

Transfer Switch for Solar, Grid and Utility Power

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Abstract - This article shows how to manage each device, particularly AC, Geyser, and Refrigerator. Nowadays People typically need a particular remote control, which is really inconvenient. To combine many remote-control features into a single piece of software, Application on the smartphone, the system was used to create a smartremote-control system with two actions The device can assist in controlling the flow of electricity from solar panels to batteries or the grid, as well as turning on and off power to various home appliances. As a result, in this work, they present a system model for controlling and monitoring home appliances using a Wi-Fi Module. This study describes the process of creating a smart control system for a room's lighting, air conditioning, and ceiling fans. People who are blind or visually impaired often have trouble turning on and off household electrical equipment because it might be difficult to reach the wall-mounted switches. The designed operating flowchart of a Wi-Fi Module must first be transformed System design that has the potential to prevent stalemate. The next stage is to manage household appliances. Remotely via a Wi-Fi Module network, instructions are sent to the gadget. Finally, the trial results indicate that, depending on the study findings, our daily lives will change. When using a Wi-Fi Module to control household appliances, It's more practical and secure. There is no network connection on the currently used conventional AC split devices. The AC Split device can be managed by the user over a network

Key Words: Home automation, Wi-Fi module, solar panel, Grid, Smart monitoring, communication.

1. INTRODUCTION

Nowadays the world is changing with technology. While the economy grows, people want to live in a safe, pleasant, energy- efficient, and convenient environment. Combining computer, embedded, sensor, network communication, and control technology, a smart home can provide remote or centralized monitoring for family matters. Taking in mind the modern need of people they proposed a model "A smart switch". that can control the operation of the high- power appliances used in day-to-day household work. The Smart Home, which incorporates a security control subsystem, lighting control subsystem, multimedia entertainment subsystem, network connection, and other services, addresses the quest of high quality of life in the information

age. Users can take advantage of a full range of multifunctional services that help create a comfortable home environment. Innovative smart home technology has emerged in recent years as the development of home appliance control systems and smart gadgets has improved. Every day, a network of local smart homes generates a lot more data. As a result, a system capable of storing and processing massive amounts of data is urgently required.. Cloud computing is a technological solution that can deliver such a method.

2. LITERATURE REVIEW

The hardware for the proposed SSCS (Smart Switch Control System) is made up of a few parts, The Arduino UNO board, an ESP8266 Wi-Fi module, wall outlets, an AC/DC power source, and a Level Logic Converter are all included. These elements are used. The Android mobile application is a graphical user interface that receives user commands on an Android-compatible smartphone, tablet, or PC. Wi-Fi transmission is used to send the instructions to the smart device's controlling unit. The system's brain is the Arduino UNO embedded microprocessor. Prior to being delivered to the relay board, which switches items, it processes all commands. The gadget has an AC outlet, among other things.[1]. This document has a purpose statement stating that the term "smart home automation" is widely used to describe homes in which the lighting, air conditioning, TVs, and other gadgets may interact with one another and be remotely controlled on a schedule or through an interface. This project presents a home automation system that uses Wireless Fidelity as a communication interface.[2]. Home automation technology must be able to identify which appliances use a lot of power in order to conserve electricity. A device must be turned off if it is not in use but is still required. Home automation systems come with multiple AC power outlets, a power reading meter, a PLC module, and a microcontroller. These elements control the transfer of related data as they'll as actions tied to applications, including turning on and off lights. Additionally, they developed a core-based home server that makes it simple for users to interface with the page users, allowing users to manage and monitor devices that are linked to the internet [3]

After finishing the home automation system. the author explores the numerous and complex issues involved in establishing smart cities, such as those relating to cost,

efficiency, sustainability, communication, safety, and security. The primary goal of these articles is to focus on smart home users and service providers in an inexpensive and user-friendly energy network. The Raspberry Pi serves as the server in this study, and user devices are utilised. such as smartphones and tablets are used as the clients [4]. This work proposes a wireless fidelity communication interface-based home automation system. Both the controller and the wireless communication module in the project were reimplemented using the Node MCU ESP 8266 12 E. Several sensors, including the DHT 11, MQ6, and MQ 135 A Firebase database, an Android application, and hardware components make up the system in this project. The preferred method of communication is Wi-Fi [5] Cloud storage and wireless communication are combined with Intel Galileo to give users remote access to a variety of household equipment. Through an Android application, they use a Graphical User Interface (GUI) to monitor and manage linked devices. The strategy involves leveraging IOT technology to connect systems and remotely control appliances in order to meet user demands and expectations.[6]

