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NRF based wireless light and Fan dimmer controlling system.

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Abstract - *Work in regions near the cabin is made simpler by the automation technology known as Smart Paper Weight. Home automation is becoming more and more crucial as we approach a new technological era as individuals convert from conventional switching systems to centralized, remote-controlled switching systems. An automated "smart paper weight" is one of the most pressing needs of the time, as it enables a worker who is working from home to be independent and concentrate on his or her work without being distracted at a time when the entire world is afflicted with COVID and businesses have adopted the idea of remote work. As a result, employees are more efficient and productive since they can give their all at work while taking the time to unwind, recharge, and remain attentive. In this project, we present the complete design and implementation of an Internet of Things (IoT) based smart paper weight that can be used to wirelessly control a fan and a light bulb within a cabin from any location inside the cabin.*

***Key Words*: Automation technology, Remote controlling switching system, Internet of things, Wireless control system**

1. INTRODUCTION:

Machines that saved labour were the first home automation components. With the development of electric power distribution in the 1900s[2], self-contained gas or electric home appliances were economically feasible, resulting in the advent of washing machines (1904), water heaters (1889), freezers (1913), sewing machines, dishwashers, and clothes dryers. The first all-purpose home automation network technology, known as X10, was created in 1975[5]. It is an electronic device communication protocol. It continues to be the most accessible and largely employs electric power transmission wiring for signalling and control, where the signals contain quick radio frequency bursts of digital data. [3] A 16 channel command console, a lamp module, and an appliance module were all available as X10 devices by 1978. The first X10 timer and the wall switch module followed shortly after. ABI Research estimates that 1.5 million home automation systems were installed in the US by 2012. [4] By the end of 2018, more than 45 million smart home devices will be installed in American homes, predicts research firm Statista [6]. By the end of 2018, more than 45 million smart home appliances will be deployed in American homes. [7]

The Latin word for "house" (domus) and the word "robotics" are combined to get the word "domotics."[1] The term "smart home" refers to a setup that utilises information and communication technologies (ICT) protocol and the Internet of Things to keep track of the status of its gadgets (IoT).

1.1 LITERATURE REVIEW:

1. Bluetooth-based mobile phone-based home automation system: Relays are used to connect the home appliances to the Arduino BT board at input and output ports in a Bluetooth-based home automation system. The Arduino BT board's software is written in the high-level interactive C language for microcontrollers, and Bluetooth is used for connection. The secret only authorized users are permitted access to the appliances due to the protection that is given. For wireless communication, a Bluetooth connection is made between the Arduino BT board and phone. The Python script used in this system is portable and may be installed on any Symbian OS environment. For receiving feedback from the phone that shows the device's status, one circuit is created and put into use. The development of technology never stops. It is a significant contribution to society to be able to create a product with current technology that will improve the lives of others. The design and execution of a low-cost, adaptable, and secure mobile phone-based home automation system are presented in this work.

2. A mobile phone-based Zigbee home automation system:

The system is created and deployed utilizing Zigbee in order to monitor and control the home appliances. Network coordinators record and archive device performance. For this, a four switch port standard wireless ADSL contemporary router is used over the Wi-Fi network. SSID of the network and security Wi-Fi settings have already been set. The message is processed by the virtual home algorithm for security purposes first, and once it is deemed secure, it is re-encrypted and forwarded to the actual network device in the house. Zigbee controller transmitted messages to the destination across the Zigbee network. The virtual home algorithm ensures the safety and security of all messages it receives. To lower the cost of the system and the

intrusiveness of the corresponding installation Zigbee. Through a shared house gateway, a ZigBee-based home automation system and Wi-Fi network are combined. The home gateway offers system remote access, a straightforward and adaptable user interface, and network compatibility.

3. A home automation system based on GSM that uses mobile devices:

Because of the mobile phone and GSM technology, the GSM based home automation is lure to research. The SMS based home automation, GPRS based home automation and dual tone multi frequency (DTMF) based home automation, these options we considered mainly for communication in GSM. Alheraish, it shows how the home sensors and devices interact with the home network and communicates through GSM and SIM (subscriber identity module). The system use transducer which convert machine function into electrical signals which goes into microcontroller. The sensors of system convert the physical qualities like sound, temperature and humidity into some other quantity like voltage. The microcontroller analysis all signal and convert them into command to understand by GSM module. Select appropriate communication method among SMS, GPRS and DTFC based on the command which received GSM module. This paper discusses the analysis and use of home automation technology using a Global System for Mobile Communication (GSM) modem to manage home appliances including lighting, climate control, and security systems via SMS text messages. A maximum of four loads were used to implement and test the planned prototype of the GSM-based home automation system.

