



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, remotecontrolled 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.

Keywords: Automation technology, Remote controlling switching system, Internet of things, Wireless control system.

I. 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 "demotics". [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).

II. LITREATURE 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 reencrypted 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.

III. PROPOSED WORK

NRF Tx

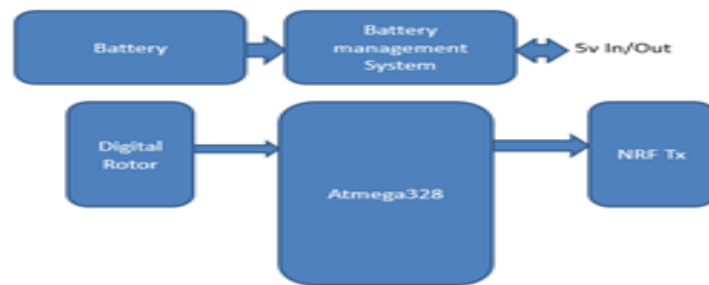


Fig-1: NRF Transmitter

Here is the block diagram for the NRF transmitter node. It contains an NRF module used for communication with other nodes. Additionally, a digital rotor for user input is included. The digital rotor can be spun both clockwise and anticlockwise via an internal button. The digital rotor can be spun both clockwise and anticlockwise with the built-in button. Yes, this is wireless and battery-operated because it is put on a table. A battery management circuit was installed next to the battery because it needed to be charged, and the At mega 328 controller was used to manage everything.

NRF Rx Bulb Node

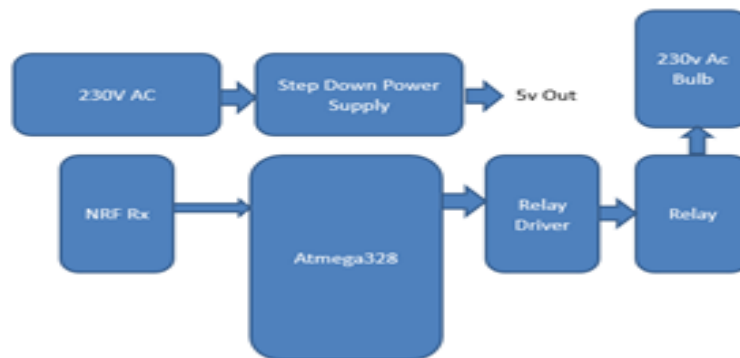


Fig-2: NRF Rx Bulb Node

The NRF receiver bulb node will receive the signal from the transmitter node so that the controller may choose whether to turn on or off the bulb. When reducing voltage from high to low, a step down converter, also known as a buck converter, typically converts AC current to DC current. The output voltage for a circuit is maintained constant by a voltage regulator, regardless of changes in the electrical load or connected devices. Relay switches function electromechanically and electrically to close and open the circuit. Relay driver circuits are used to keep controllers separate from relays and shield controllers from changes in relay voltage. An electromagnetic switch called a relay is utilised to turn on the lightbulb. Regarding the controller



NRF Rx Fan Node

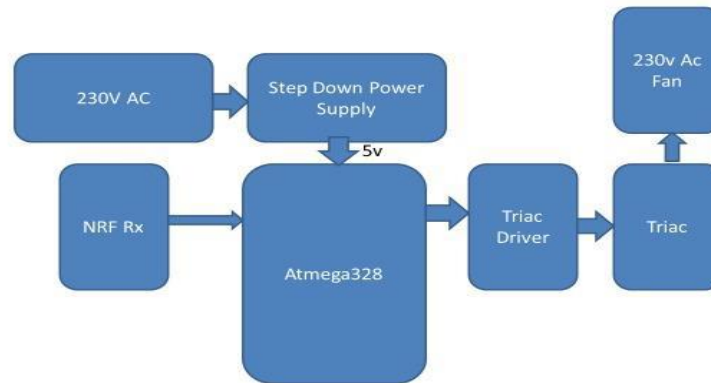


Fig-3: NRF Rx Fan Node

Common boards are typically used for fans and bulbs, but we decided to utilise a distinct node to build the fan regulator circuit just in case we needed to learn the NRF one-to-multi communication protocol.

The Atmega 328 microcontroller, which can do the most actions in a single clock cycle, is widely used in projects involving autonomous systems that demand for a simple, low-powered microcontroller. The TRIAC permits current to flow in either way because the polarity of the input voltage impacts how current flows. A semiconductor component called a TRIAC switch is utilised in an AC voltage circuit and is an improvement over a typical thyristor.

This node operates in the same way as a bulb node, however instead of using

Tools and software for algorithms:

Embedded C:

One of the most well-liked and frequently employed programming languages in the creation of embedded systems is embedded C. Therefore, we will look at some of the Basics of Embedded C Programmer and the Embedded C Programming Structure in this post.

The language most frequently used by embedded programmers to create embedded systems is probably embedded C. Embedded C allows programmers more direct control over things like memory management because it is a low-level programming language. This is helpful when programming embedded microcontrollers because they typically have memory and power limitations.

Assembly, BASIC, C++, Python, and other well used programming languages are frequently used for creating embedded systems, but Embedded C is still widely utilised because of its effectiveness, speed of development, and portability. Prior to digging

History:

- 1978 saw the release of the first C standard under the moniker K&R C in honor of the company's co-founders Thompson and Ritchie.
- 1989–1990: In order to formalize a standard for the specification of the C language, the American National Standards Institute (ANSI) started working on it in 1983. In 1989, the ANSI published the finalized standard. The ISO (International Organization for Standardization) approved the ANSI standard in 1990, and the result was the publication of ISO/IEC 9899:1990.
- 1999: In the late 1990s, the C standard underwent additional revisions that led to the release of ISO/IEC 9899:1999. This version of the C standard is frequently referred to by the abbreviation "C99". New data types and other features, such as variable-length arrays and flexible arrayed members, were added in C99.
- 2011 saw the introduction of generic macros, anonymous structures, and multi-threading.



IV. CONCLUSION

Numerous technologies are used to build this type of system, according to an analysis of many home automation systems. This study presents and compares each of the suggested systems, highlighting both the benefits and drawbacks of each. Equipment connected to the home PC that is part of home automation will be able to be controlled remotely through the internet. This assessment included a wide range of home automation technologies, including Web, Bluetooth, mobile, SMS, ZigBee, Arduino microcontroller, Android app, Internet of Things (IoT), and cloud-based solutions. Home automation systems are growing more and more well-liked on the global market because of their dependability, efficiency, simplicity, and affordability. Every home will eventually be a smart home.

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