

# WIRELESS SENSORS IN IoT BASED SMART RESTAURANT

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## ***Abstract—***

This paper proposes the use of Wireless Sensors in an IoT based Smart Restaurant to enhance customer experience of restaurants as well as enable the restaurant owners to manage their business more effectively. The system enables customers to place orders wirelessly via an app installed on their smart phones and, can automatically regulate the temperature of the restaurant. The system also comes with an automated door facility. This IoT Smart Restaurant is designed using Arduino Mega and Nano boards and a few sensors which include LM-35 temperature sensor, PIR sensor, HC-05 bluetooth module and action is taken further with the help of Piezo Buzzer, LED's and Servo Motor.

***Keywords—*** IoT, Wireless Sensors, Restaurant, Smart Appliances, Automation

## I. INTRODUCTION

The restaurants that we see today employ a variety of people for some work related to their skills. For instance, chefs for cooking and managers to manage various components. However, the lack of coordination and services is never subtle when a person visits a restaurant. Also, booking a table in a traditional restaurant has some serious issues. Customers often don't know how many tables are free and often have to wait in long queues. Moreover, unforeseen anomalies have many times led to failed booking of tables. All these issues can be efficiently resolved by integrating Wireless Sensors and Internet of Things (IoT) in the traditional version of restaurants.

The project under consideration is designed to enable restaurant owners overwhelm their customers with a wonderful experience as well as modernize conventional restaurants. This system portrays the implementation of an automated restaurants with wireless functionality on a small scale. This model is cost effective, easy to handle and portable.

## II. REVIEW OF LITERATURE

Internet of Things refers to the capability of network devices to sense and collect data from our surroundings, process it and use it in a way that can be used to connect various devices together. [1] It is possible to increase Internet connectivity beyond the boundaries of standard devices, such as laptops and smartphones and applied to ordinary everyday physical devices. With the advent of innovations in science, these devices can communicate with each other over the internet, and they can be controlled from a far away distance. [2]

Wireless sensor network (WSN) refers to a set of geographically distributed and specialized sensors for monitoring the physical status of the surrounding environment. It also provides functionality to organize the collected data at a central location. WSNs are often used to measure environmental conditions such as temperature, pressure, wind, humidity, etc. [6]

The main idea behind the project was the continuation of the project to led to a development to a greater scale , the aim was to Automate ordering and kitchen services in the business portal model of a system in the new age society ,Visiting restaurant with such small startup ideas in IoT like placing Orders have motivated the group to led to even further development and research in this field one such restaurant is palladium socials have implemented the idea of the automatic order placing has motivated to work towards this field. [10]

The Main Sensors needed research to implement the interfacing with the system like arduino the world wide web provided highly implicative responses for this purpose , the Motor for the Opening of the door of the restaurant is a specialized motor

which is responsible for the amount of opening of the door for the same reason using it was an important aspect of the project – [6] . For the automated order placing system the project needed the Bluetooth connectivity which will interface with the android application ready available on the application store to give an input via the Bluetooth connectivity to select the item which has to be placed – [7] .

Kitchen consisted of the automated cooling system when a temperature rise has been detected in the room, for this purpose a temperature detection sensor was necessary – [8] [9]. For the automated table booking system the project needed the Bluetooth connectivity which will interface with the android application ready available on the application store to give an input via the Bluetooth connectivity to select the table which has to be booked, and supportive LEDs working together with input which is provided to indicate the booked table.

The idea for the implementation was clearer with the reference of the projects which had been created by students in other universities, the project consisted similar idea and provided a base for the development of the project system and the physical layout of the same [5].

