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Intelligent Stove using NodeMCU

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***Abstract*—** Internet of things is the network of devices and home appliances that contain electronics, software, actuators, and connectivity which allows these things to connect, interact and exchange data. The recent advances in sensor technology empower adaptable smart systems targeting safety. Smart sensing in ambient systems enables to enhance safety during cooking which is very important for people. The Intelligent Stove is an IOT based project which aims at automating the operations of gas stove and notifies the user about status of the stove with the help of mobile application. The main problems using gas stove is the failure of gas leakage detection, overcooking and people forgetting to turn it off. To overcome these problems we have designed a system which detects gas leakage and rotten smell. The system consists of smoke sensor, gas sensor, buzzer and a motor attached to knob of the stove and a Wi-Fi module to connect to the mobile. It also has an automated knob which can be controlled with the help of mobile application. The knob is automatically turned off in case of gas leakage and the buzzer is activated and a notification is sent to the mobile so that quick action can be taken by the user. The knob can also be controlled through the application.

***Keywords*—** gas leakage, IOT, NodeMCU, sensors

I. INTRODUCTION

IOT has changed the life of human beings. Massive increase in users of Internet and developments in the Internet technologies has enabled the connection between the physical objects around us. order to prevent leakage. And when we speak about technology, there is a major shift happening and it is centered around the Internet of Things (IoT). The IoT is mainly about connecting the unconnected objects or things. In the current world, most of the objects are not connected to the internet as well as to the computer network, but that paradigm is rapidly changing. Previously unconnected objects or things that surrounds us are provided with the ability to interact with other objects or people, this in turn drives new services and efficiencies in our lives. This was the basic idea behind t h e t e r m I o T .

Liquefied petroleum gas (LPG) is used in our home for cooking purpose. It is a flammable gas, if this gas leaks it might cause damage to life and property. The leaked gases when ignited may lead to explosion. Due to this, number of deaths has increased in recent years. Therefore it should be handled safely and additional care has to be taken in order to stop the leakage of gas. To detect gas leakage and alert the user through buzzer and display the status of the stove on android mobile is the aim of designing this system.

The main objective of the project is to detect the gas leakage by activating the alarm, informing the user via app notifications and automatic controlling of stove knob. A real time database is used for fast storage and retrieval of sensor data. The additional advantage of this system is that the user can view the status of the stove from anywhere in this world and can control the knobs of the stove. The IOT components used helps in making the system much more cost effective in comparison with traditional Gas detector systems.

Gas sensors are used in this system to detect the leakage. Servo motor is used to control the knobs of the stove. Whenever there is leakage in gas, the sensor will sense and automatically the buzzer will get on, the knob will be turned off using the servo motor and notification will be sent to the user. Therefore there will be continues monitoring of gas leakage and hence the stove is made intelligent.

II. LITERATURE SURVEY

In Paper [1], A Toxic Gas detection system based on IOT was developed. This system has become efficient and ease to use in many industry and home based applications. This gave Internet of Things a big jump in today's technology. The main units of the system were raspberry pi3 and gas sensors. The results of these developments were so useful that in the common free region of IoT an automation environment was created so that user was relieved from looking after the stove.

In Paper [2], The measure taken for gas leakage was to notify the neighbors. So an alarm was used which gets activated automatically in case of any leakage in and around

the system. Also an email or SMS was sent to the user of the system. The output generated from the system is stored in a database which will be useful for predictions that can be made in future. This IoT based system was much more effective and useful than the traditional systems which were used for gas detection.

In Paper [3], The smart system based on IoT ensures the safety in home and industries by sending quick notification to the user through the android App developed specially for this system. Then, the user of the app can control and monitor the stove sitting anywhere. This system has an additional feature of gas refilling. It uses a load sensor which would sense the amount of gas in the cylinder. If it goes below a certain minimum a message was sent to concerned authority. If in case the user forgets to turn off the stove after use, an alarm got activated there by helping in efficient use of fuel energy.

In Paper [4], The system developed here does not use alarm unlike others. It simply notifies the concerned user regarding the gas leakage there by making the stove system intelligent enough to react to changes occurring in the environment. Thus creates a calm & safe place for the people around. As usual gas sensors detected the leakage of the gas in the stove and produced outputs. A special ATmega32 is used which is a microcontroller. This is used for the interface to happen with data output and the controller. A mobile phone configured with GSM technology is used to send quick messages to the concerned user.

