

# INTELLIGENT RESTAURANT WITH SERVING ROBOT USING IOT

**Abstract:** In today's world of technology and scientific development the use of robot is going on increasing. Robots today are able to carry out every work more effectively and efficiently than a man can do; they are more precise as well as work effective. Hence one of such application of robot could be in restaurant as waiter. There are many areas of research that could be done for a serving robot. In this project we have tried to demonstrate a prototype of Autonomous Serving Robot which will bring order and serve the food to the customer. This paper aim is to make restaurant to be smart with serving robot using Internet of Things

**Keywords:** Microcontroller, switches, LCD, IR sensor, LDR, DC motor with driver, Buzzer.

## 1. Introduction

The country is said to be developed, when the standard of living in that country improved. we can improve our life style by using automation in each and every sector. By using technology we can reduce the efforts of the people. Now a days IOT is a popular technology which enables us to exchange information though the internet. By using IOT we can replace the traditional method of taking orders using paper and pen as in traditional restaurant system. In IOT based smart restaurant as the customer enters restaurant the door will automatically open. The customer can sit anywhere in the restaurant and they can select the items from display provided at each and every table. The corresponding LED will glow at kitchen section which is in the site of chefs. The members in the kitchen section will place the food items on the LINE FOLLOWING ROBOT. It will stop at the corresponding table based on IR sensor at each and every table. The advancement of information and communication technology has led to an increasing number of industries to use electronic media and corresponding application for information exchange.

Restaurant is a place where people pay to sit and eat meals that are cooked and served on the premises. In traditional restaurant system orders are taken by a waiter and they bring the food when it is ready. After eating the food customers will pay the bill. This system relies on large numbers of manpower to handle customer reservation, inquiry about them, ordering food, placing order on table, reminding dishes of customer. Therefore, how to effectively improve the service quality for customers by using advanced technologies has received much attention in recent years. This project we have tried to demonstrate a prototype of Autonomous Serving Robot which will bring order and serve the food to the customer

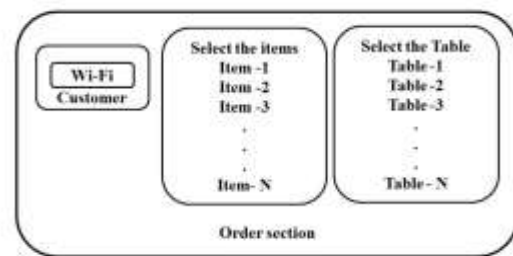
## 2. LITERATURE SURVEY

Intelligent Restaurant is designed to reduce the work load of waiter and to increase the efficiency. In the paper by Sakari Pieska, Juhana Jauhainen, Markus Liuska, Antti Auno [1] has propose that the customer's application works on an Android tablet. This application is connected to the database and download real-time restaurant's menu. The customer can browse the menu and order it. Using the software, customer can call the waiter by pressing a button. The waiter comes to confirm the order and count the bill. This menu can be displayed in the kitchen's display. When this food items are ready then the kitchen staff can mark them as done. And this food items are visible in the cashier

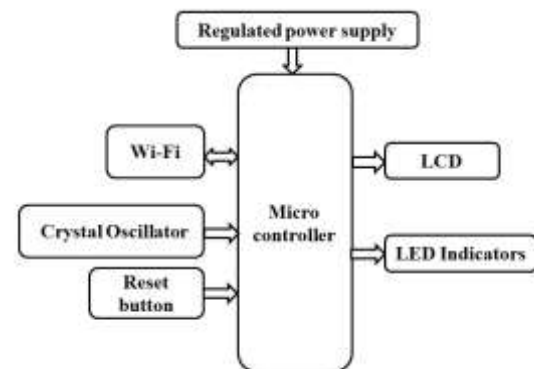
and also in waiter application so that they deliver them to customer

[2] Another paper by Sun Guiling, SongQingqing [3] has proposed self-service ordering information system based on ZigBee wireless technology. This system uses FFD (Full Function Device) and RFD (Reduced Function Device). FFD is network coordinator that can communicate with other device; RFD is used in star topology network, which can communicate with the FFD.

