

## SMART KITCHEN SYSTEM USING IOT

Neha Kumari, Radhika Agrawal, Satakshi Singh, Vinayak M S.<sup>1</sup>, Kavana Salimath.<sup>2</sup>

<sup>1</sup>B.E Students, Department of Electrical and Electronics Engineering, DSCE

<sup>2</sup>Assistant Professor, Department of Electrical and Electronics Engineering, DSCE

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**Abstract:** With advancement of technology, life is getting easier. Increase in the number of users of internet over the past few years has made internet a vital part of life, and internet of things known as IOT is the latest technology. In IOT various devices are connected over internet, all connecting and sharing data.

Safety is the main aspect that must be taken into consideration during the activity in the kitchen. In the case of gas leakage, fire and high temperatures must be quickly identified and addressed. The system is designed using different sensors and boards, ultrasonic sensor, ir sensor, gas sensor, flame sensor, node MCU and Arduino UNO. It will help in identifying gas leakage and flame detection after which it will take necessary action and will send notification using IOT.

**Keywords:** IOT, Flame sensor, Gas sensor, Node MCU, Webhooks.

### I. INTRODUCTION

The main aim of Internet of things is to create the life of the individuals easier by automating each task. Factor of safety is the most significant aspect

for designing home, buildings, cities and Industries. The Internet of things (IOT) are often defined as connecting everyday objects like smartphones, sensors and actuators to the web where the devices are intelligently linked together enabling new forms of communication between things and other people, and between things themselves[1]. The kitchen is the most important place in the house. The existence of uncontrolled fire, excessive temperatures, and gas leakage must be quickly identified and addressed.

### II. LITERATURE SURVEY

The prototype of the smart kitchen detects the excessive temperature, gas leakages, takes the proper action and inform the user through a automated message. The major focus was given to the factor of safety as kitchen-based accidents has been increased. The model also includes an IR sensor to control the LED bulb. The LED automatically gets turned off in case of brightness or during day times which in turn save electricity.

### III. PROBLEM FORMULATION

The main objective of the paper "Smart Kitchen using IOT" is to focus on the various aspects of Internet of things (IoT) and its role in smart kitchen. Today, Kitchen based accident has been increased due to excessive temperature, gas leakage etc. These accidents can be avoided using IOT technologies by observing and monitoring the entire kitchen from remote areas.

The hardware used are microcontroller boards like Arduino and Node MCU, Ultrasonic sensor, IR sensor, gas sensor, flame sensor, servo motor, water pump. From the software side use an Arduino IDE, IFTTT web based service mobile application like Telegram.

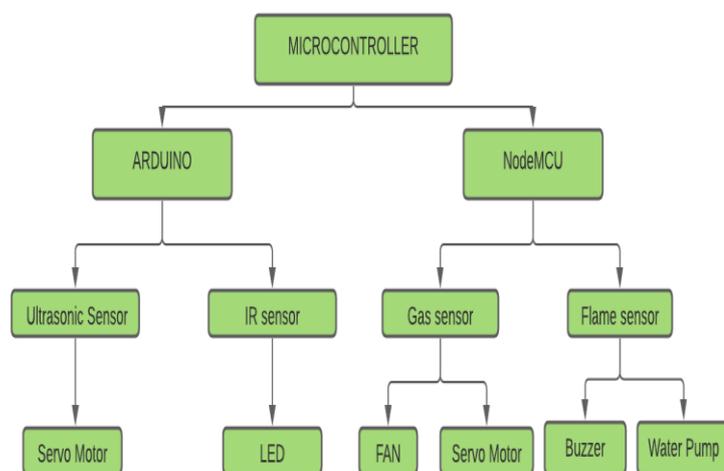
All these sensors are going to be integrated with Arduino UNO processor board and Node MCU board, to control the movement of the door, to observe the gas leakage or fire and take the actions consequently.

Paper is based on the role of IOT in smart kitchen. Different kind of sensors are used for automatic control of the kitchen door, detecting the gas leakages, detecting the fire in the kitchen etc.

