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AUDITORIUM AUTOMATION USING IOT

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Abstract: Automation is accomplished by the use of a variety of sensors like LDR, IR, Temperature sensor for monitoring production processes, actuators, and numerous techniques and equipment. The automation system established in this project is an automatic lamp and an automatic fan. Light Dependent Resistor (LDR) Provides variable resistance based on light intensity. Microcontroller Interfaces with the LDR, processes light level data, and controls the lamp. An Infrared (IR) sensor uses infrared radiation to detect and measure various physical properties or presence of objects by that visitor count is monitored. Fan operation is based on temperature measurements and fire detection. When smoke or fire is detected, the microcontroller activates the L293D motor driver to operate the fan, Buzzer is used for alert and water pump is used when the temperature gets more. The Wi-Fi module ESP8266 is integrated to enable wireless communication, providing seamless connectivity between the system and user interfaces, such as mobile applications and web-based platforms. In this project mobile application is used. The IoT-based control framework allows real-time monitoring and control. In this project, an Arduino Uno acts as the central controller, It has different groups of pins that allow it to connect with sensors, modules, and output devices. For displaying real-time information, a 16x2 LCD with I2C module is connected to the Arduino, showing sensor readings and system status. By integrating all these components, the Arduino Uno coordinates sensor inputs, processes the data, and activates outputs, thereby creating a fully automated and remotely monitorable auditorium system.

Index Terms **–** Arduino uno, ESP 8266, sensors, IOT.

I. INTRODUCTION

Auditoriums, often used for events, seminars, or cultural programs, require precise control over environmental factors to ensure comfort, safety, and efficient resource utilization. Manual monitoring is inefficient, error-prone, and energy-consuming. This project introduces an automated system capable of real-time monitoring and control based on sensor data. Using microcontroller- based

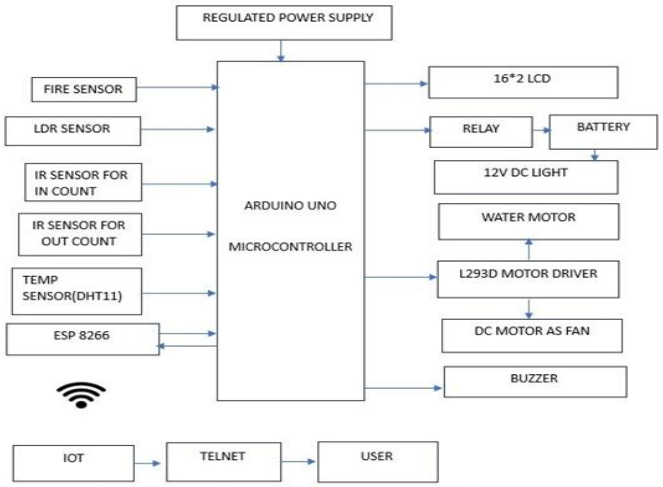

Figure 1.1 Block Diagram

decision-making, the system dynamically manages the internal environment by automatically controlling devices such as fans, lights, and water pumps. The integration of visitor counting adds another layer of automation by enabling the system to act only when people are present, further reducing unnecessary power consumption. This project presents an IoT-based auditorium automation system where Wi-Fi is used to establish communication between the mobile device and the hardware such as microcontrollers like ESP8266. Through this wireless connection, users can monitor and control auditorium devices such as lights, fans, and water pumps directly from a mobile application, Figure 1.1 explains about the system.

II. HARDWARE REQUIREMENTS

The Arduino uno is the central control frame work of entire system to which various sensors, motors, ESP 8266 and other modules are connected directly or indirectly. The system will be power up by using regulated power supply. The communication between user and system is done through IOT, where user can monitor through smart phone.

The main hardware components of the system are:

- Arduino UNO
- Power Supply
- Relay
- L293D motor Driver.
- Liquid Crystal Display (LCD)
- DHT11 humidity sensor
- Fire sensor
- Light-Dependent Resistor (LDR)
- Infrared (IR) sensor
- Light Emitting Diode (LED)
- Buzzer
- Water pump
- DC fan

2.1 ARDUINO UNO

The Arduino Uno is a widely used open-source microcontroller board designed for building digital devices and interactive projects. It is based on the ATmega328P microcontroller, which serves as the brain of the board. The board operates on 5V DC and can be powered through a USB connection or an external adapter. It features 14 digital input/output pins and 6 analog input pins for reading sensor values. The USB port allows for both programming and serial communication with a computer. The power jack is used to supply external power when the USB is not connected. The reset button restarts the program loaded into the board. The crystal oscillator ensures precise timing for the microcontroller's operations. Additionally, the board includes a voltage regulator to maintain a steady voltage supply, TX and RX LEDs to indicate data transmission and reception, and a power LED to show when the board is on. Overall, the Arduino Uno's simplicity, versatility, and compatibility with various sensors and modules make it ideal for beginners and professionals in electronics and IoT projects.