### III. SYSTEM DESIGN

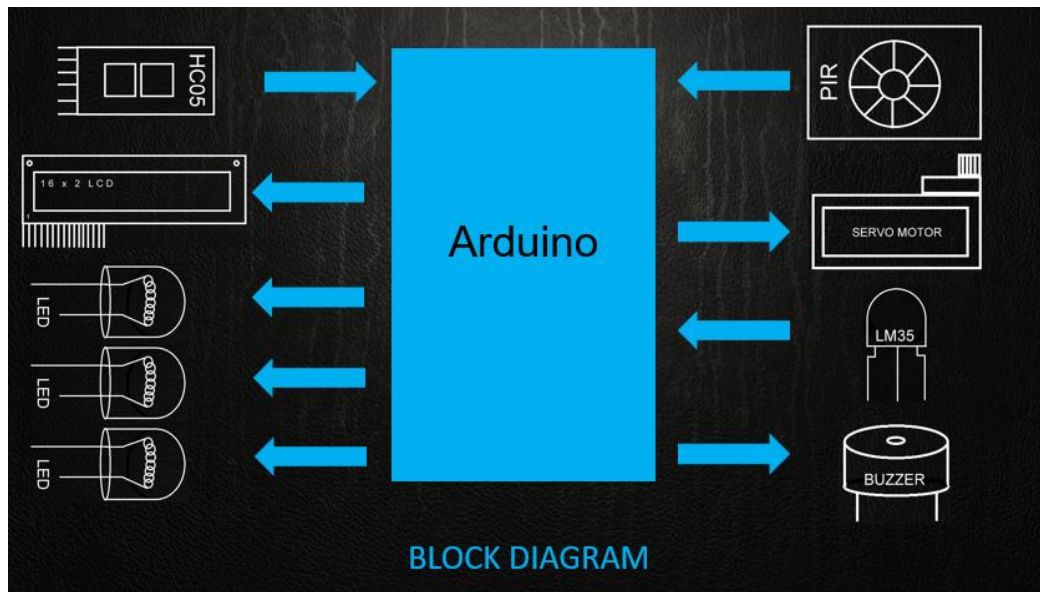


Fig 1. Block Diagram of IoT based Smart Restaurant

### IV. HARDWARE AND SOFTWARE REQUIREMENTS

#### A. Hardware Requirements:

- 1) Arduino Uno
- 2) Temperature Sensor (LM-35)
- 3) Servo motor (SG 90)
- 4) Arduino Nano
- 5) PIR Sensor
- 6) Breadboard
- 7) Bluetooth Module (hc-05)
- 8) LCD Display
- 9) LEDs
- 10) Piezo Buzzer
- 11) Jumper wire
- 12) Arduino Uno & Nano connection wire

## B. Software Requirements:

- 1) Arduino IDE
- 2) Arduino Bluetooth Control App
- 3) Bluetooth Connectivity

## V. IMPLEMENTATION STEPS

1. Firstly, all the individual modules of the system are implemented separately and testing of each of them is carried out independently.
2. All the individual modules are now integrated into a monolithic system and testing of the entire system is performed.
3. The smart phone app is connected to the model via Bluetooth HC-05 module.



Fig 1. Connecting Smart Phone App to HC-05 module

4. When motion is sensed near the PIR sensor, the servo motor gets activated and the automated door of the restaurant opens up.



Fig 2. PIR Sensor & Automated Door

5. Initially, the number of available tables will be displayed on the LCD display and also indicated by the table LEDs.



Fig 3. LCD Display-Available Tables



Fig 4. Available Tables

6. Sending a 'b' on the mobile phone app, customers can book a table and this is indicated by LEDs on the respective table.

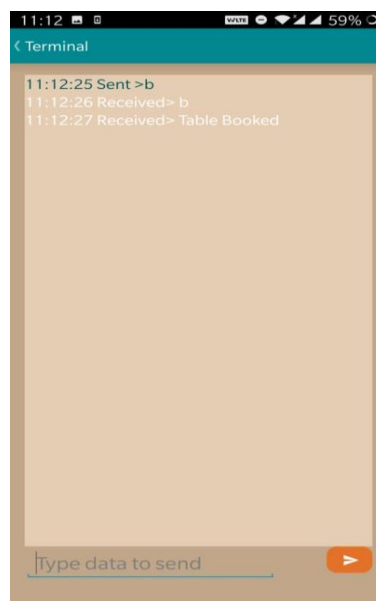


Fig 5. Booking Table via App



Fig 6. Table Booked

7. Customers can place orders through their app as directed in instructions and their orders will be displayed on the LCD display and indicated in the kitchen to the chef by glowing LEDs. In our case, orders like sandwich, burger and cold drink can be ordered by pressing a 's', 'b', and 'c' on the mobile app respectively.

