing productivity, precision, and client pleasure. Our IoT delivery robot integrates cutting-edge technologies like robotics, AI, and IoT connectivity to produce an intelligent and self-sufficient solution. The robot has a variety of sensors, including lidar, cameras, and proximity sensors, which allow it to precisely perceive and navigate its surroundings. This guarantees safe and dependable operation, even in congested urban locations or challenging indoor environments. The delivery robot maintains a constant connection to a centralised logistics management system thanks to its IoT connectivity. Since real-time monitoring and control are made possible by this link, the robot's actions may be effectively coordinated with the whole logistics network. By taking into account variables like traffic circumstances, delivery priorities, and customer preferences, it enables dynamic route optimisation. As a result, the delivery robot may change with the situation and deliver things in the fastest and most economical way possible. Additionally, the Internet of Things delivery robot may easily integrate with other elements of the logistics network. When picking up items for distribution and providing real-time information on inventory levels, it can communicate with automated warehouses. The robot may also interact with clients via mobile applications, giving them up-to-the-minute information on delivery progress, an estimation of when they can expect their deliveries, and the choice to reschedule or reroute them.
Keywords: IOT, delivery Robot

I. INTRODUCTION

A. Aim

The aim of the IoT delivery robot is to enhance last-mile logistics by leveraging IoT technology and automation.

Customers place orders through a website or an app, selecting a source from a list of carefully selected suppliers and providing their location. After that, the delivery robot will head over to the supplier to retrieve the items and deliver them to the consumer.

The project's goal is to build an IOT-based food delivery robot that can be controlled wirelessly by a smart phone. This project is built on the internet of things (IOT), and it specifically makes use of the Esp32 camera, headlight, two DC motors, and L293D motor driver.

The ESP32 camera will record real-time information about its surroundings and broadcast it over the internet to a specific IP address. The user can access this equipment via a mobile phone, and while watching the video, they can use a webpage to manage the robotic vehicle's headlights and door locks.

This robot has an ultrasonic sensor that it employs to identify obstructions in its route and turn on the blue lights as warnings. This robot also has the capability to detect theft and sound an alert via buzzer.

The robot will request the password once it has arrived. The right password must be entered using the keypad. If it's right, the door will open to collect the food and then close itself after a while. On the LCD, the project's status will be shown. The PIC microcontroller, which loaded a program written in embedded C, serves as the project's primary controlling device.

B. Objective

- Robot that delivers food via IOT.
- Web browser-based control of a robot, a headlight, and a door lock
- ESP32-based surveillance system with cameras.
- System for typing passwords based on a keypad.
- Detecting obstacles and turning on the blue lights.
- Buzzer-based theft detection and alerting.
- LCD display notifications that can be seen.
- Using a PIC Microcontroller, this task will be accomplished.

II. LITERATURE SURVEY

The Internet of Things (IoT) is a network of interconnected animals, objects, mechanical and digital equipment, computing devices, or people who may exchange data over a network without needing to interact with one another. Contrary to humanoid robots, industrial robots are now used extensively. IoT and humanoid robots have been combined in a few tries, although they have few functions. In contrast to earlier research initiatives, this study provides a revolutionary open-source Android application for remote humanoid robot control, either with or without network address translation (NAT). Through the Android application, the user may see what the robot is seeing and move it. We can also deliver real-time audio via our application using our technology. We hope that our suggested system will serve as a comprehensive educational resource for students with special needs in addition to being an appealing solution for various telerobotic applications. [1]

More people now choose to eat out, thus the food and beverage industry needs to modernise the services it offers to be competitive in the face of the growing population. To solve this issue, this project intends to build an automated food delivery system. In the newly proposed system structure, which consists of coloured lines drawn on the restaurant floor that connect all tables to the kitchen and serve as a guiding track, a robot in sync with the ordering system will work. Customers who submit orders online will have the system relay their requests to the kitchen. Several technological problems need to be resolved before the food and beverage industry adopts this approach. The automated meal delivery system using a robot, however, is a potential answer to the problems experienced by thousands of restaurant owners once the technical challenges can be surmounted and improvements are made. [2]

The global effects of the COVID-19 pandemic have been immense, and instead of social isolation, we now engage in distant socializing. On this issue, the medical industries are at a crossroads. Professionals in the medical field are terrified of dying themselves. The only approach to treat this sickness is to prevent interconnections between people, even in hospitals,

where many people are isolated daily. Additionally, IoT-based remote-controlled robots for navigation, food delivery, and drug delivery may reduce contact between medical workers and patients. The robot may be controlled from anywhere in the hospital, assuring COVID-19's safety and limiting its spread. And several sensors can perform a variety of duties, such as checking the oxygen level, without interacting with patients. [3]