4. Using cell phones to operate a Wi-Fi-based home automation system:

Three primary components make up a Wi-Fi-based home automation system: a server, a hardware interface module, and software. The system model layout is depicted in the picture. Servers and hardware interface modules connect with one another using Wi-Fi technology. The Remote users can access server web-based applications through the internet using a compatible web browser since the server is connected to the internet. The newest home automation system's software is divided into microcontroller (Arduino) firmware and server application software. The microcontroller itself includes the Arduino software, which was created using the IDE and C language. Software for Arduino is at fault for collecting information from connected sensors, then using actuators to carry out pre-programmed action. Reporting and recording history in the server DB is another task. The server program the suggested home automation system's software is a web-based application created with the Asp.net framework. If the server has a real IP address on the internet, it can also be accessed from the internet using any internet browser that supports asp.net technology. The entire home automation system's setup, configuration, and maintenance are the responsibility of server application software. We decided to use XML files instead of a server's database to store the system log for the various parts of our home automation system.

5. Arduino, GSM, and Android-based home appliance control for a home automation and security system application. Every time someone enters the house, the number of people entering the house is increased. In the Home Automation mode, appliances are switched on, while in the Security mode, a light and an alarm are turned on.

In the Home Automation mode, appliances will turn on, whilst in the Security mode, the alarm and security light will turn on. When the room is unoccupied when the system is in home automation mode, the appliances are shut off to save energy. Additionally, a person can manage their home appliances using an Android app on their phone, which will lessen the effort required from them. At the same time, a text message alerting the home owner that someone is inside the house will be sent to their phone if someone enters when security mode is activated. With the use of an Android app or SMS, the alarm can be switched off.

6. The Internet of Things (IOT) opens up possibilities for more direct communication by enabling devices to be sensed and controlled remotely through existing network infrastructure. Electrical devices, such as fans and lights, can be turned ON or OFF through the internet from anywhere in the world by keeping track of factors like a person's movement, temperature, and light intensity. This study presented an Internet of Things (IoT)-based home automation system that is built with user-friendliness and cost-saving in mind. Modern technologies offer multitasking solutions with enhanced security features in several industries. Additionally, automation processes have made everyday life wiser by reducing the amount of time spent on activities. The number of internet users has also been rising steadily over time. One of the newest and most promising technologies is the internet of things (IoT), which enables internet-based wireless monitoring and control.

Integration of the physical environment with computer-based processes, leading to increased effectiveness, accuracy, and financial gain. Comprehensive health monitoring IoT technologies are emerging to assist in managing health vitals and repeating medication needs for prenatal and chronic patients. In this study, we leverage IOT for home automation and energy-efficient environmental condition sensing.

7. IOT-based smart homes are gaining popularity at an increasing rate. Various studies have recently suggested various designs. Recommendations for monitoring the health care of the patient's vital signs (blood pressure, pulse, heart rate) and let the doctor know whether a problematic situation worsens or improves changes. An alarming gadget or warning sensor can be used to track and alert people who are at risk. the choice between using voice commands or an application to control their home appliances. Due to this,

customers can automate their homes without spending a fortune on pricey smart devices. After logging in, users may check on the performance of each Smart Home subsystem thanks to the IoT gateway's transmission of the data collected to the server online. In this study, a methodical framework for an Internet of Things (IoT)-based smart house has been established, along with studies on home safety precautions, smart lighting, environmental management, and home appliance control. The system functionalities have also been evaluated.

1.2 METHODOLOGY:

Overall working flow:

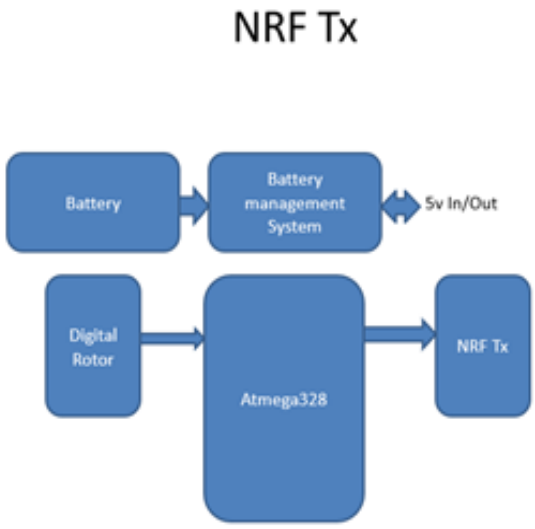

Fig-1: NRF Transmitter

NRF transmitter: The block diagram for the NRF transmitter node is shown here. It is made up of an NRF module that is utilised to communicate with other nodes. Additionally, it incorporates a digital rotor for human input. The digital rotor has an inbuilt button and may be rotated both clockwise and counter clockwise. The inbuilt button on the digital rotor allows it to be rotated both clockwise and anticlockwise. Yes, this is placed on a table, making it wireless and battery-operated. The battery needed to be charged, therefore a battery management circuit was placed alongside the battery, and the At mega 328 controller was used to handle everything.