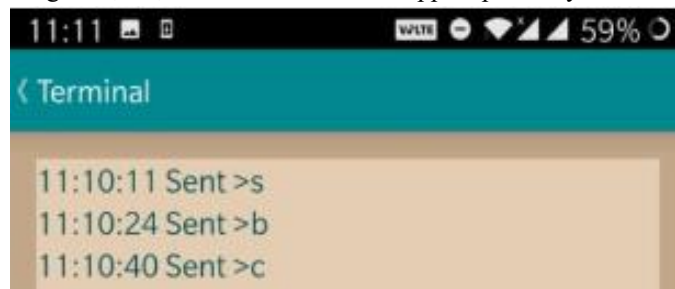


Fig 7. Selecting order items via app



Fig 8. Orders displayed on LCD display

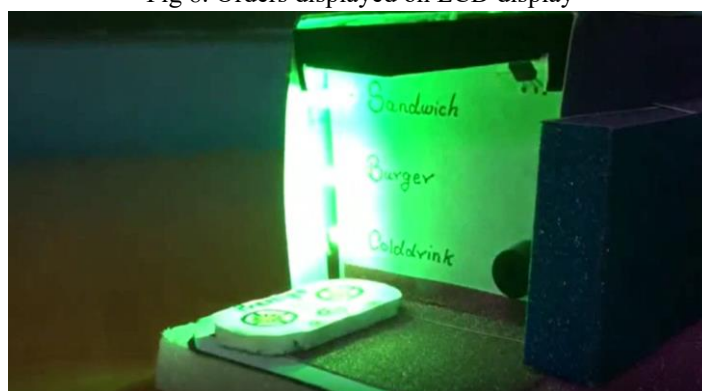


Fig 9. Orders indicated by LEDs

8. The customers can give a 'p' command in their mobile application to place their orders.

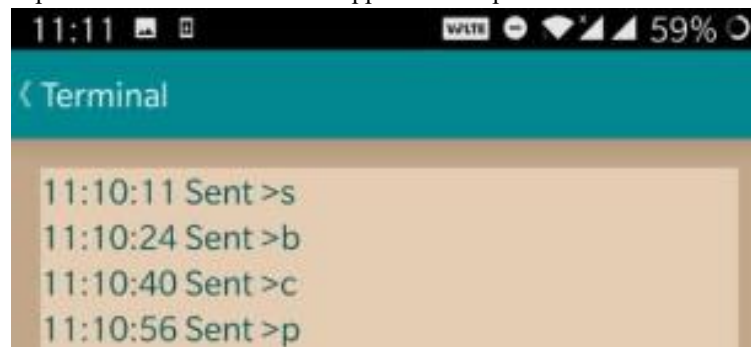


Fig 10. Place order via app



Fig 11. Order Placed-LCD display

8. If customers want to place another order, they can press an 'o' in their app. This will be indicated by the LCD display and LEDs in the kitchen.



Fig 12. Next order





Fig 13. Next Order-LCD display

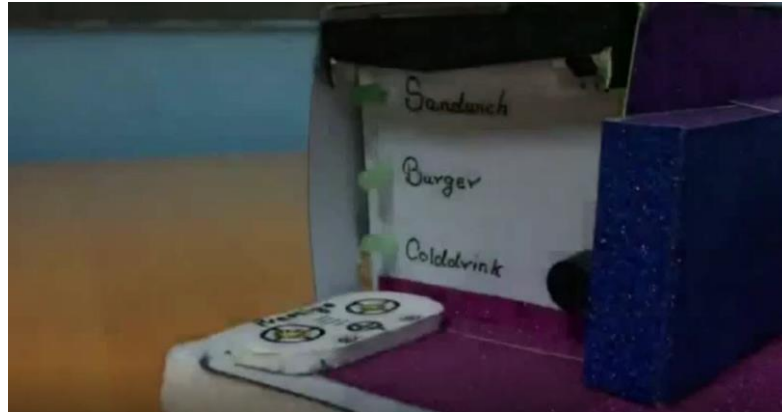


Fig 14. Next Order-LEDs

9. When the temperature rises, an alarm will be sent off indicating the restaurant staff to turn on the cooling system. This is demonstrated by bringing fire near the Temperature Sensor which sets off the Piezo Buzzer.



