INTERNET OF THINGS ENABLED SMART AUDITORIUM WITH MONITORING SYSTEM

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Abstract: The main purpose of this project is to design and employ of power saving and security of the people in general places like auditoriums and class rooms etc., by using IOT. This project describes the smart working of electrical and electronic devices with automatic control with the help of Arduino controller. Power saving is achieved by controlling electrical appliances depending on the temperature and number of seats filled in the auditorium or class room. In this project seating arrangement is based on number of persons in auditorium. In this project we place a feedback system to take online feedback regarding the lecturer's teaching in class rooms and stage performances in auditorium. For the security purpose we use alarms to give warning immediately. The digital economy requires services be created in nearly real time – while continuously listening to the customer. Managing and analyzing the data collected about the stage performances in auditorium become very critical. It is not a problem quickly; we require automation of feedback processing. To hear a real this project overcomes the above problem through a device having feedback options like GOOD, AVERAGE and BAD current practice and the potential for customer feedback collection using Internet of Things Technology. This method provides the live feedback to authorized persons and data can be stored in Internet of Thing Cloud. This data can be used for further analyses and prediction.

Index Terms **– Internet of Things(IoT), IoT enabled Smart Auditorium.**

I. INTRODUCTION

The development of the new technologies in the area of electronics has brought tremendous changes in the day to day life of human being. In new technology, automated systems are more preferable than manual system. The power monitoring and controlling of electric equipment are developed using developed technology. Currently, it is required to avoid wastage of power. An IoT enabled system is designed for controlling the equipment's and monitoring systems using Blynk application. Automatic power controlling and monitoring system is designing for making an auditorium's lighting system as well fans easily controllable and monitoring. The fans and lights will be automatically turn ON in auditorium after detecting number of persons seating with their respective location. This is effective method to control the no of electric equipment's and to reduce power consumption.

Electronic Feedback system (EFS) retains all the characteristics of feedback by ballot papers, while making papers a lot more expedient. Being fast and absolutely reliable, the EFS saves considerable time, money and manpower. And, of course, helps maintain total feedback secrecy without the use of papers. The EFS is 100 per cent tamper proof. And, at the end of the feedback, just press a button in a Mobile there will be a result. A lot of enterprises, institutions and businesses have been underestimating the importance of digital customer feedback system. They fail to comprehend that it is essential when it comes to generating new business leads and retaining loyal customers. Advertising is a powerful tool and it is considered to be an excellent way to generate brand awareness. Product promotions and advertisements help to provide updates to customers about product features, development and new products.

However, capturing and addressing to customer feedback is more critical for better customer satisfaction. When customers are buying a product what is the first and foremost thing that they always look for before committing to a product? It is the 'customer reviews'. This is solely, done because people trust reviews and user ratings over advertisements and promotions. Numerous research and several studies have been carried out in order to support this theory. Customers have a tendency to compare reviews and reasons while purchasing products and selecting services. The results of the various studies and research have been found out to be that customer feedback is of utmost priority. Such is the power of customer feedback, reviews and user ratings. Companies and businesses, nowadays, are keen on receiving and publishing customer feedback to better their services. This is an avenue, which they are exploring, because they want to have an edge over the competitors.

To create a power management system across 52 campus buildings to monitor and improve the management of power consumption, and guarantee efficient energy usage. The ability to monitor power consumption at each building in real-time, forecast power demands, adjust power consumption, and improve power management. Take advantage of the features of their network to create a power consumption inquiry system. To create a real-time display system to show the power use conditions in each building, in order to push forward and advocate power saving around the campus.

