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SMART CONFERENCE HALL BY USING IOT

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Abstract : The main control system implements wireless technology to provide remote access from smart phone. We are using a cloud server-based communication that would add to the practicality of the project by enabling unrestricted access of the appliances to the user irrespective of the distance factor. We provided a data transmission network to create a stronger automation. The system intended to control electrical appliances and devices in conference hall with relatively low cost design, user-friendly interface and ease of installation. The status of the appliance would be available, along with the control on an android platform. This system is designed to assist and provide support in order to fulfill the needs of elderly and disabled in college. Also, the smart conference hall concept in the system improves the standard living at college. One of the most important components of a smart conference hall is the motion sensor and microwave sensor, which detects movement within the conference hall and triggers various actions. In this project, we explore the concept of a smart conference hall that uses IoT technology and AI technology. We discuss the benefits of such a system, including increased security, energy Conservation, and convenience. We also highlight some of the challenges associated with implementing such a system, such as data privacy and security concerns.

Keywords **– AI, Microwave Sensor, Motion Sensor, IOT, Smart conference hall, etc.**

INTRODUCTION

In today's fast-paced and interconnected world, technology plays a vital role in enhancing efficiency and productivity in various domains. One such area where technology can revolutionize the experience is the conference hall. With the advent of the Internet of Things (IoT), a new era of smart and connected spaces has emerged, offering innovative solutions to streamline operations and improve user experiences. We proudly present the Smart Conference Hall, a cutting-edge solution that leverages IoT technology to transform traditional conference venues into intelligent and interactive environments. This state-of-the-art system integrates smart devices, sensors, and data analytics to deliver a seamless and dynamic conference experience like never before. One of the key features of the Smart Conference Hall is intelligent automation. Through IoT-enabled devices, the conference hall becomes self-aware and capable of adapting to the needs of its users. As participants enter the hall, smart sensors detect their presence and automatically adjust the lighting, temperature, and audiovisual settings to create an optimal atmosphere for collaboration and engagement.

Furthermore, the IoT infrastructure allows for efficient management of resources. Real-time data monitoring and analysis enable precise control of energy consumption, optimizing lighting and HVAC systems based on occupancy and ambient conditions. This not only enhances sustainability but also reduces operational costs for conference organizers. The Smart Conference Hall also revolutionizes the way participants interact with the space. IoT-enabled devices, such as smart displays and interactive whiteboards, facilitate seamless content sharing and collaboration. Attendees can effortlessly connect their devices and share presentations, documents, and multimedia content, fostering greater engagement and productivity during meetings and presentations. In addition to the enhanced user experience, the Smart Conference Hall offers advanced analytics capabilities. By collecting and analyzing data from various sensors and devices, valuable insights can be derived. Conference organizers can gain a deeper understanding of attendee behavior, preferences, and engagement patterns. These insights can inform decision-making, enabling organizers to optimize future events, tailor offerings, and provide personalized experiences. Security and safety are paramount in any conference setting, and the Smart Conference Hall addresses these concerns comprehensively. IoT-based security systems ensure secure access control, video surveillance, and real-time monitoring of the venue. Any suspicious activities or incidents can be swiftly detected, enabling proactive response and ensuring the safety of participants and assets.