The article discusses the smart control system for lighting, air conditioning, and ceiling fans in a room. This system accurately considers users' demands and offers a safe environment for them.. which rely on the power of wireless technologies like ZigBee, Wi-Fi, WiMAX, Near Field Communication (NFC), and the cloud. [7] The people who have trouble reaching the wall-mounted electrical switches that control their home appliances are discussed. As a result, assistive technology is required to aid the visually handicapped. The primary focus of this project is the initial level of the system's control panel. The control panel is set up with braille indicators and mechanical buttons. The Braille text indication, along with the mechanical buttons, is included in this specifically built remote control panel to make it easier for the blind person to know which electrical appliances they chose to switch on or off. [8] The growth of intelligent home appliance technology is discussed in this study. A lot of real-time data about home appliance status is currently produced. New technology is required to process the huge volume of status information generated each day. They propose a cloud-based system concept for providing real-time home appliance monitoring and control services. The cloud service stores and manages a major percentage of the status data generated by smart home gadgets.[9]. People who are busy at work have better solutions thanks to modern technologies. Personal computers, switches, doorbells, ovens, televisions, LED lights, water heaters, and HVAC (heating, ventilation, and air conditioning) systems are all standard features in today's homes. It becomes difficult to maintain track of all appliances at the same time.. Two sensors are utilized in this project; one is a PIR sensor to detect motion and turn on or off the lights, and the other is a temperature sensor to maintain a pleasant indoor temperature for people. Together, the two sensors enable sustainable life[10]. Offloading data, apps, processes, and services from mobile devices help them use less energy

while enabling high-end, complicated operations to execute on a mobile interface and take advantage of the cloud's processing power and storage system (not the mobile devices). Because the cloud uses scattered or remote sites to handle and manage data, security, and privacy are dependent on the cloud providers. The agents are responsible for automatically moving the packed state and code from a single authenticated mobile user to execute in results to a mobile device from a distant location (cloud environment) without the user's knowledge or involvement. This article recommends using JADE-based mobile agents to improve the capabilities of This study proposes the use of JADE-based mobile agents to improve the functioning of mobile devices by allowing the transfer of state and bundle code to remote locations..The mobile agents will have behaviours pre-programmed to recognize malicious host- and agent-based attacks. They (mobile agents) would notice if the bundled code had been altered. Nonetheless, a thorough study of the offloading choice must be carried out [11]. One of the most promising sectors of the communications industry is Wi-Fi. The challenge of managing diverse terminals has generated significant concern in the academic and industrial communities as mobile terminals and intelligent robots have become more common in the substations and business halls of provincial electric power companies. Hence, it is required to establish a uniform Wi-Fi-based power cloud platform that complies with the security requirement of provincial electric power companies. It is capable of meeting the requirements for unified management of multiple, widely dispersed Wi-Fi network devices. The high-availability intelligent power cloud platform based adjunct to the traditional grid network. [12]. By installing a thermal regulator and keeping a comfortable temperature in our environment relative to the room temperature, this project began as a standard A/C modification. The combination of a cooling and heating element can be controlled using a variety of approaches, which increases automation. Additionally, it may be managed and watched utilizing IOT technologies. Regardless of the weather, the air conditioning we get from the suggested system gives us additional comfort all year round. Our equipment is portable since it combines a heating and cooling unit into a single air conditioning unit[13]. Home automation technology now offers protection, safety, and a comfortable lifestyle. That is why everyone needs home automation technology in today's cutthroat economy and quick-paced society. Many ways have been utilised to control and monitor the state (ON/OFF) of the appliances, including the Internet, electrical switches, and Graphical User Interface (GUI) interfaces. Depending on his interests or demands, the home's owner can keep a watch on his family, the security guard, and the building at any time and from any location. [14] As technology advances, more electrical home appliances become available, particularly for smart homes driven by the Internet of Things (IoT). As a result, people have become overly reliant on power. Unfortunately, many of us are oblivious to how power is wielded. In this research, we propose a mobile application that can run on an Android-

powered smartphone.. Via the application, users may control every element of a smart home system, submit numerous input commands, and keep an eye on the appliance[15].