The power monitoring computer workstation uses Web Access HMI to collect data and show status. The system is used to analyze and compare the data and then take appropriate action to reduce power consumption and save energy. In order to ensure that the data will not be lost when there is no network connection, BAS- 3520 DDC Controller is connected to digital multimeter. Then data can be stored temporarily on local computer and will be uploaded when the connection is resumed to ensure the integrity of data. With the advancements in technology and innovation, one can witness the customers' growing reliance on cell phones and tablets. Digital customer feedback system allows organizations to collect and analyze feedback from the customers, more efficiently and effectively, without facing much hassles or disadvantages. In order to compete in the labor market and not lag

behind, businesses need to gain greater insight into the customers' mind. Nowadays, enterprises and businesses are coming up with innovative questions which assist the management in understanding customer sentiments. Companies are taking proactive steps to improve the overall business experience. From understanding your customer to anticipating their needs, a digital customer feedback system can engage your customer at every touch point. It is a customer intelligence platform that provides a dynamic set of real-time tools for the sole purpose of gathering, tracking, and analyzing customer responses.

II. PREVIOUS WORK

There are many projects undertaken for smart controlling of electrical equipment's in the public places like shopping malls theaters etc. Various technologies have been used to implement this keeping power saving as a main motto. Following are the few projects that used microcontroller as the base similar to our project. Sunil Kumar.Matangi, Sateesh.Prathapani [1]. The main aim of this paper is to design and employ of power saving in general public places like auditoriums, shopping malls and theatres etc. To control and monitor all these equipment's or appliances we need a person or controlling system. This paper describes the complete working of electrical and electronic devices with automatic control and also power saving in theatres, shopping malls and auditoriums. To implement this, they have used MCS 51 family microcontroller, IR sensors/LDR (Light Dependent Resister), 16X2 LCD (Liquid Crystal Display). MCS 51 family Microcontroller is used to control the total operation. In our project we implemented controlling system using arduino which is easier than other microcontrollers. Nikita Bagali, Prof. Geeta Navalyal [2]. In this research paper, they have proposed a system to analyze the power usage in gathering hall/auditorium by developing a visitor counter and automatic fan control system. Sukanya Reddy, Rajesh Kaki, Venkataramana Sarparapu, Kranthi Kumar [3]. The main aim of this paper is power saving. Automatic controlling systems are preferred over manual controlling. The design of power controlling and saving project can handle controlling of electrical and electronic devices, appliances etc. Through this project we have tried to show a smart way to control the power consumption and power saving in Auditoriums, Shopping malls and Theatres etc. Now in all cities/areas we have shopping malls, theatres and auditoriums. In these monitoring and controlling appliances becomes very crucial. If less number of people enters into the auditorium, then no need to switch on all the devices. If all the devices turn on then there will be loss of power. If maximum people enter into the auditorium, then automatically all the devices will be switched on.

III. BLOCK DIAGRAM

The below block diagram consists of components like NodeMCU, Servo Motor, IR Sensors, Relays, LCD, DHT 11, Touch Sensors and DC Motor. The IR sensor which act as the input to the processing NodeMCU unit and power supply is necessary for functioning of NodeMCU. IR Sensor helps in counting number of people entering and leaving the auditorium. The Servo Motor angular position changes depending upon the count of people entering or leaving the auditorium.