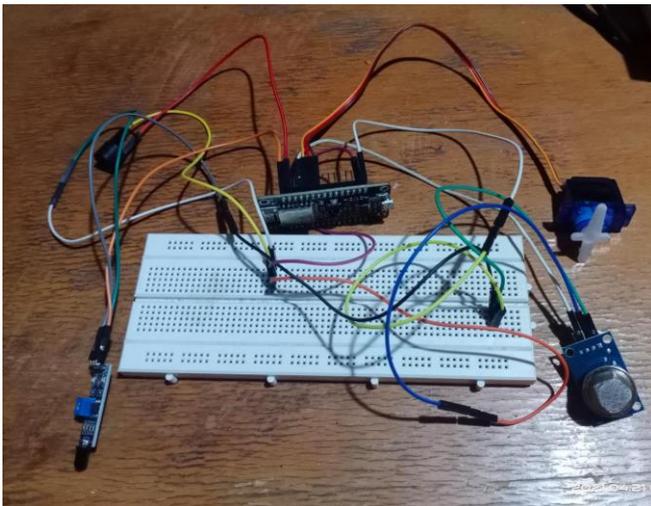
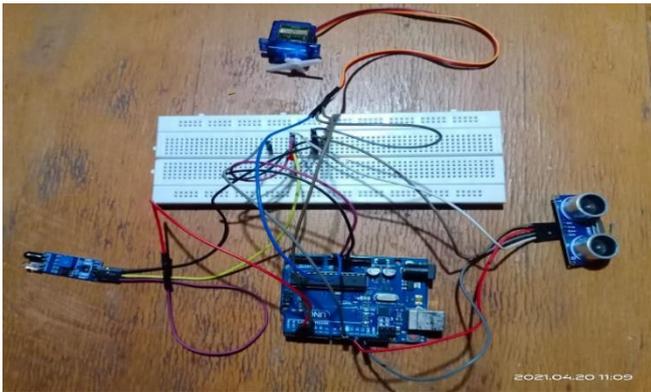
Two microcontroller boards Arduino and a Node MCU(ESP8266) module are used. The Arduino board is connected to the Ultrasonic sensor and IR sensor. The Ultrasonic sensor controls the servo motor of a door and automatically opens the door, if a person is near to the door of the kitchen. The IR sensor turns the light on during the darkness.

The Node MCU is connected to two sensors, flame sensor and gas sensor. The flame sensor controls two devices a buzzer and a water motor. The flame sensor turns on the buzzer, and controls the flow of water in case of fire. If a fireplace is detected, an automatic email message saying "fire detected" is distributed to the owner of the house. The gas sensor detects the gas leakages. It controls two devices a fan and a servo (to open the window). The fan is connected to a relay and a battery for power supply. In case of the gas leakages the owner receive a phone call and a telegram message saying "Gas leakage detected".

## V. HARDWARE



## IV. BLOCK DIAGRAM



## VI. CIRCUIT DISCRIPTION

### ARDUINO UNO

- It has 14 digital I/O pins out of which 3 are pwm pins and 6 analog pins.
- The ultrasonic sensor has 4 inbuilt pins echo trig VCC and ground.
  - The VCC and ground of ultrasonic is connected to VCC and ground of the Arduino board.
  - The trig pin is connected to pin 2 of the Arduino board.
  - The echo pin is connected to pin 3 of the Arduino board.

- Servo motors have total three female wires: power, ground, and signal. The power wire is red, and should be connected to the 5V pin on the Arduino board. The ground wire is typically black or brown and should be connected to a ground pin on the Arduino board. The signal pin is typically yellow, orange and is connected to pin 8 of Arduino.
- The positive terminal of LED is connected to pin 13 of the Arduino and the negative terminal is connected to the ground pin of Arduino.
- IR SENSOR is used to turn the light on during darkness. It has three inbuilt pins
  - VCC connected to VCC to 5v of Arduino.
  - GND pin connected to GND of the Arduino board.
  - And third is the signal pin connected to pin 10 of Arduino.

### NODE MCU

- Gas sensor has 4 pins Vcc, Gnd, Aout and Dout.
  - Gas sensor pin is connected to D3 i.e pin 3 of digital output in node MCU.
  - Gnd is connected to Gnd of Node MCU.
  - Vcc is connected to Vcc of node MCU
- Flame sensor has 3 pins Vcc, gnd and dout.

- Gnd is connected to Gnd of Node MCU.
- Vcc is connected to Vcc of Node MCU.
- Dout is connected to D0 of Node MCU.
- Servo motors have totally three female wires: power, ground, and signal. The power wire is red, and should be connected to the 5V pin on the Arduino board. The ground wire is typically black or brown and should be connected to a ground pin on the Arduino board. The signal pin is typically yellow, orange and is connected to pin 8 of Arduino.
- Exhaust fan has 2 pins which are connected to relay and Vcc.
- Buzzer has 2 pins. One is connected to D0 and other is connected to gnd of Node MCU.

## VII. SOFTWARE DESCRIPTION

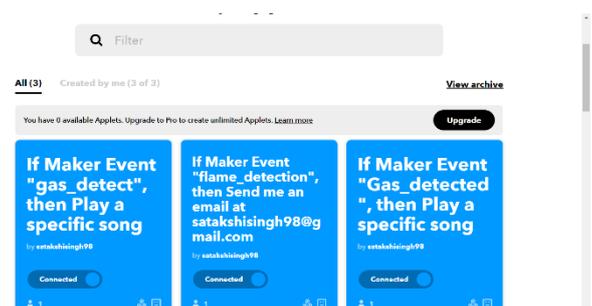
### IFTTT (HOST)

IFTTT host is use to create events using webhooks. Webhooks are the automatic messages sent when some event is triggered. There are many possible options for notification. From there get the link of the event and paste in program in string url.

### SETTING UP NOTIFICATION

Ifttt platform can be used which means if this then that, it is basically a cloud platform. If condition occurs then some action has to take place.