III. PROPOSED METHODOLOGY

The proposed method is to make the operation of the stove automatic which eases out the user in controlling the stove. The intelligent stove comprises of three subsystems: (1) central processor system which is a microcontroller that is responsible for all decision making process along with that (2) sensor subsystem that senses the physical quantities to identify gas leakage (3)Module to send and receive messages to the user.

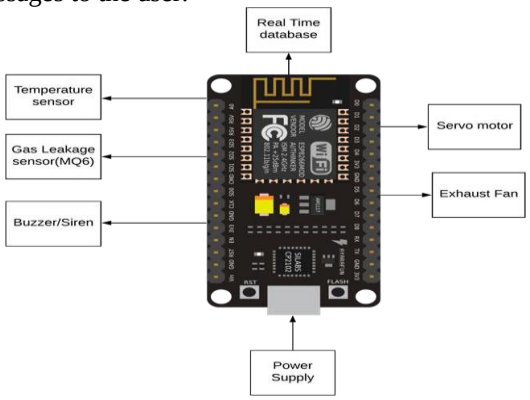

Fig1 System Architecture

A set of sensors are connected to the Node MCU board. Each sensor used has its own functionality. The temperature sensor detects the temperature of the surroundings. The gas leakages sensor checks if any LPG gas leakage is there in the system, if any leakage is noticed the sensor gets activated and send electric pulse to the Node MCU board. If the stove is on, then stove is automatically turned off with the help of servo motor and the buzzer is also activated so that the user can take quick action. The servo motor can also be controlled by the user, this motor is connected to the knob of the stove, so the flame can be increased or decreased or can even be turned off. The Node MCU board is the central processing system. It takes the sensor inputs and processes it and is stored in real time database. The user input received from the application is processed by the microcontroller and sent to the servo motor. The in-built Wi-Fi module is used to connect to the network so that the user can be notified in case of emergencies. All the interactions done by the user is sent to Node MCU with the help of Wi-Fi module.

IV. HARDWARE IMPLEMENTATION

The hardware components used for this system are Node MCU, MQ6 sensor, temperature sensor, servo motor, buzzer, and fan. The MQ6 checks for any gas leakage in the environment and sends the data to Node MCU where all processing is done. The temperature sensor constantly monitors the temperature of the gas stove. The servo motor acts as the knob of the stove. It is controlled based on the input received from Node MCU. The buzzer is used to notify the user and fan acts as prototype for exhaust fan which is turned on in case when MQ6 is activated.

Node MCU

NodeMCU is microcontroller used which is an open source IoT platform. It consists of firmware which runs on the ESP8266 Wi-Fi, and hardware which is based on the ESP-12 module. The term "NodeMCU" refers to the firmware rather than development kits.

MQ6

The MQ6 is a liquefied petroleum gas (LPG) sensor. It can be used for gas leakage detection equipment in consumer and industry applications, this sensor is mainly used for detecting LPG, iso-butane, propane, LNG. The sensitivity of detection can be adjusted by the potentiometer.

Temperature sensor

A temperature sensor is a chip that tells you what the ambient temperature is. The temperature sensor uses a solid-state technique to determine the temperature of the surroundings. The fact as temperature increases, the voltage across a diode increases at a known rate is used to measure temperature.

IV. SOFTWARE IMPLEMENTATION

Node MCU supports C language. Arduino IDE is used to write the algorithm and to upload it into Node MCU. The flowchart of the proposed system is shown below. The flowchart explains how the system works, first it checks if the stove is on by getting the position of the servo, if it is more than 0 degrees then the stove is on else it is considered as off. If the stove is on then there might be two cases, one is where the stove is working normally and there is no gas leakage. In this case the status of the stove and servo is updated to real- time database. The other case is where the gas leakage isdetected, in this case the NodeMCU sends command to turn servo to 0 degree, turn on buzzer, update the database and notify the user. There is also a consideration when the stove is off and there is a gas leakage, in this case the user is notified and the buzzer is activated and it is updated in the database.