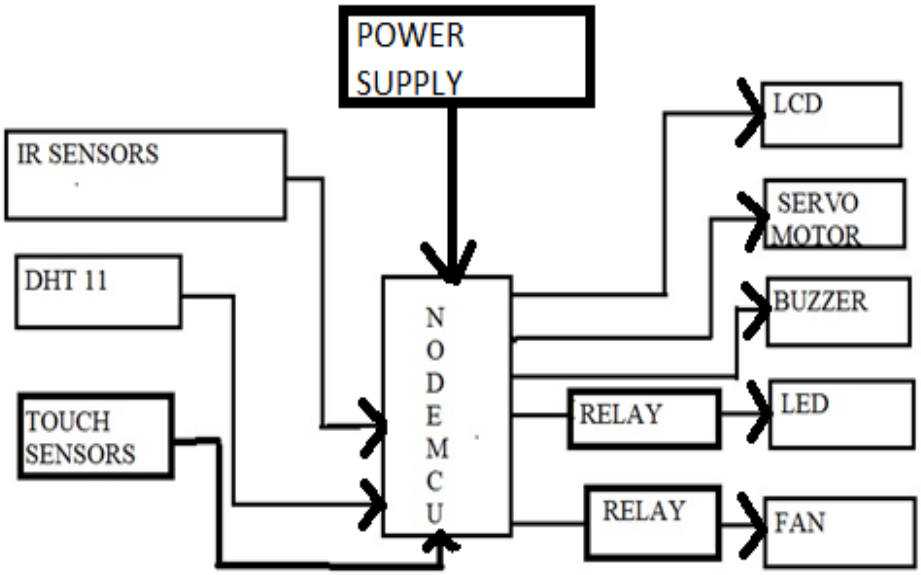

Figure 1: Block Diagram of IoT enabled Smart Auditorium.

A. NodeMCU

The NodeMCU (Node Microcontroller Unit) is open source software and hardware development environment that is built around a very inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Espressif Systems, contains all crucial elements of the modern computer: CPU, RAM, networking (Wi-Fi), and even a modern operating system and SDK. When purchased at bulk, the ESP8266 chip costs only $2 USD a piece. That makes it an excellent choice for IoT projects of all kinds.

However, as a chip, the ESP8266 is also hard to access and use. You have to solder wires, with the appropriate analog voltage, to its PINs for the simplest tasks such as powering it on or sending a keystroke to the "computer" on the chip. And, you have to program it in low-level machine instructions that can be interpreted by the chip hardware. While this level of integration is not a

problem when the ESP8266 is used as an embedded controller chip in mass-produced electronics, it is a huge burden for hobbyists, hackers, or students who want to experiment with it in their own IoT projects.

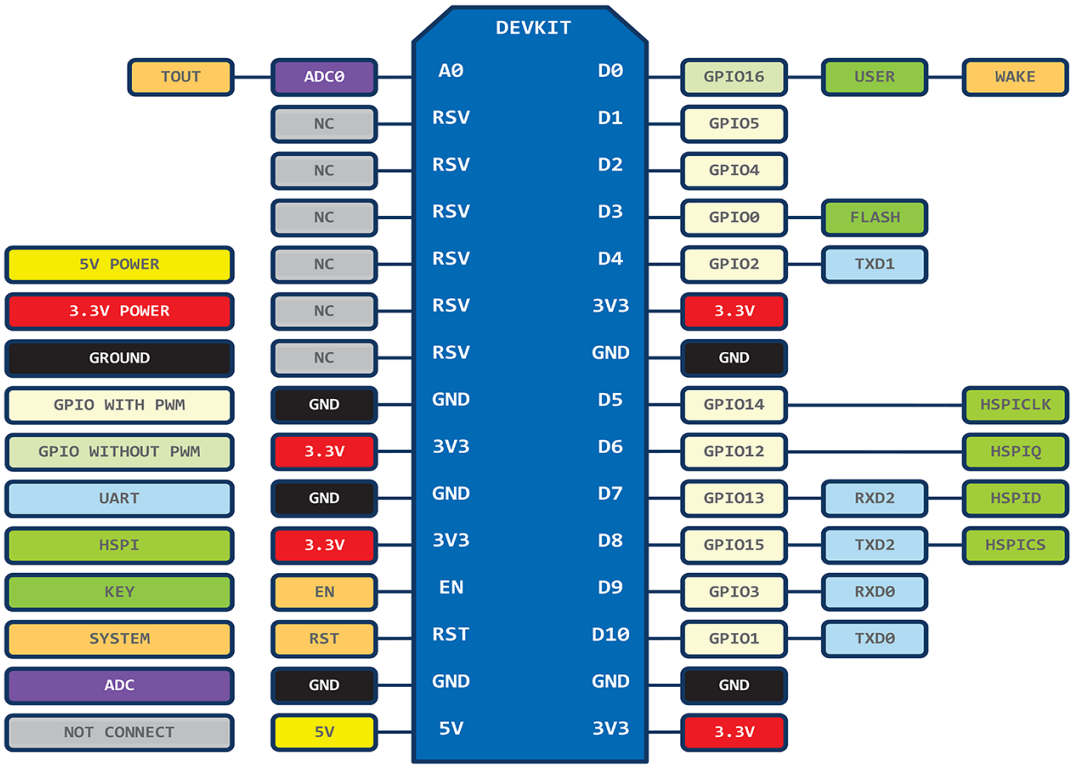

Figure 2: NodeMCU Pin Details.