- First create applets for that click on plus icon on the home page of ifttt, which will redirect to a page. There it is written If This Then That, so basically create an trigger and based on that, action has to take place.
- Then again click on plus icon and choose a service. So now search webhooks and click that. Webhooks are used for receiving web requests.
- So now enter name of the event.
- Again click on the plus icon after that and choose the action service.
- In case of flame sensor choose email and in the case of gas sensor choose call me bot service for that or any other according to preference.
- So now enter email in case of email service and number in case of call to receive the notification.
- Now enter the subject and can also add some extra values like when the event has occurred.
- Now click on create action and then finish.
- Now search webhooks in the search bar and click on the service.
- It will direct to the page of webhooks and shows all the events that are created.
- Click on documentation and it will provide the url.



## VIII. WORKING

### METHODOLOGY

- After powering on the system the sensors starts taking input from the surrounding.
- If any person is comes in proximity of door the ultrasonic sensor will give the signal and servomotor will rotate at 90 degrees.
- In the case of darkness the IR sensor turns on and vice versa.
- In the case of fire, flame sensor will detect the fire and sends the signal to buzzer and pump.
- Buzzer will start beeping and pump will turn on water sprinkler system
- Also node MCU will send email to the device.
- In case of gas leakage, gas sensor will detect the leakage and send signal to servomotor and exhaust fan.
- Servomotor will rotate 90 degrees and open the window and also exhaust fan will be switched on.

## IX. ALGORITHM

### ARDUINO

- Step 1: Start
- Step 2: Include the servo library
- Step 3: Initialize pins of ultrasonic sensor, servo motor, LED, and IR sensor and Distance\_threshold.
- Step 4: Set the pins of the ultrasonic sensor LED, and IR sensor to input and output mode.

- Step 5: Attach the servo pin to servo object and initialize the position of servo motor at 0° angle.
- Step 6: Read the input from IR sensor and store it in the variable statusSensor.
- Step 7: If the value of statusSensor == 1, turn the “LED OFF”. Otherwise, turn the “LED ON”.
- Step 8: Trigger the ultrasonic sensor. If the pulse is received, calculate the distance using the formulae  $Distance = (Time \times Sound\ speed\ in\ air(340m/s)) / 2$ .
- Step 9: If  $Distance < Distance\_Threshold$ , rotate the servo motor. Otherwise keep the servo motor in its initial state.
- Step 10: Stop

### NODE MCU ALGORITHM

- Step 1: Start
- Step 2: Include ESP8266WiFi.h, ESP8266HTTPClient.h, Servo.h library
- Step 3: Initialize flame sensor, gas sensor, servo motor and relay pin.
- Step 4: Assign the variables ssid and password with the value of the WiFi.
- Step 5: check if the wifi is connected, If True set the pin of the flame sensor, gas sensor, servo motor to input and output.
- Step 6: Read the input of the gas sensor and flame sensor and store the values in the variable gvalue and fvalue respectively.

- Step 7: If the the gvalue == 0, set the relay to HIGH and rotate the servo to 180°. Otherwise, set the relay to LOW and servo to 0°.
- Step 8: If the fvalue == 0, set the Buzzer and Relay to HIGH. Otherwise, to LOW.
- Step 9: Stop

## X. RESULT

### ARDUINO

Automatic control of the door using ultrasonic sensor and servo motor.

The threshold value for the distance is set to 5 cm.

If the distance between a person and door is less than 5 cm, the servo motor will automatically open the door. If the distance is greater than 5 cm the door will be closed.

```
COM4
Door Closed
distance: 10.73 cm
Door Open
distance: 2.79 cm
Door Closed
distance: 6.53 cm
Door Closed
distance: 195.11 cm
Door Closed
distance: 195.67 cm
Door Closed
distance: 195.42 cm
Door Closed
distance: 194.74 cm
Door Closed
distance: 195.28 cm
Door Closed
distance: 24.85 cm
Door Open
distance: 2.16 cm
```

Control of the led using Ir sensor.

When the status of IR sensor is 0 i.e during darkness, the LED will get turn ON. If the status of

IR sensor is, the LED will get automatically turn OFF.

```
COM4
Status of IRSensor0
LED ON
Status of IRSensor1
LED OFF
```

### NODE MCU

First line shows connecting to wi-fi and it will print “...” while it is getting connected. Then it will print home IP address. 1 denotes flame and gas sensor is not detecting any flame and gas respectively.

```
COM4
Connecting to ACT102514978414
.....
IP address:
192.168.0.102f11
11
11
11
11
11
11
11
11
11
11
Autoscroll Show timestamp
```

## XI. CONCLUSION

Smart kitchen has various features like flame detection, gas leakage, automatic light and door. It can do various things like in case of flame detection it will send email and in case of gas detection it will send call. Also in case of flame detection it will switch on water sprinkler system and in case of gas leakage it will open the window and exhaust fan. It is a very good alternative to conventional method of cooking because it not only makes work easier but also has additional safety measures which can prevent various accidents. Same model can be implemented in the same model in hospital, hotel, and even at homes.

## REFERENCES

- [1] "Innovations in Computer Science and Engineering", Springer Science and Business Media LLC, 2019