LITERATURE SURVEY

A system was developed by M.L. Sharma, which utilized a used Android mobile phone to send commands to an Arduino board through a Wi-Fi module. The Arduino processed these commands to control various home appliances, such as fans and lights, by adjusting their voltage levels. Users could conveniently monitor the status of their home appliances through their Android mobile phones. However, there were some communication delay issues between the remote control device, inner control device, and outer control device, which posed a limitation for further improvement [1]. This technology proved particularly beneficial for individuals with disabilities, as it allowed them to control home appliances through a Bluetooth interface. The system enabled users to turn appliances on and off, with the respective input received from the Bluetooth interface, while the state of the appliances was displayed on an LCD screen via an installed Android application on their smart phones [2]. The Internet of Things (IoT) has greatly impacted the market for home automation devices, with increased collaboration among enterprise players to create interconnected ecosystems. As our devices become smarter, the competition in the IoT consumer product market is expected to drive further innovation. The Smart Homes Summit, now in its third year, focuses on voice AI capabilities and service innovations for the home [3]. In the context of the Android operating system, a remote control program was developed to establish Wi-Fi communication with a robot. This wireless control system addressed the fundamental need for wireless network control. The researchers aimed to make home automation more accessible for disabled and elderly individuals by implementing voice commands. They also sought to reduce the time taken to recognize and respond to these commands, while exploring the application of this idea in other real-world scenarios [4]. R. Piyare emphasized the benefits of controlling electronic appliances through a mobile phone and Arduino, highlighting its cost-effectiveness and durability compared to traditional electric switches. The use of Bluetooth and Ethernet provided wireless communication between the Arduino and smart phone, allowing for short-range indoor communication and long-range connectivity across the world, respectively [5]. In another project, a system was designed using the Blynk framework, enabling control and monitoring of appliances via a smart phone connected through Wi-Fi. A Raspberry Pi served as a private server, facilitating communication between the appliances and sensors connected to the internet via a Node MCU [6]. Another researcher discussed their work on a smart central controller that established a wireless sensor and actuator network (WSAN) using a 433 MHz frequency. Control modules, including switch modules and radio frequency control modules, were developed within the WSAN to directly control a wide range of home appliances [7].

PROPOSED SYSTEM

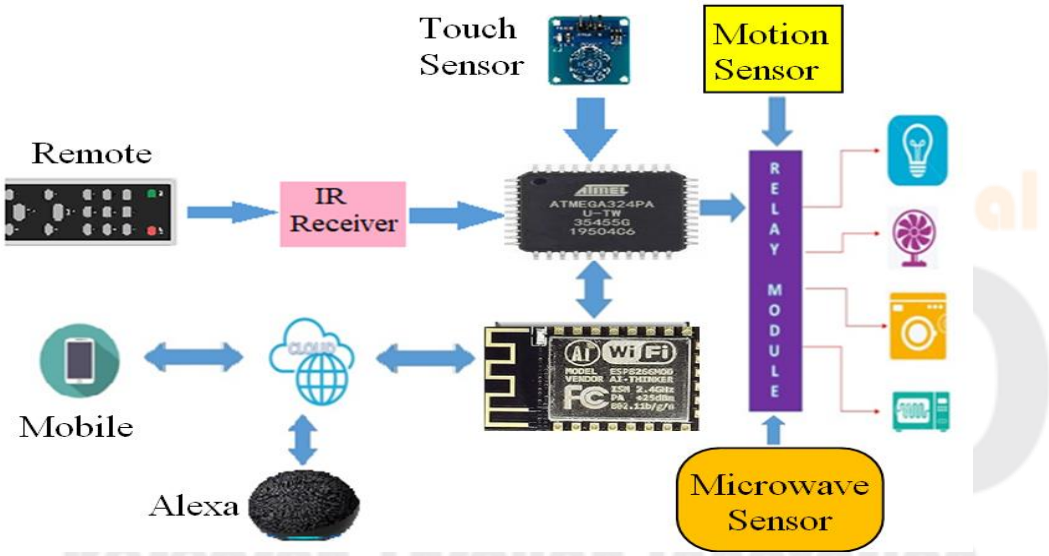

fig.1: block diagram

The above figure 1 shows the block diagram of system. The heart of the system is Node MCU. Node MCU is an open source IOT based firmware developed for ESP8266 Wi-Fi chip. It has inbuilt Wi-Fi with TCP/IP protocol. It also provides access to various GPIO through which we connect various devices or sensors. In the proposed system we use one app on our mobile through which we are able to control the various appliances with the help of IOT. Our mobile is connected to cloud through internet so that we can send command to the Node MCU. Node MCU is also connected to cloud through Wi-Fi as it has inbuilt Wi-Fi and therefore it controls relay module to which our various appliances are connected. The relay module is a separate hardware device used for remote device switching.