Borrowing a page from the successful playbooks of Arduino or a Raspberry Pi, the NodeMCU project aims to simplify ESP8266 development. It has two key components. An open source ESP8266 firmware that is built on top of the chip manufacturer's proprietary SDK. The firmware provides a simple programming environment based on eLua (embedded Lua), which is a very simple and fast scripting language with an established developer community. For new comers, the Lua scripting language is easy to learn. A DEVKIT board that incorporates the ESP8266 chip on a standard circuit board. The board has a built-in USB port that is already wired up with the chip, a hardware reset button, Wi-Fi antenna, LED lights, and standard-sized GPIO (General Purpose Input Output) pins that can plug into a bread board. The NodeMCU contains 13 general purpose input and output digital pins which is used as both input and output pins.

B. DHT 11

Digital temperature and humidity sensor is a composite Sensor contains a calibrated digital signal output of the temperature and humidity. Application of a dedicated digital modules collection technology and the temperature and humidity sensing technology, to ensure that the product has high reliability and excellent long-term stability. The sensor includes a resistive sense of wet components and an NTC temperature measurement devices and connected with a high-performance 8-bit microcontroller.

C. LCD

An LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used in DIYs and circuits. The 16×2 translates on a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5×7-pixel matrix.

D. Servo Motor

A servo motor is an electrical device which can push or rotate an object with great precision. If you want to rotate and object at some specific angles or distance, then you use servo motor. It is just made up of simple motor which run through servo mechanism. If motor is used is DC powered then it is called DC servo motor, and if it is AC powered motor then it is called AC servo motor. We can get a very high torque servo motor in a small and light weight packages. To these features they are being used in many applications like toy car, RC helicopters and planes, Robotics, Machine etc.

E. DC Motor

Almost every mechanical movement that we see today is accomplished by an electric motor. An electric motor takes electrical energy and produces mechanical energy. Electric motors come in various ratings and sizes. Some applications of large electric motors include elevators, rolling mills and electric trains. Some applications of small electric motors are robots, automobiles and

power tools. Electric motors are categorized into two types: DC (Direct Current) motors and AC (Alternating Current) motors. The function of both AC and DC motors is same i.e. to convert electrical energy to mechanical energy.

F. Capacitive Touch Sensor

Capacitive touch sensors are widely used in most of the portable devices like mobile phones and MP3 players. Capacitive touch sensors can be found even in home appliances, automotive and industrial applications. The simplest form of capacitor can be made with two conductors separated by an insulator. Metal plates can be considered as conductors. The formula of capacitance is shown below.

$$C = \varepsilon 0 * \varepsilon r * A / d$$

Where ε0 is the permittivity of free space, εr is relative permittivity or dielectric constant, A is area of the plates and d is the distance between them.

IV. METHODOLOGY

The functioning of the system starts with detecting the entry of the people to the auditorium and keeping a track of number of people in it. This count is the parameter to control the appliances like fan. The Fire alarm which is placed at the entry door detects for the presence of fire and buzzer will be turned ON. The entry sensor and exit sensors are kept at the entry and exit doors to detect the people entering and leaving the auditorium which gives a signal to the microcontroller which will have the count of number of people inside and will be displayed on the LCD screen. When a person enters into auditorium it will guide the person into the vacant seat starting from the first row. The temperature sensor will sense the temperature inside the auditorium and give a voltage corresponding to temperature which controls the speed of the fan inside the auditorium.