Fig 15. Temperature Sensor and Piezo Buzzer

## VI. RESULT

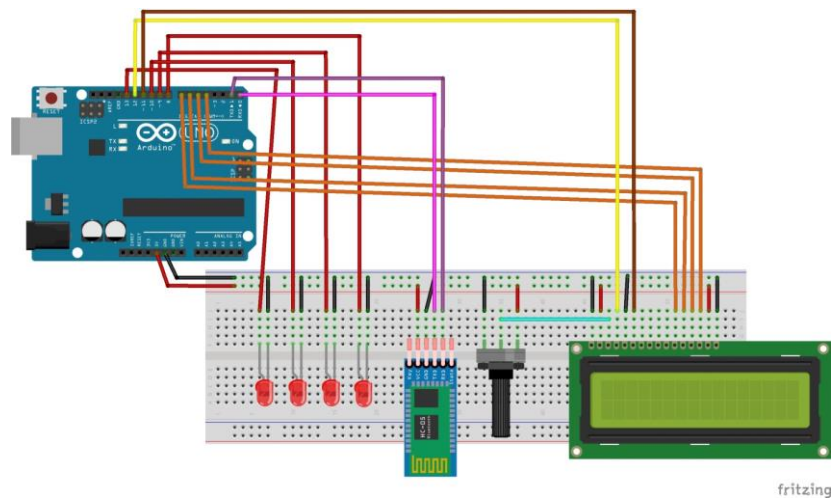


Fig 16. Circuit Connection for Table Booking Module

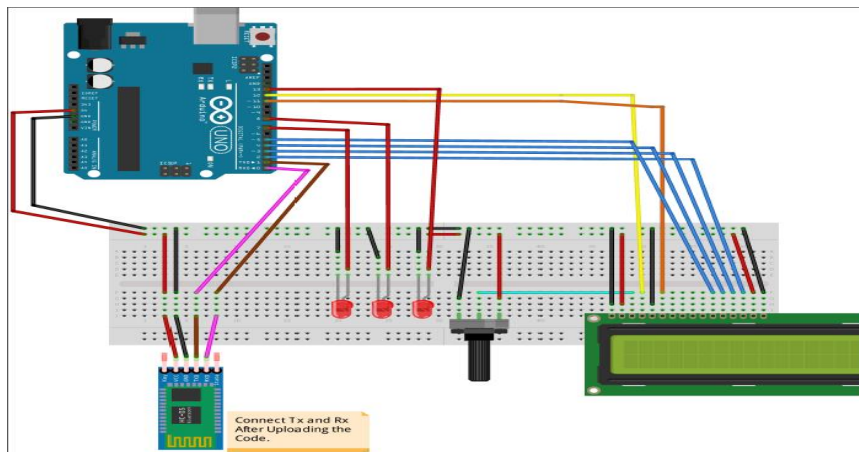


Fig 17. Circuit Connection for Ordering Module



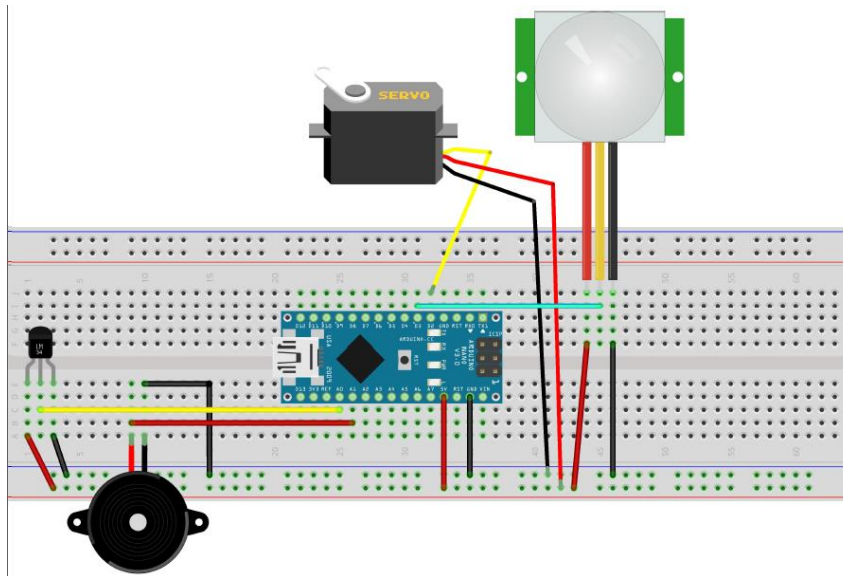


Fig 18. Circuit Connection for Door and Temperature Module

## VII. CONCLUSIONS

Thus, by first testing individual modules and then integrating them together, a prototype model of an IoT based restaurant has been implemented. The original ideas which were intended to be created, a Restaurant model which provides automation through wireless services like table booking, indications, ordering systems, through the use of sensors, wireless automation mechanisms for simple operations which needed work load to be appointed and time consuming , has been successfully created and tested for the prototype environment.

## ACKNOWLEDGEMENT

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