2.2 SENSORS

Sensors are electronic devices that detect and respond to changes in the environment, such as light, temperature, sound, or motion. They convert physical quantities into electrical signals that can be read and processed by microcontrollers like the Arduino Uno. Each type of sensor is designed to measure a specific parameter. These signals help the system make decisions automatically without human intervention. Sensors play a crucial role in automation, robotics, and IoT applications. They increase system accuracy, efficiency, and reliability by providing real-time data. Overall, sensors act as the "sense organs" of electronic and smart systems. In this system, sensors like DHT11, IR sensors, LDR sensor, Fire sensors are used to detect the environment.

III. SOFTWARE REQUIREMENTS

3.1 Arduino IDE

The Arduino IDE (Integrated Development Environment) is a software application that makes it easy to write, compile, and upload code to Arduino boards. It provides a simple interface for beginners and powerful tools for advanced users to interact with Arduino microcontrollers. The Arduino IDE is the official software used to program Arduino boards like the Arduino Uno, Mega, Nano, and others. It is open-source and available for Windows, macOS, and Linux. So, in this system Arduino ide is used.

3.2 Mobile Telnet

Telnet is a protocol that allows to connect with another device over TCP/IP (Wi-Fi, LAN, or internet) and send/receive text commands. In this project, the ESP8266 will act as a small TCP server, and your mobile Telnet app will act as a client. The Arduino sends sensor outputs (like visitor count, temperature, fire alerts, etc.) to the ESP8266, which forwards them via Wi-Fi. Your mobile device connects using a Telnet client app to view these outputs in real time.

Telnet works by establishing a connection between local device and the remote server. It transmits keystrokes and receives the server's responses, essentially creating a text-based communication channel.

IV. METHODOLOGY

The designed auditorium automation system operates by using electrical components and Arduino uno is the central control unit of the system. Arduino uno is a microcontroller board based on the ATmega32BP chip. It acts as the brain of system. It can read input signals from sensors, buttons, etc. and controls outputs like LEDs, motors, displays, relay, etc. based on the program instructions. The Arduino uno board can be powered via USB or an external adapter. The ATmega328P microcontroller starts running the bootloader, which loads the program. Input signals are taken from the LDR sensor, IR sensors, fire sensor and DHT11 sensor, in this system two IR sensors are used for input count and output count.

4.1 Visitor Counting

In this system two IR sensors detect the presence of an object, one counts people entering and the other counts people leaving from the auditorium. By doing this we can know the total number of people in the room.

4.2 Automatic Lighting

The LDR sensor is used to control the light, It operates by photoconductivity principle, where its electrical resistance decreases as light intensity increases and resistance increases as light intensity decreases. It is connected to the analog pin using a voltage divider circuit, allowing the Arduino to detect ambient light levels and control the auditorium lighting accordingly. The light will get ON/OFF based on the threshold value.

4.3 Temperature Control

the DHT11 (temperature and humidity) sensor is used to measure the surrounding humidity and temperature. DHT11 sensor is connected to a digital pin for reading environmental conditions, if the temperature is above 36, Arduino directly receives digital data (temperature & humidity values) and fan will get on.

4.4 Fire Safety

Fire sensor detects infrared radiation emitted by fire or flame, when fire is detected, buzzer gives alert signal by making sound and water pump will sprinkle water to stop the fire.

4.5 Information Display

For real-time information display, a 16x2 LCD with I2C module is connected to the Arduino through the SDA and SCL lines, In this system LCD will display sensor readings and system status.

4.6 Remote Monitoring

An ESP8266 is connected to Arduino TX and RX pins, Arduino will transform the information to the esp8266. An ESP8266 Wi-Fi module is used, enabling wireless communication with a mobile device using a Telnet app, so that the auditorium’s conditions and alerts can be monitored remotely.