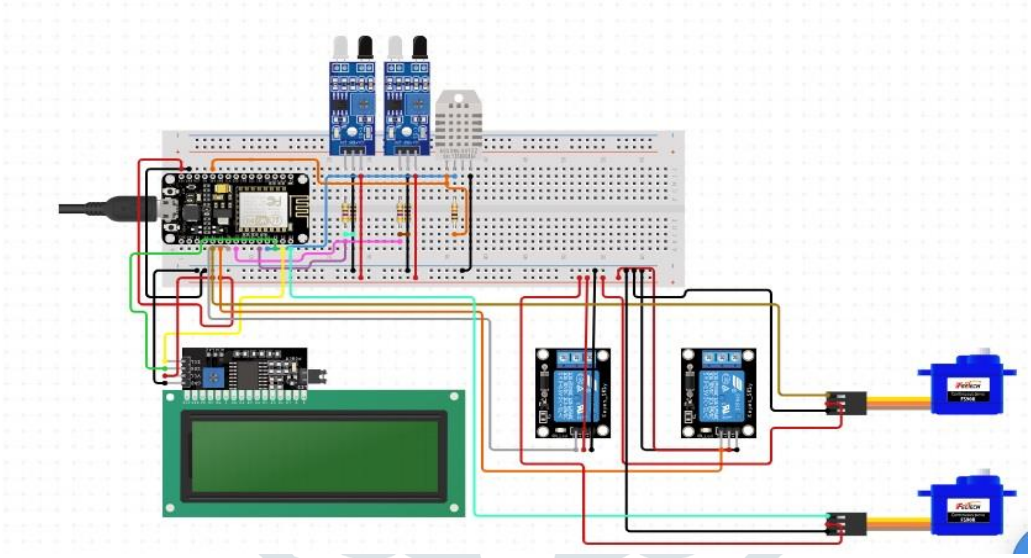

Figure 3: Circuit Diagram of Smart Auditorium.

In this project the capacitive touch sensors have been used for collecting the feedback from the customers. Whenever the customer presses the touch sensor the touch sensor generates the signal and the signal was sent to the controller. Internet of Things technology has been added in it means feedback given by customer can be seen by higher authorities of the organization at the same time and it will be recorded in cloud storage and that data will be sent to the cloud by using the IOT technology. The feedback we can be seen in web or Mobile but here we use the Blynk cloud to send the feedback. We can also use the Blynk app in mobile to know the status of feedback which we can receive the data directly from Blynk cloud.

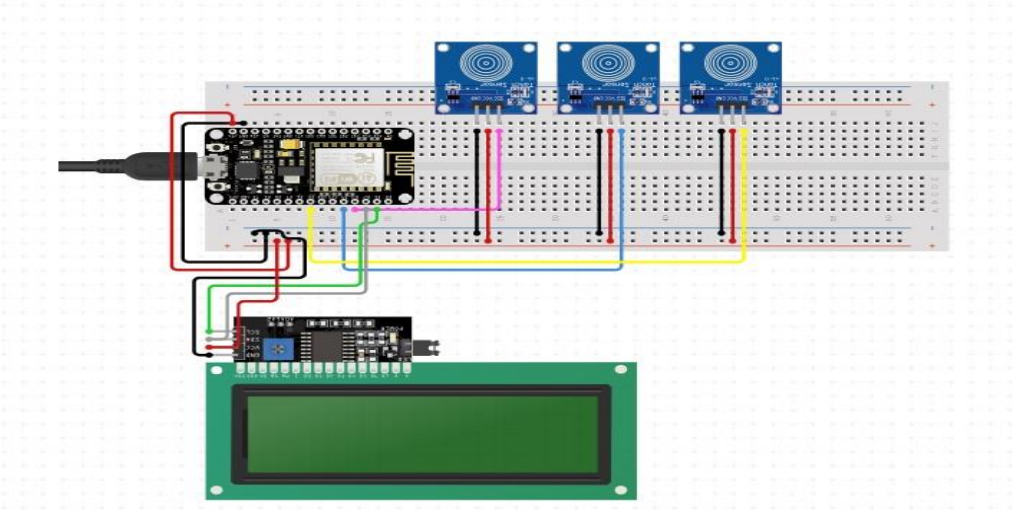

Figure 4: Circuit Diagram of Feedback System.