HARDWARE PROFILE

1) Node MCU
2) Microcontroller
3) Bridge Rectifier
4) Relay Driver IC
5) Capacitive Touch Spring Switch

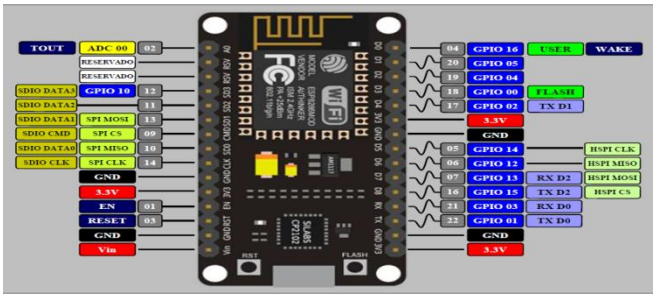

fig.2: node MCU

The above figure 2 shows the Node MCU which is an open source IOT based firmware developed for ESP8266 Wi-Fi chip. It has inbuilt Wi-Fi with TCP/IP protocol. It also provides access to various GPIO through which we connect various devices or sensors. Node MCU Development board is featured with Wi-Fi capability, analog pin, digital pins and serial communication protocols. Node MCU included more 40 different modules by summer 2016. Due to resource constraints user need to select the modules relevant for their project and build a firmware tailored to their needs. The figure 3 shows the pin diagram of Node MCU.

fig.3: ATmega 324PB

The ATmega324PB is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega324PB achieves throughputs close to 1MIPS per MHz this empowers system designers to optimize the device for power consumption versus processing speed. The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in a single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers.

fig.4: DB 107

DB107 are 1.0A Single-Phase Glass Passivited Bridge Rectifiers. As a power component, DB107 Rectifier Bridge is widely used in a variety of electronic equipment. Its internal is mainly composed of four diodes to realize the conversion of the input AC voltage into the output DC voltage.

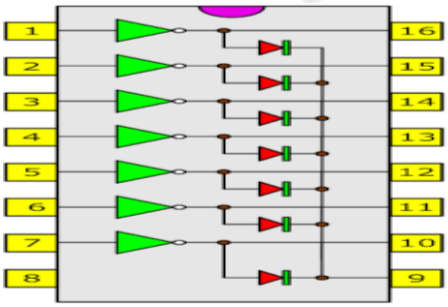

Fig.5: ULN 2003AG

These versatile devices are useful for driving a wide range of loads including solenoids, relay DC motors, LED display filament lamps, thermal print heads and high-power buffers. The ULN2001A/2002A/2003A and 2004A are supplied in a 16-pin

DIP package with a copper lead frame to reduce thermal resistance. They are available also in small outline package (SO-16) as ULN2001D1/2002D1/2003D1/ 2004D1. ULN2003 is also available in TSSOP16 package, for reduced application space.

Fig.6: touch spring

Touch spring is also known as touch-sensitive spring, touch button spring, and contact springs. Touch spring is a special spring-loaded button designed with capacitive and monolithic touch screen appliances. The touch spring is usually made of stainless-steel wire, carbon steel wire, and nickel-plated wire. The application range covers aviation, industrial, medical applications, automotive applications, etc. In addition, springs can provide other functions such as backlighting, hybrid mechanics, and capacitive buttons. Offers a wide range of touch springs for various needs, including the touch switch spring, touch spring for circuit board, touch buffer spring, washing machine touch spring, touch panel spring, compression touch switch spring, combined spring touch key, electrical touch springs, and so on.

PROCESSING

The process for implementing smart conference hall system for 8 loads, including 6 lights and 2 fans, can be broken down into several steps:

Hardware setup: The first step is to set up the necessary hardware components for the smart home automation system. This includes a Node MCU board, relays, sensors, and wiring.