V. RESULTS AND DISCUSSION

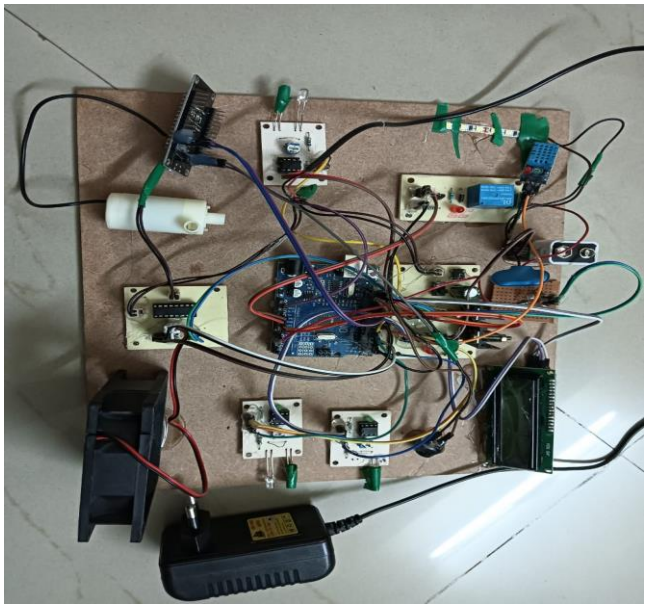

Figure 5.1Final setup of the system

The project "Auditorium automation Using IOT" was designed an automation system for monitoring number of people in the auditorium using Visitor Counting, Automatic Lighting, Fire Safety Information Display, Remote Monitoring, Temperature Control. All the operations in this system can be monitored by using mobile telnet. The above image shows final setup of the project.

5.1 OUTPUT OF LIQUID CRYSTAL DISPLAY(LCD)

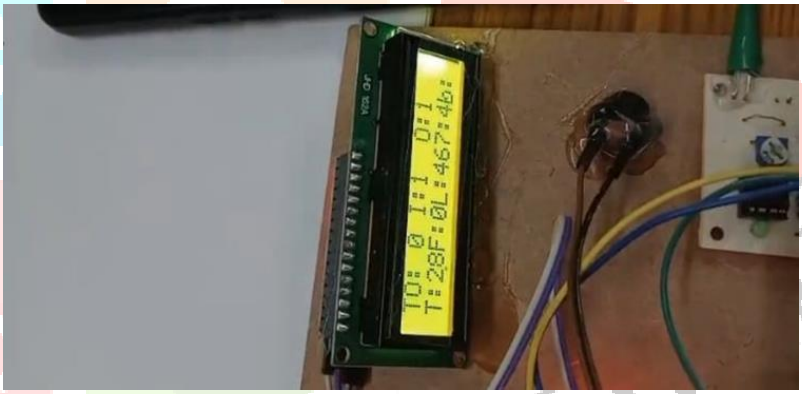

Figure 5.2 LCD Display

The output of LCD, on which it mentions the operation results of the system such as input, output and total values of IR sensor, temperature, fire and light. Figure 5.2 shows the LCD operation.

5.2 OUTPUT OF MOBILE TELNET OPERATION

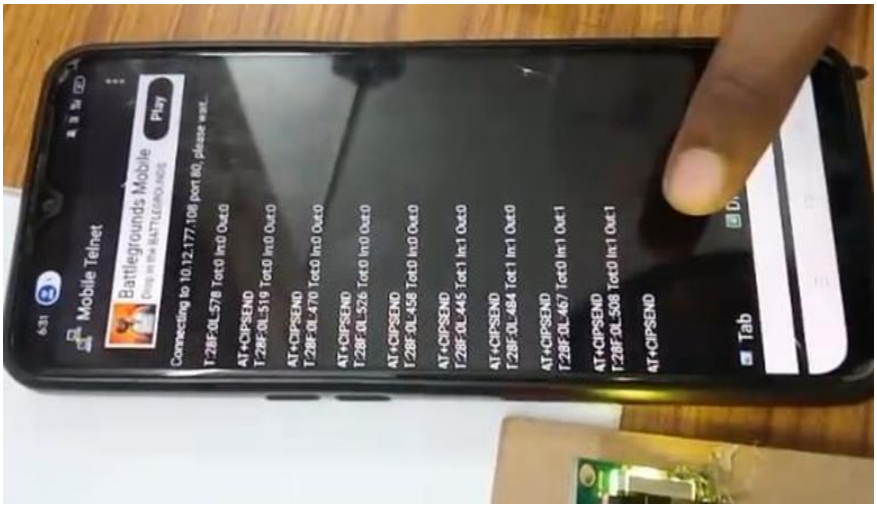

Figure 5.3 Mobile Telnet Display

The output values of the system, such as input, output and total values for visitor count, temperature, fire and light values. By using mobile telnet monitoring process of the system will be easy.