Robotics-based IoT application development is currently undergoing continuous review. Security, remote monitoring, and monitoring of our houses by surveillance robots are the key topics of this essay. Over the past ten years, remote surveillance has emerged as the most significant study area. In this study, we present a surveillance robot that can be applied in household settings as well as many other settings. As they decrease the need for human labor and the likelihood of error, robots are becoming more and more vital in our daily lives. Depending on what the people want, robots can be controlled manually or automatically. The main focus of this study is the design and implementation of a mobile robot for real-time obstacle recognition and avoidance. [4]

A mobile robot is a device that is controlled by software that moves around to observe its surroundings using sensors and other equipment. Mobile robots come in two varieties: autonomous and non-autonomous. Without human intervention or direct running, autonomous machines carry out actions without being run over by humans. According to the system, line-following robots are an autonomous class of robots that use IR sensors to follow a black line. The trail is already established and may be seen as a black line on a white background. Humans can command a non-autonomous robot over the cloud at any time and from any location. Robots that are autonomous and non-autonomous are combined in the suggested system. Robot mobile is therefore intended to reduce human labor while becoming more adaptable, dependable, and accurate in terms of monitoring. The atmosphere of the enclosed room, which is off-limits to unauthorized humans, can be observed by the robot. Additionally, you can use the Android mobile IoT application push bullet to send an alarm message. [5]

III. PROPOSED METHOD

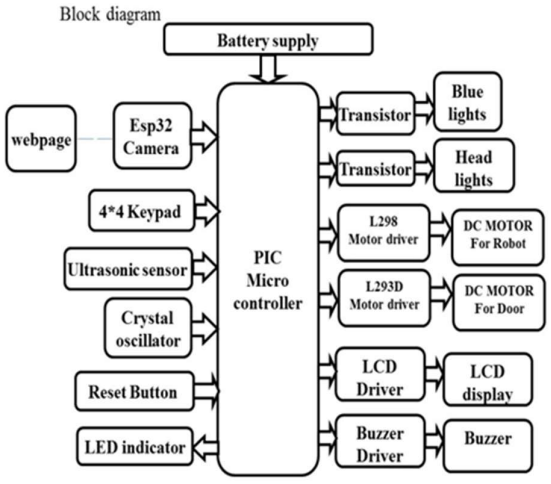


FIG 3.1: Block diagram of IOT Delivery Robot

The main blocks of this project are:

- **Rechargeable battery.**

A rechargeable battery is a form of energy storage device that can be repeatedly recharged by using an external electrical current. It is sometimes referred to as a secondary battery or an accumulator. It is made to offer movable and reusable power for a variety of electrical systems and devices.

- **ESP32 Camera.**

A compact, inexpensive, and incredibly adaptable development board called the ESP32 Camera combines an ESP32 microcontroller with a camera module. It is ideal for applications like surveillance systems, IoT cameras, robots, and more because it was created expressly for projects that need the ability to take and process images.

A fast dual-core processor, Wi-Fi, and Bluetooth connectivity, and several I/O pins for connecting peripherals are all built into the ESP32 Camera board's ESP32-S module. It also has a camera module with a lens and an image sensor that enables it to record both still videos and images.

- **DC Motor with L293D driver.**

The L293D and L293 are these quadruple high-current half-H drivers. The L293 is designed to deliver bidirectional drive currents of up to 1 A at voltages between 4.5 V and 36 V. The L293D is designed to generate bidirectional drive currents of up to 600 mA at voltages ranging from 4.5 V to 36 V. Both devices are made to drive inductive loads in positive-supply applications, including bipolar stepping motors, dc, solenoids, relays, and among others.

Fig: L293D IC

- **Head light.**

A headlamp is a lighting accessory used to give illumination in low-light or dark environments. It can be installed on the front of a vehicle or worn on the head. It is primarily used to increase visibility and safety while driving at night or inclement weather.

- **Ultrasonic sensor.**

Ultrasonic sensors operate on a similar basis to radar and sonar, which assess a target's characteristics by analyzing the echoes of radio or sound waves, respectively. These sensors are also referred to as transceivers when they send and receive data, but are more commonly called transducers. High-frequency sound waves are produced by ultrasonic sensors, which then analyze the echo they hear back. Sensors calculate the elapsed time between transmitting a signal and getting an echo to estimate the object's distance.