Software setup: Once the hardware is in place, the next step is to set up the necessary software. This includes installing the Arduino IDE, ESP8266 libraries, and other necessary software.

Sensor installation: The sensors, such as the PIR motion sensors and microwave sensors, need to be installed in the appropriate locations to detect motion and occupancy.

Wiring: The wiring for the lights and fans needs to be connected to the Node MCU board and the relays. The relay switches will control the on/off function of the lights and fans.

Voice control setup: To enable voice control through Amazon Alexa, the Node MCU board needs to be connected to a Wi-Fi network and the Amazon Alexa app needs to be configured to control the smart home automation system.

Programming: The final step is to program the Node MCU board to control the lights and fans based on the sensor inputs and voice commands. The code will include logic to turn on/off the lights and fans based on motion detection and voice commands from Amazon Alexa.

By following these steps, the smart home system can be set up and ready for use. Users can control the lights and fans using their voice through Amazon Alexa or through the mobile app, and the system will automatically turn off lights and fans when no motion is detected to conserve energy.

WORKING

1. Manual Control

Capacitive touch springs are a type of touch sensor technology used in various electronic devices, including smart phones, tablets, and wearable devices. The basic operation of a capacitive touch spring involves the detection of changes in capacitance caused by the user's touch. A capacitive touch spring consists of two conductive layers separated by an insulator, forming a capacitor. The top layer is a flexible metal spring that is held at a certain distance from the bottom layer. When the user touches the top layer, the capacitance between the two layers changes, causing a measurable electrical signal. The signal is processed by the device's controller to determine the location and intensity of the touch. The sensitivity and accuracy of capacitive touch springs can be improved by adjusting the distance between the two layers and the properties of the insulator. The size and shape of the spring can also be optimized to provide a comfortable and responsive touch experience.

2. Remote Control

IR remote controlling loads are popular and convenient way to control your home lighting system. An IR remote is a device that uses infrared signals to communicate with a receiver to control various devices, including lights. The IR remote sends a unique code or signal to the IR receiver when you press a button. The IR receiver, which is usually installed in the room where the lights are located, receives the signal from the remote and converts it into an electrical signal. The electrical signal is then sent to an ATmega 324pb microcontroller board. The microcontroller board interprets the signal received from the IR remote and turns on/off the corresponding lights or group of lights. The microcontroller board sends a control signal to a relay or switch to turn on/off the lights. The relay or switch is connected to the home's electrical wiring, allowing it to turn on/off the lights. Overall, IR remote allows you to easily and conveniently control your home lighting system with a simple remote control device. It provides greater flexibility and convenience in controlling your home's lighting system.

3. Mobile App Control

Smart home can also be controlled using IOTICS mobile app on your smart phone or tablet. You will need a smart phone that is compatible with IOTICS app. Most smart home systems in today's era have a mobile app available for download. Download the IOTICS app from the App Store or Google Play Store and install it on your smart phone or tablet. Connect your smart home system to your home Wi-Fi network and set it up using the instructions provided with the system. Open the IOTICS app and sign in to your account. The app will automatically detect the devices that are connected to your smart home system. Use the IOTICS app to control your devices. You can turn lights on and off, adjust the temperature of your thermostat, or view the live feed from your security cameras. You can also create routines or scenes that include multiple devices. For example, you could create a "good night" routine that turns off all the lights, adjusts the thermostat to a comfortable temperature, and locks the doors. Using a mobile app to control your smart home system provides convenience and flexibility. You can control your devices from anywhere with an internet connection, and you can create customized routines and scenes that fit your lifestyle.