3. METHODOLOGY

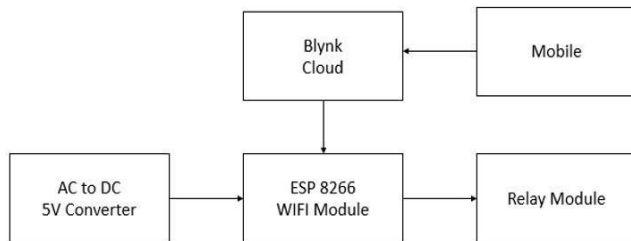


Fig -1: System Block diagram of a model

ESP 8266 - Node MCU

The system’s beating heart is ESP. ESP consists of numerous pins, including Power pins (3.3 V).

Ground pins (GND).

Analog pins (A0) Analog pins (A0).

Digital pins (D0 – D8, SD2, SD3, RX, and TX – GPIO

The relay and the 230V to 5V DC Converter are both connected via Ground and Vin coming from the Node MCU. Additionally, this grounded pin from the D1, D2, D5 is given to the Relay. To get the desired output, the code is loaded onto the ESP8266. The Arduino IDE is used to dump the code.

230V AC to 5V DC Converter

Volts is it necessary to use an external voltage converter? Because of its inexpensive cost and small size, it is mostly utilized in robotics and Internet of Things applications.

5v Relay Module

The relay opens or closes switch contacts using the current supply. Typically, a coil is used to magnetise the switch contacts and draw them together when the switch is engaged. After the coil is not strengthened, a spring drives them apart

High link 5v AC to DC convert

The input voltage range for the Hi-Link 5V 0.6A power supply module is extensive, ranging from 100V to 240V. It guards against output overload and short circuits for the assembly. In order for the system to be energized to function properly, Hi-Link Power supply modules are utilized to transform AC power into usable DC power.

4. WORKING

In this project, they have used different components to control the AC supply coming to the household. In our circuit they have used a relay, ESP8266(Node MCU), and AC to DC (5-volt converter).

1. First of all, they supply 230 volt AC supply to the AC to DC 5 volt converter. Then they supply that 5-volt supply to the V input and Ground of the ESP8266 Module. Then they supply another 230- volt supply connected to the Relay module.

2. Then a positive 5-volt supply is given to the Vcc and GND of the relay and the output of the Node-MCU is given as input to the relay. The output of the relay was taken from NO(Normally open) and given to the output plug where they connect our device.

Now, Whenever 230 supply passes through the AC to DC converter converts it to the 5volt and gives it to the ESP8266 module. Which controls the relay module. They have interfaced the ESP module with the Blynk cloud application. which provides us with the control key interface to the appliances. In this instance, they will be in charge of the relay module. As a result, they have connected a 230 volt supply. They connected the common terminal of the relay module to the output connector, which is linked to the appliance, and then they connected the NC (Normally closed) terminal to the output plug. As they connect the Blynk app to the ESP module and then they pass a signal to the relay which switches to the NO (Normally open) and turns the supply after which a 230-volt AC supply passes to the device through a relay and it turns on the device..

5. RESULT OF THE PROJECT

A smart switch that made it easier for the mobile application and the actual device to connect and communicate Future home automation technologies.



Fig -2: smart switch off condition



Fig -3: smart switch on condition

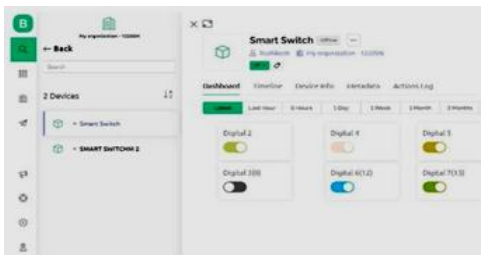


Fig-4 -Blynk Console

6. SOLAR POWER TRANSMISSION SYSTEM

Smart switches make switching from your main power source to a backup power source simple and safe. As solar energy grows in popularity as a source of electricity, many homeowners are beginning to install grid-tied and hybrid solar power systems in their homes. Grid-tie and hybrid systems both enable residences to have two power sources.