- **DC motor with l298 driver.**

The TTL logic signals are received by the L298 motor drive chip, which operates at high voltage and current. An H-Bridge is necessary to power a variety of loads, including motors, solenoids, and other devices. You need a high-power motor driver. The control unit is limited to TTL outputs.

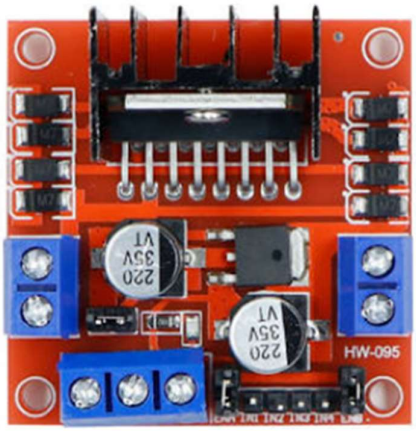


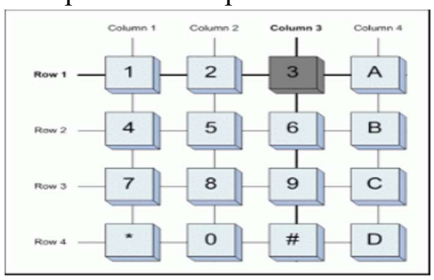
Fig: L298N

- **Buzzer.**

A buzzer is a continuous or sporadic-sounding electronic audio signaling device. It frequently serves as an audio alert, notification, or alarm in a variety of applications. An electrical signal is transformed into sound through a buzzer's fundamental concept, which involves the vibration of a piezoelectric device or a diaphragm.

- **Keypad.**

A keypad is a group of buttons placed in the shape of a block or "pad," typically bearing numerals, various symbols, and typically the full alphabet. It may also be referred to as a numeric keypad if it primarily consists of numbers. Numerous alphanumeric keyboards have keypads, as do other gadgets like digital door locks, combination locks, push-button phones, and calculators that primarily accept numeric input.



- **PIC Microcontroller.**

Peripheral Interface Controller, or PIC, is the designation given by Microchip Technology to its single-chip microcontrollers. The success of these components in 8-bit microcontrollers is really impressive. The primary factor is that Microchip Technology consistently improved the design of the device and added necessary peripherals to the microcontroller to meet client requirements. PIC16F877A is the name of the microcontroller used in this project.

- **LCD display.**

A flat panel display called an LCD (Liquid Crystal Display) uses liquid crystals to provide visual output. A variety of gadgets, such as tablets, smartphones, computer monitors, televisions, and other electronic devices, frequently uses LCD screens. An LCD monitor is one of the most popular accessories for microcontrollers. 16x2 and 20x2 LCD screens are some of the most popular LCDs attached to the numerous microcontrollers.

IV. RESULT

Fig: IoT Delivery Robot

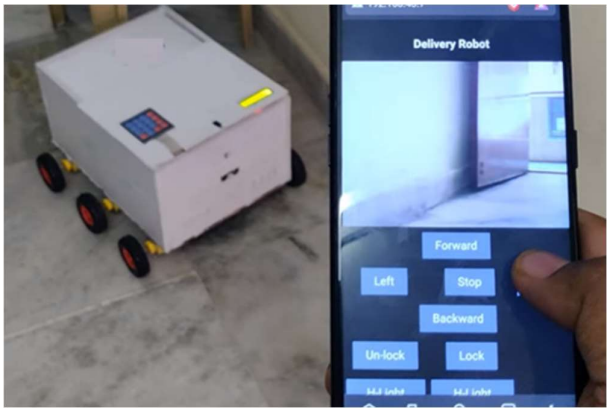


FIG: CONTROLLING ROBOT FROM WEB BROWSER

Fig: controlling head lights from WEB Application

Fig: unlock the robot from web app

Fig: The robot is asking to enter a password

Fig: The robot will open the door and deliver the food

V. CONCLUSION

All of the hardware components that were employed in its creation have integrated functionality. The placement and arrangement of each module have been carefully thought out, allowing the unit to operate as efficiently as possible. Second, the project has been completed with the aid of evolving technology and cutting-edge ICs. The project's design and testing were successful as a result.

Future Scope:

This project could incorporate a bomb detection sensor. In order to pick and place the goods, we can add a robotic arm.

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