4. Voice control

Smart home can be controlled using voice commands through Amazon Alexa and Google Home. Here's how it works you will need a smart home system that is compatible with Amazon Alexa or Google Home. Most smart home systems today have integration with these virtual assistants. Set up your Amazon Alexa or Google Home device according to the instructions provided. Connect your smart home automation system to your Amazon Alexa or Google Home device. This can usually be done through the device's app or web interface. Use voice commands to control your devices. For example, you could say "Alexa, turn off the living room lights" or "Alexa, set the AC to 18 degrees. You can also create routines or scenes that include multiple devices. For example, you could create a "movie night" scene that turns off the lights, lowers the temperature, and turns on the TV. You can use the virtual assistant to control your devices from anywhere with an internet connection, even if you are not at home. Using Amazon Alexa or Google Home to control your smart home automation system provides convenience and hands-free control of your devices. You can use natural language commands to control your devices, and you can create customized routines and scenes to fit your lifestyle.

5. Automatic Control

Smart home system can be enhanced by using Microwave sensors and PIR motion sensors. These sensors can be used to detect movement and activity in different areas of the home, which can trigger automated actions.

Microwave sensors: These sensors emit high-frequency radio waves that bounce off surfaces in the home and detect movement. When an object moves through the sensor's detection zone, it causes a change in the radio wave frequency. The sensor detects this change and triggers an action. Microwave sensors are sensitive to movement and can detect movement through walls, making them ideal for monitoring larger areas or rooms.

PIR motion sensors: PIR (passive infrared) sensors detect infrared radiation emitted by people and animals. They can detect the heat signatures of moving objects within their field of view. When a person or animal moves within the sensor's detection zone, it triggers an action. PIR sensors are less sensitive to movement and are typically used to detect movement in specific areas of the home, such as a hallway or doorway.

Both types of sensors can be integrated into a smart home system to trigger specific actions. For example, a microwave sensor could be used to detect movement in a specific area, such as a Conference Hall, and trigger a lamp to ON. A PIR motion sensor could be used to turn on lights in a hallway when someone walks by, or to trigger a notification on a mobile app when someone enters a room.

ADVANTAGES

Smart conference hall by using IOT technology offers several advantages that can improve the quality of life and increase the convenience and security of college owners. Here are some of the most significant advantages:

Convenience: Smart conference hall automation allows homeowners to control various devices and systems in their homes remotely using a smart phone, tablet, or voice-activated assistant. This allows them to automate routine tasks such as turning on lights, adjusting temperature settings, and controlling home entertainment systems.

Energy Efficiency: Smart conference hall automation systems can help homeowners save energy and reduce their electricity bills by automatically adjusting the temperature, lighting, and other systems based on usage patterns, time of day, and other factors.

Security: Smart conference hall automation systems can enhance the security of homes by allowing homeowners to monitor and control access to their homes, and receive alerts if there is any unusual activity.

Comfort: Smart conference hall automation systems can make homes more comfortable by adjusting the temperature, humidity, and lighting to suit the preferences of the homeowners.

Accessibility: Smart conference hall automation systems can make homes more accessible for elderly or disabled individuals by allowing them to control various devices and systems remotely, without the need for physical exertion.

Customizability: Smart conference hall automation systems can be customized to suit the specific needs and preferences of homeowners, allowing them to create a personalized and efficient home environment.

Personalization: Smart conference hall automation systems are highly customizable, allowing you to create a personalized home environment that meets your unique needs and preferences. You can control the lighting, temperature, and other settings to create the perfect ambiance for your home.

Integration with other smart devices: Smart conference hall automation systems can be integrated with other smart devices, such as smart speakers or virtual assistants, to create a seamless experience. For example, homeowners can use voice commands to control their smart devices, or set up routines that automate multiple tasks at once.

Entertainment: Smart conference hall automation systems can enhance the home entertainment experience by streaming music or video content from online sources or local storage. They can also be integrated with home theater systems for a seamless entertainment experience.

Flexibility: Smart conference hall automation systems are highly customizable, allowing homeowners to create a personalized home environment that meets their unique needs and preferences.

Overall, smart home conference hall automation using IOT technology offers several advantages that can improve the quality of life and increase the convenience and security of homeowners, while also reducing energy consumption and enhancing accessibility.