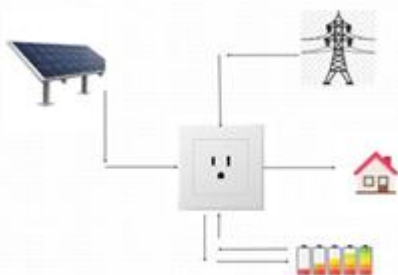


Fig -5: Description of solar power transmission system

Smart switches make switching from your main power source to a backup power source simple and safe. As solar energy grows in popularity as a source of electricity, many homeowners are beginning to install grid-tied and hybrid solar power systems in their homes. Grid-tie and hybrid systems both enable residences to have two power sources: the grid and a solar power system. Hence, in the event that your primary power source fails, you will have a backup. These grid-tied and hybrid systems frequently employ a Smart switch for convenience and safety. Why would you need a smart switch.

Without a Smart switch, manual transfer switches are typically used in different solar home configurations. What exactly are the advantages of employing an automatic switch as opposed to a manual one? A manual switch allows you to move between your primary and backup power sources in the event that your primary power source fails.

Constant Power

The main benefit of including a Smart switch in your solar power system is that it ensures that your home will always have electricity, even if the grid or your solar generator goes down. Depending on the Smart switch you install, you can even get uninterrupted power when the Smart switch quickly switches to your backup power source. Each and every uninterruptible power source (UPS) uses a Smart switch to deliver uninterruptible power and guard against computer damage.

Convenience

You and your family can conveniently have electricity with the integration of a Smart switch into your electrical system without having to manually switch to your backup source. In particular, this is valid for homes with manual switches. to your emergency supply. This is especially true for homes where the manual switch is tucked away in a basement, attic, or another difficult-to-reach location.

Simplicity

Some Smart switches can also be configured to only power particular rooms or pieces of electrical equipment inside the home. This is crucial since backup power frequently comes in scarce quantities. This implies that you can't simply run your home at full power because you probably don't want to use up all of your stored energy too fast. When there are power outages, having a Smart switch and configuring it to just power specific portions of the house is a terrific way to save energy.

Safety for the solar system

In a dark setting, manually switching from primary to backup power is risky. The worst-case scenario is that you might not even be home if the power goes off. It would be unsettling to let a member of your untrained family play around with the panel board in search of the manual transfer switch. A Smart switch is a safer choice than a manual transfer switch since it eliminates the need to manually manipulate the switch.

7. ADVANTAGE OF PROPOSED MODEL

Time optimization

In many circumstances, smart plugs are time-savingly. they won't need to wait for all of your home's appliances to be

ready if it is set to turn on each morning at a specific time. Simply set the time for the heating and coffee machine, and turn on the television in advance. They'll be there for you when you need them.

Electricity Saving

Smart plugs help you to save money on your electricity bill. Furthermore, because these products can be controlled remotely, you will no longer need to remember to turn on or off radiators, air conditioners, or fans to keep your home at the proper temperature. Additionally, you may have programmed the lights to turn off when they go to bed or when you leave the house. Even models that give insights on usage exist. It is a break for both your wallet and you.

Safety

Additionally, electrical outlets protect you from potentially unsafe equipment and commodities. These plugs reduce the risk of leaving a heater, coffee maker, iron, or any other device that releases heat plugged in and unattended. This will stop any harm to a person's home or other property.

It's also a good idea to limit our children's time spent playing video games or watching television when they're not at home. Furthermore, they are able to remotely protect them from any dangerous equipment that they might mistakenly activate.

Size

Smart plugs can take less space than conventional plugs, despite their increasing popularity and supply as a result. Knowing where the smart plug will go will help ensure that it does not obstruct the usage of other outlets due to its size, which can make it easy to access other outlets. Outlets due to its size, which can make it easy to access other outlets.

Compatibility

With a smart plug, they may discover that the plug they purchased is compatible with other intelligent components of their home, such as on and off the mobile device.

8. CONCLUSION

A Wi-Fi module that made it easier for the mobile application and the actual device to connect and communicate. Future home automation technologies will be quicker, smarter, and simpler to scale. It is hoped that after developing the system with the ESP 8266 and using Wi-Fi as a transmission method, they would have a fully functional smart home system. To control an ESP8266 board, an Android app was made. The ESP 8266 and Wi-Fi were used in the system's architecture as the communication medium. The standards for system design that have been put into place allow for both global control and flexibility in the number of devices that can be controlled.

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