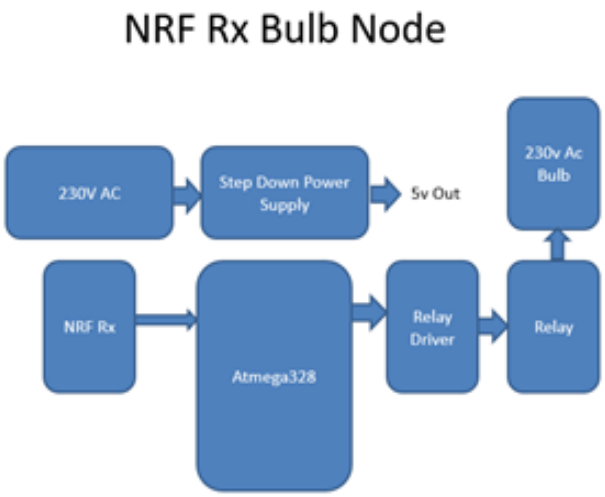

Fig-2: NRF Rx Bulb Node

The signal from the transmitter node will be received at the NRF receiver bulb node so that the controller may decide whether to turn on or off the bulb. A step down converter, sometimes referred to as a buck converter, reduces voltage from high to low, typically converting AC current to DC current. Regardless of changes in the electrical load or linked devices, a voltage regulator keeps the output voltage for a circuit constant. Relay switches work to close and open the circuit both electromechanically and electronically. Relay driver circuit is a circuit that is used to keep controller isolated from relay and protect controller from relay voltage fluctuations. Relay is an electromagnetic switch that is used to switch the light bulb. For the controller to have pure, regulated 5V DC, the power source in this location is 230V AC that has been stepped down to 5V.

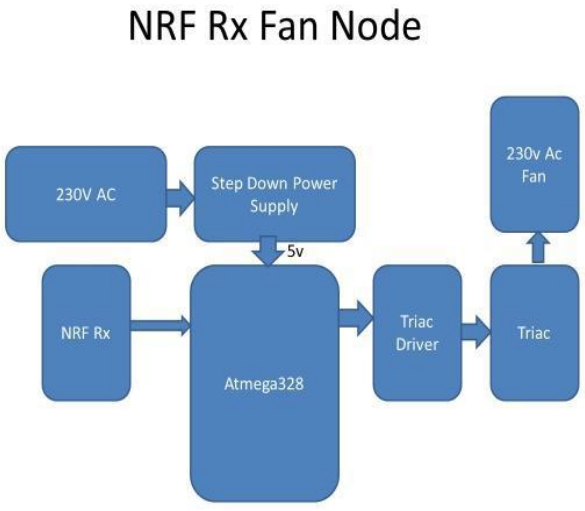

Fig-3: NRF Rx Fan Node

The majority of the times, common boards are used for fans and bulbs, but we chose to utilise a different node to construct the circuit of a fan regulator simply in case we needed to master the NRF one-to-multi communication protocol. Many projects using autonomous systems that call for a straightforward, low-powered microcontroller frequently use the Atmega 328, that can complete the most operations in a single clock cycle.. Since the polarity of the input voltage affects how current flows, the TRAIC allows current to flow in either direction. An improvement over a standard thyristor, a TRAIC switch is a semiconductor device used in an AC voltage circuit.

The operation of this node is identical to that of a bulb node, but instead of using a switch, we use a TRIAC to control the speed of the fan. A TRIAC driver circuit protects the controller from high voltage and current passing through the TRIAC.

OBJECTIVES:

1. Designing and comprehending WLAN networking

2. To create and educate oneself in hybrid topology (STAR + MESH)

3. To develop a mechanism for controlling fan speed.

4. To create a light switching circuit.

CONCLUSION:

A review of numerous home automation systems reveals that a variety of technologies are employed to construct this kind of system. Each of the suggested systems has been

Presented and contrasted in this paper, which highlights several system advantages and disadvantages. Home automation will enable remote internet control of (simulated) home automation equipment linked to the home PC. This review described many types of home automation systems, such as those that are Web-based, Bluetooth-based, mobile-based, SMS-based, ZigBee-based, Arduino microcontroller-based, Android app-based, IOT-based, and cloud-based. Home automation systems are becoming more and more popular on the international market thanks to their effectiveness, simplicity, affordability, and dependability. Soon, every house will be a smart home.

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