DISADVANTAGES

While smart conference hall by using IOT has numerous benefits, there are also some limitations that should be considered. Here are a few of them:

High initial costs: Smart conference hall devices can be expensive, especially if the homeowner wants to automate the entire home. Additionally, the cost of installation and maintenance can also be significant.

Compatibility issues: With the vast array of smart devices available on the market, compatibility issues can arise when trying to integrate different devices from different manufacturers. This can lead to frustration and confusion for homeowners who are trying to set up their smart conference hall systems.

Reliance on internet connectivity: Smart conference hall automation systems are reliant on a stable internet connection to function properly. If the internet connection goes down, the devices may not work as intended, leading to inconvenience for the homeowner.

Complexity: Smart conference hall automation using IOT technology can be complex and difficult to set up and configure. This may require professional installation and technical support, which can add to the cost.

In summary, while smart conference hall automation using IOT technology offers many benefits, it also has some limitations and challenges that need to be considered. Homeowners should carefully evaluate the costs and benefits of adopting the technology and take steps to mitigate the security risks and compatibility issues.

APPLICATIONS

Smart Conference Hall by using IOT (Internet of Things) technology allows for the integration of various home appliances, devices, and systems to create an interconnected network that can be controlled and monitored from a single platform or device. Here are some common applications of conference hall.

Energy Management: Smart conference hall automation systems can be programmed to monitor and control energy usage in the home. For example, smart thermostats can learn and adjust the temperature of a home based on the residents' preferences and habits, saving energy and reducing utility bills.

Security and Safety: Smart conference hall automation systems can integrate with security cameras, door locks, and sensors to provide real-time alerts and notifications when there is potential security or safety concerns. Users can remotely monitor their homes and take appropriate actions as necessary.

Entertainment: Smart conference hall automation systems can be used to control home entertainment systems, such as TVs, speakers, and streaming devices, from a single device. Users can also set up custom playlists, schedules, and preferences for different rooms in the house.

Health and Wellness: Smart conference hall automation systems can monitor and track health data, such as heart rate, sleep patterns, and exercise routines, to provide personalized recommendations and reminders for healthy living.

Home Maintenance: Smart conference hall automation systems can monitor and diagnose problems with home appliances and systems, such as HVAC systems, water heaters, and lighting, and provide notifications when maintenance is needed. This helps homeowners to proactively maintain their homes and reduce repair costs over time.

Smart Lighting: IOT-enabled smart lighting systems can automatically adjust the brightness and color of lights based on the time of day, weather conditions, and occupancy of the room. They can also be controlled remotely using a smart phone app, voice commands or motion sensors.

Smart Thermostat: IOT-enabled smart thermostats can learn the user's habits and adjust the temperature accordingly, saving energy and reducing heating and cooling costs. They can also be controlled remotely using a smart phone app, voice commands or a web interface.

Smart Kitchen Appliances: IOT-enabled smart kitchen appliances can make cooking and meal planning easier and more efficient, with features such as remote monitoring, recipe suggestions, and automatic ordering of groceries.

Smart appliances: IOT-enabled appliances, such as refrigerators, ovens, and washing machines, can be controlled remotely and programmed to perform tasks automatically. For example, a smart washing machine can be programmed to start a wash cycle at a specific time, or a smart oven can be set to preheat before the college owner arrives home.

In summary, Smart conference hall automation using IOT technology provides numerous benefits to homeowners, including improved energy efficiency, enhanced security and safety, increased convenience and comfort, and reduced maintenance costs.

CONCLUSION

The Smart Conference Hall powered by IoT represents a significant leap forward in conference technology. By harnessing the capabilities of IoT, this innovative solution offers unparalleled convenience, efficiency, and interactivity. From intelligent automation and resource management to seamless collaboration and advanced analytics, the Smart Conference Hall redefines the conference experience, making it smarter, more engaging, and ultimately more impactful. Embrace the future of conferences and unlock the full potential of your events with the Smart Conference Hall.

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