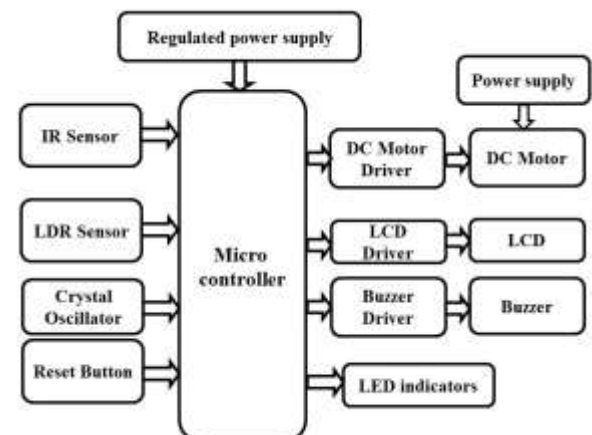
## 3. Implementation:



Block diagram of order section



Block diagram of kitchen section



Block diagram of Robot section

Project consists of three sections - Order section, Kitchen section, Robot section. Order section and kitchen section is communicated with Wi-Fi. Here customer should be entering the table number and items in his/her mobile using Wi-Fi. All the ordered items with table numbers are displayed on LCD in the kitchen section using Wi-Fi. Serving part is coming in the Robot section; IR Sensor, LDR Sensor, Buzzer, LCD and DC Motors are interfaced to the Robot. The robot is like a line following robot, it follows

the line by using IR Sensor. The intelligent process is done by using Embedded C language.

#### 4. Related Work:

The brief introduction of different modules used in this project is discussed below:

##### PIC microcontroller(16f872):



The PIC16F872 features 64 bytes of EEPROM data memory, self programming, an ICD, 5 channels of 10-bit Analog-to-Digital (A/D) converter, 2 additional timers, a capture/compare/PWM functions and the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface (SPI™) or the 2-wire Inter-Integrated Circuit (I<sup>2</sup>C™) bus. All of these features make it ideal for more advanced level A/D applications in automotive, industrial, appliances and consumer applications.

##### DC MOTOR:



A DC motor is a electric motor that works on Direct Current (DC). Motor supply: 9-15V DC.

DC motor can be made to run in both directions by changing the supply polarities. Microcontroller cannot run the motor in both directions and is not capable of driving the motor when it is directly connected to it. So, motor driver (RELAY) is used as an interface between motor and Microcontroller.

##### RELAY:



A **relay** is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism, but other operating principles are also used. Relays find applications where it is necessary to control a circuit by a low-power signal, or where several circuits must be controlled by one signal. Here we are using relay to on and off the DC motors of robot and change the direction of the dc motors according to microcontroller instructions.

##### Wi-Fi module (ESP8266):



The ESP8266 Wi-Fi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much Wi-Fi-ability as a Wi-Fi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

##### LCD (LIQUID CRYSTAL DISPLAY) :



One of the most common devices attached to a micro controller is an 16x2 LCD display.. This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively. The project status will display on LCD.

##### IR sensor:

The robot is like a line following robot, it follows the line by using IR Sensor



IR sensors use infra red light to sense objects in front of them and gauge their distance. The commonly used Sharp IR sensors have two black circles which used for this process, an emitter and a detector (see image right).

A pulse of infra red light is emitted from the emitter and spreads out in a large arc. If no object is detected then the IR light continues forever and no reading is recorded. However, if an object is nearby then the IR light will be reflected and some of it will hit the detector.

This forms a simple triangle between the object, emitter and detector. The detector is able to detect the angle that the IR light arrived back at and thus can determine the distance to the object. This is remarkably accurate and although interference from sunlight is still a problem, these sensors are capable of detecting dark objects in sunlight now.

**LDR:**



A **photo resistor** or **light dependent resistor** or **cadmium sulfide (CdS) cell** is a resistor whose resistance decreases with increasing incident light intensity. An LDR is made of a high-resistance semiconductor. If light falling on the device is of high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electron (and its hole partner) conduct electricity, thereby lowering resistance.