V. RESULTS AND DISCUSSION

In this project we are going to allocate the seats in the auditorium by the entering and leaving of the persons. Whenever the person is passing through the door the servomotor makes the count of that person, then it is detected by the IR sensor. As soon as the person is detected then the servo motor makes the allocation of seats and the switching of lights and fans gets automated through the requirement of the place. This process is continued till the system is set to OFF.

The result of the smart auditorium can be observed on serial monitor appear in Arduino software which is installed in system and another way of observing output is by using Blynk app. By using this Blynk application we not only observe the allocation of seats but also control the system by switching ON or OFF even we are at distant places.

On switching ON the system, the motor starts working and it makes the count of the person and make it displayed on the LCD screen. While the persons are passing they are detected by the ultrasonic sensors placed and the allocation can be observed on the serial monitor. In the below figure, we observe that the first person is detected i.e., the person is detected at both IR sensors and since it is first person the count of person is given as '1'.In the same process it continue and count of persons increases from 1 to 42 and final count of persons becomes '42'. Similar to the count, the fans and bulbs switched on.

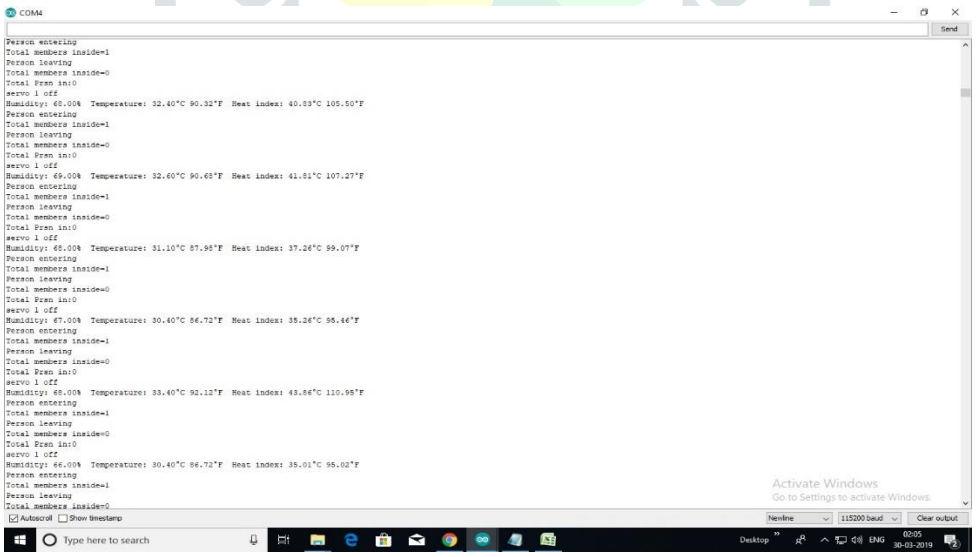

Figure 5: Output on Serial Monitor.

Consider another example to clearly understand smart auditorium system. Repeat the process and observe the output on the serial monitor. The feedback circuits help in analyzing the performance results which is given by the audience to judge whether the performance taking place in the auditorium is good, average or bad. The feedback results are displayed on the LCD.

Figure 6: Output on LCD

VI. CONCLUSION

The IoT allows objects to be sensed and/or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems. It results improved efficiency, accuracy and economic benefit in addition to reduced human intervention. On the other hand, IoT systems could also be responsible for performing actions, not just sensing the things. Intelligent Shopping systems, for example could monitor specific users purchasing habits in a store by tracking their specific mobile phones. Other applications that the Internet of Things can provide enabling extended home security features and home automation. This relates smart home or home automation which induce technology for home atmosphere which is usage to provide ease and protection to its occupants.

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