VI. Conclusion

Refer The project "Auditorium Automation using IoT" successfully demonstrates the integration of smart technologies to automate and optimize auditorium operations. Core functionalities such as automated lighting, temperature control and real-time monitoring are effectively implemented using IoT devices and microcontrollers. These systems not only reduce manual intervention but also ensure energy efficiency, operational convenience, and enhanced user experience. The centralized control via smartphone or web interface simplifies auditorium management and paves the way for scalable smart infrastructure in institutional and commercial settings. The Arduino UNO acts as the central controller, processing inputs from sensors (like LDR, DHT11, IR, etc.) and sending data to the cloud or a mobile application via the ESP8266 wi-fi module.

This setup enables monitoring and control over Wi-Fi, ensuring convenience, energy savings, and improved auditorium management. The system minimizes human effort and maximizes operational efficiency with a cost-effective and scalable hardware configuration.

REFERENCE

[1] T. Dinesh Kumar, L. Hemanth Kumar, P. Sai Vijaya Sravan Kumar, V. Rakesh Aditya Sai, “Smart Auditorium Automation Using IOT”, International Journal of Research Publication and Reviews, pp 260-263, February 2022.

[2] Simar Singh, Sourabh Anand and Dr. M.K. Satyarthi, “A Comprehensive Review of Smart Home Automation Systems”, Advances in Computer Science and Information Technology (ACSIT), April-June 2023. pp. 61-66.

[3] Ansh Kapoor, Sarthak Shah, Shashank Agrawal, Preeti Kathiria, Smita Agrawal, “Smart Auditorium Automation system based on object recognition”, International Journal of Recent Technology and Engineering (IJRTE), Nov-2019. DOI:10.35940/ijrte.D9575.118419.

[4] G. Sandeep, Nikhat Firdose Jahan, P.V.Phanidhra, K. Lella Vardhini, A. Sahitya, “Auditorium Monitoring System Using Bi-directional Visitor Count”, Journal of Engineering Sciences,03,2023.

[5] Kamal Elhattab, Karim Abouelmehdi, Abdelmajid Elmoutaouakkil, “Internet of Things (IOT) For Smart City, Agriculture and Healthcare”, Journal of Theoretical and Applied Information Technology,28th February 2022, E-ISSN: 1817-3195.

[6] Noor Kareem Jumaa, Younus Mohammed Abdulkhaleq, Muntadher Asaad Nadhim, Tariq Aziz Abbas, “IoT Based Gas Leakage Detection and Alarming System using Blynk platforms”, Iraqi Journal for Electrical and Electronic Engineering (IJEEE). June 2022. DOI: 10.37917/ijeee.18.1.8

[7] Andrea Zanella, Nicola Bui, Angelo Castellani, Lorenzo Vangelista and Michele Zorzi, “Internet of Things for Smart Cities”, IEEE Internet Of Things Journal, FEB- 2014, Digital Object Identifier 10.1109/JIOT.2014.2306328

[8] Saikat Sarkar, Satyaki Nan, Pryanikar Ghosh, Moinak Adhya, Sandip Kumar Singh, Avali Ghosh, “Bidirectional Visitor Counter with security system and Automated Room Light Controller”, International Journal of Innovative Science and Research Technology (IJISRT), May – 2017.

[9] Aadhya B N, Archana M, Deepika D, Dr. Electa Alice Jayarani, “Bidirectional Visitor Counter”, International Advanced Research Journal in Science, Engineering and Technology, July 2024, DOI: 10.17148/IARJSET.2024.11789.

[10] Akshata Parekar, Sonal Vishwakarma, Poonam Bhalge, Vedant Pande, Prof. Kishor Mahale, “Smart Kitchen Using IOT”, International Journal of Scientific Development and Research (IJSDR), March 2022.

[11] N. Rajendra Kumar, B. Siva Sai Raja P. Jyothi Bhavani P. Bindu Sai Nikhila, Rupalin Nanda, "Internet of Things Enabled Smart Auditorium with Monitoring System", Journal of Emerging Technologies and Innovative Research (JETIR), April 2019.

[12] Anjaly Rajesh, Alen Antony, Femy Jose, R. Satheesh Kumar, "IoT Based Smart Street Light System", Asian Journal of Applied Science and Technology (AJAST), 30 March 2018.

[13] Indiran Mahandran, Jumadi Abdul Sukor, "IoT based Smart Lighting System in an Auditorium", UTHM Publisher. 01 March 2021, e-ISSN: 2773-5303, DOI: https://doi.org/10.30880/peat.2021.02.02.054