**Buzzer:**

A **buzzer** is a mechanical, electromechanical, magnetic, electromagnetic, electro-acoustic or piezoelectric audio signalling device. We are using electromagnetic buzzer in our project. The vibrating disk in a magnetic buzzer is attracted to the pole by the magnetic field. When an oscillating signal is moved through the coil, it produces a fluctuating magnetic field which vibrates the disk at a frequency equal to that of the drive signal.



**LED:**



LED's are used as indicator lamps in many devices, and are increasingly used for lighting. Introduced as a practical electronic component

**CRYSATAL OSCILLATOR:**



An **electronic oscillator** is an electronic circuit that produces a repetitive Electronic signal, often a sine wave or a square wave. PIC micro controller internally having 4mhz clock

frequency. We are giving the 20Mhz clock frequency as an external source for increasing the system performance

**RESET BUTTON:**

The reset button is a button that when clicked, will clear all of the fields in the micro controller, and executes the instructions from the starting address.

A switch placed between the digital input and ground will short the digital input to ground when it is pressed. This means the voltage seen at the input will be high when the switch is open and low when the switch is closed.



**4. CONCLUSION:**

The presence of each and every component has been reasoned out and placed very carefully, thus contributing to the best and efficient working of the unit. Secondly using very highly advanced IC's with the help of up growing technology, the project has been successfully developed and implemented. This project provides an efficient method that help to all the people, especially dumb/illiterate people to communicate easily and also it is user friendly device. This is our proposed system which reduces the cost of running the restaurants as it doesn't require any waiters. This project also helps in transforming the whole catering industry in the world. This system will help in reducing the waiting time of customer in the restaurant. It will also reduce the manual service given by waiters and serving staff, and also eliminating the mistakes.

**5. ACKNOWLEDGEMENT**

We would like to thank all the authors of different research papers referred during writing this paper. It was very knowledge gaining and helpful for the further research to be done in future.

**6. RESULTS**



Image of Serving robot

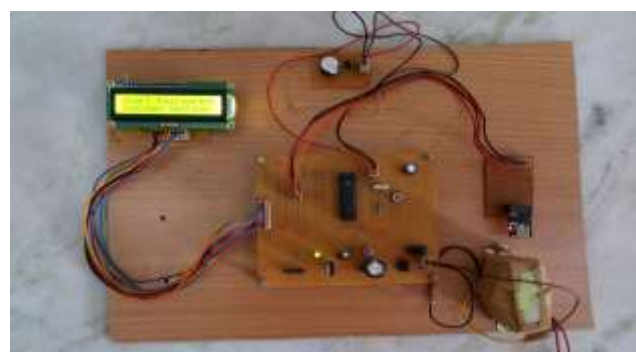


Image of Kitchen section

**REFERENCES**

1. "Implementation of smart restaurant with the EMENU card" by mayur D.Jakhete.
2. "E-Restaurant management system using zigbee and IOT" by Harish phapale.
3. "Smart menu ordering system in restaurant" by Prema.G.
4. "Digital ordering system for restaurant using android" by S.R.Lahane.
5. Khairunnisa K." The Application of Wireless Food Ordering System" in MASAUM Journal of Computing, Volume 1 Issue 2, September 2009
6. N. M. Z. Hashim "Smart Ordering System via Bluetooth" in International Journal of Computer Trends and Technology (IJCTT) – volume 4 Issue 7–Month 2013
7. S. R. Patil "e-converse An affordable touch screen solution to intrigue Dining experience" International Journal of Computer Applications (0975 – 8887) Volume 119 – No.21, June 2015 27
8. K. A. Wadile "E- restaurant management system using robot" in international journal of informative & futuristic research. 2015
9. Ashwini Bankar "Review paper on - Design of Intelligent Restaurant with a Touch Screen Based Menu
10. Sushmita Sarkar "Integration of Touch Technology in Restaurants using Android" in International Journal of Computer Science and Mobile Computing 2014
11. Suradej Sarmaputra," The Food Pre-Order System for Restaurant using NFC Based Smartphone" Technopreneurship and Innovation Management Program Chulalongkorn University.
12. Kiran Kumar reddy, B.Naresh"Intelligent ERestaurant using android OS" international journal of scientific engineering and technology 2014

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