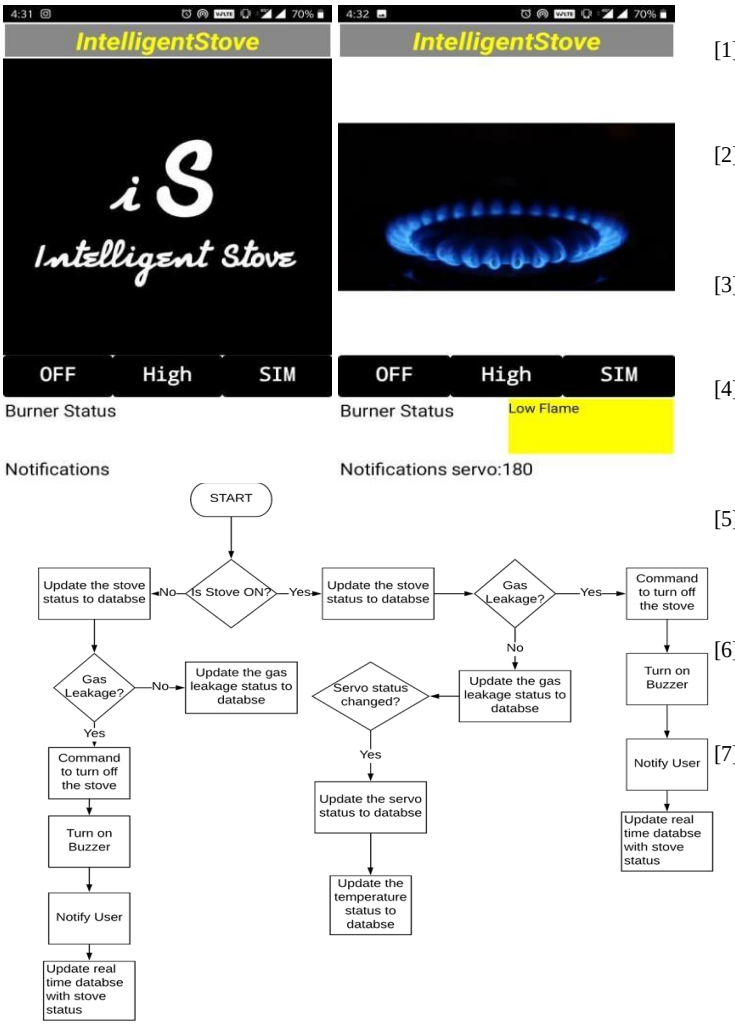

Fig 2: Flowchart

The mobile application is designed using MIT app inventor. The application mainly shows the status of the stove and notifications appear when changes take place in database. The user can control the stove using this application. The user can turn on, turn off and adjust the flame of the stove. There are three buttons which are used to do these operations. The image also changes which shows if the stove is on or off.

V. CONCLUSION

The Intelligent Stove constantly monitors and detects the gas leakage in the stove surroundings and the data gets stored in the firebase real time database. The IOT components thus helps in making the system smart and cost efficient. The system alerts and responds quickly in case of gas leakage with the help of alerting mechanism and turns off the knob automatically. The user can control the stove from anywhere through the App developed for the system.

REFERENCES

[1] IoT based Gas Leakage Monitoring and Alerting System with MQ6 sensor, submitted by Rohan Chandraa Pandey1, Maneesh Verma2 , Umesh Kumaar Sahu3 , Saurabh Deshmukh4 © 2018 IJCRT | Volume 6, Issue 1 January 2018 | ISSN: 2320-2882.

[2] IoT based Gas Leakage Detection System with Database logging, Prediction and Smart Alerting, submitted by IOSR Journal of Engineering (IOSRJEN) www.iosrjen.org ISSN (e): 2250-3021, ISSN (p): 2278-8719 Chaitalee Bagwe1 , Vidya Ghadi2 , Vinayshriee Nayak3 , Neha Kunte4.

[3] IoT based Smart Gas Monitoring System, submitted by Anandakrishna S, Deepesh Nayar IOSR Journal of Electrical and Electronics Engineering (IOSR-JEEE) e-ISSN: 2278- 1676, p-ISSN: 2320-3331, PP 82-87 www.iosrjournals.org.

[4] Intelligent Stove for Gas Leakage Detection, submitted by: Sriirsath Shradha, Somvamshi Snehaal, Chavan Ameya, Tambe Rahuu, International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 5, Issue 5, May 2016.

[5] Smart Kitchen using IoT, submitted by Mr. Gourav V Tavale-Paatil, Miss. Kalyaani H Kulkarani, Miss. Puja U Kuvad, Miss.Puja R Pawar, International Journal of Research in Advent Technology (E-ISSN: 2321-9637) Special Issue National Conference "NCPCI-2016", 19 March 2016.

[6] Smart Gas System for Kitchen using Internet of Things, submitted by J. Damodhar et al. (IJITR) INTERNATIONAL JOURNAL OF INNOVATIVE TECHNOLOGY AND RESEARCH Volume No.4, Issue No.4, June – July 2016

[7] 3306 – 3311.

