

Smart Switching Devices Using Internet Of Things

Ms.S.Mathumitha,Mr.A.Arunraja,Mr.J.Prasad

Abstract: Smart switching condition can be happen through LAN, WAN and through internet remotely. Design the particular application for On and Off or Start and Stop commands and follow their applications. This project proposes an embedded system for making smart plug. This system consists of CC3200 and old energy meter which gives the energy consumption in the form of pulses. Each and every electrical appliances present in the room are connected via power outlet that is operated by the fuse in the MCB unit. Each and every electrical appliances present in the room are connected via power outlet that is operated by the fuse in the MCB unit. Each and every electrical appliances present in the room are connected via power outlet that is operated by the fuse in the MCB unit. When the electrical appliances are switched ON at home it consumes an amount of power per hour. This gives rise to certain amount of consumption value which depends on the type of the load. If the pulse is greater than the pre-set value, the power consumption value is uploaded through onboard Wi-Fi module. The mobile will have a webpage or app that consists of control buttons to switch OFF the specified relay circuit thus removing the supply to electric appliance. This reduces the unwanted power consumption at home and saves energy.

Keywords : ARM, CC3200, LAN, WAN, MCB unit, old energy meter, opto coupler.

1. INTRODUCTION

Continuous growth in wireless technology by microcontrollers reduce the manual technology and changes to automatic in terms of industrial aspects it will improve the technology in industry. Manual reading will leads to inaccurate and it needs more man power and material resources for reading and billing purpose it ill lead to confusion. Greater extended of increasing the electrical consumers. As a growing technology of micro grid it ill lead to power handling and maintaining problem. During the rainy season it is very difficult going to consumer house for calculating the power readings. For taking readings the operator needs to go consumer home in every two months and monitor whether the power meter is working efficiently and if consumer unable or forgot to pay particular bill, Once again the operator needs to go again and cut the power supply for the particular home. If the consumer getting high amount of bill or due to manual error of the operator or consumer doing some malpractices for reducing the bill operator needs to find the mistake for the particular consumer Inaccurate and Inefficient reading will be attained in billing system. Due to usage of microcontroller in wireless communication technologies leads to more efficient. In wired communication replacement will be done frequently and if technologies goes next path need to change their communication but in wireless communication it is more efficient and we are using the microcontroller as CC3200 kit, it is wireless way of communicating the information and inbuilt WiFi. Some of the features are SPI Interface, inbuilt sensors, subsystems, low power consumption and operating temperature. Rapid utilization of mobile phones, laptops was used in digital implementation. CC3200 Kit continuously monitoring the sensor value and by using wi-fi data will be stored in cloud also. As there is no use of manual switches in the entire process, these switches are remotely controlled. We develop energy meter in terms of digital meter with more challenges going to face, Our main aim is to design energy meter with low cost and wi-fi for connecting data to the cloud. Robust based network system has to build with advantages of low power and inexpensive. CC3200

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(Simple Link Wi-fi) Kit is used to provide wireless communication that will happen between energy meters and web server gateway, it is used to monitor the system for energy management. The users can able to controls the power outlets of various specified electrical appliances with the help of mobile webpage. The webpage have various control buttons and consumed unit reading for the user reference. It can be access anywhere via network connectivity.

2. LITERATURE REVIEW

Lien et al (2017) presented by using wireless communication interfaces like Bluetooth and GSM, For each individual outlets by using microcontrollers it transmit the data to GSM as Short Message Services(SMS), for getting accurate output they used Ethernet as another source along with this capability. It is used to find the current consumption. Similar work will be done with PLC Module as 5 System as electric outlet. Improvement will be done by making on and off electric outlet as power outlet system and it is used to continuous monitor of current consumption, by using Microgrid method as different sensor it will improve the power savings and disadvantage of this work is more compact and difficult to handle. Lentine et al (2013) described the electrical outlet to manage the load autonomously. Using smart power grid that includes an Ethernet unit. The smart switch is placed in electric control of the desired room. The smart switch connected to the Internet Via Ethernet to remotely manage and control smart plugs and electrical outlet, also provide the monitoring of system. The android, PC can be used to control the switch remotely. This System can monitor the current consumption by turning On and Off of their electrical Outlets. Drawback in this system is it can only monitor the consumption of power but cannot be a closed loop system.

Shajahan et al (2012) developed a smart plug by using Arduino microcontroller with external connectivity of Wi-Fi. Through Wi-Fi data can be transmit thorough Android platform. They can develop application software and monitor the power continuously. In a single room the lighting condition can be monitor continuously through android phone by Wi-Fi. Advantage of using this method free android OS and monitoring number of devices but security and control are disadvantages. Horvat et al (2012) present an electric outlet system this method indicates through Internet of Things. Devices are connected with each other through sensors and it can be controlled each other through Wi-Fi. Some of the devices are connected to human also. If Current consumption as power overloads it will shows the warning. Whole system eased to state of outlets. With Suitable protocols the sensing element can be connected through internet with other devices. Yan and Shi (2006) proposed home automation system by using mobile

phones the pairing wireless devices like Bluetooth. The Whole systems (Example. 2 lights, 2 fans, 1 Tv) is paired with blue tooth device. The Android studio Software as application is used to get the data through interface the devices. We can control and monitoring the connected devices. Major disadvantage is information sharing is within the limit due to less bandwidth

3. HARDWARE DESCRIPTION

This project proposes an embedded system for making smart switch for user. The proposed system mainly concentrates to allow the user can able to controls the switch of the specified electrical appliances and also controls the overall power outlets.

3.1 BLOCK DIAGRAM

Figure 1 show the block diagram for monitoring the power consumption of electrical appliances in home or industrials area. Texas Instruments kit CC3200 launch pad is the main controlling unit in this project. The old energy meter is helpful to get the energy consumption value in the form of electrical pulses which is optimized by the Optocoupler circuit. The base output of Optocoupler circuit is given to the main controlling unit CC3200 launch pad. The controlling unit monitors the power consumption of whole home or industrial area. The consumed value is continuously count and monitored it. The consumption range reaches the pre-set value, the system can able to intimate message pop up screen will be attained by the user with alertness. The mobile will have a webpage or app that consists of control buttons to switch OFF the specified relay circuit thus removing the supply to electric appliance. The user can also controls the Main Power outlets, Distribution board of various rooms. This reduces the unwanted power consumption at home and saves energy.

3.2 SCHEMATIC DIAGRAM

The implementation of proposed system enables easy monitoring of energy consumption and remotely controlled. The proposed system is developed with Texas Instruments kit CC3200 Launchpad, an ARM Cortex-M4 microcontroller. The old energy meter is interfaced with the CC3200 GPIO pins through Optocoupler where it gives the energy meter reading as input to the controlling unit. The output from the CC3200 is sent to the relay circuit interfaced with it. The relay circuits are various specified switches for electrical appliances, Distribution Board and Main Power which is controlled remotely by the user mobile via local network

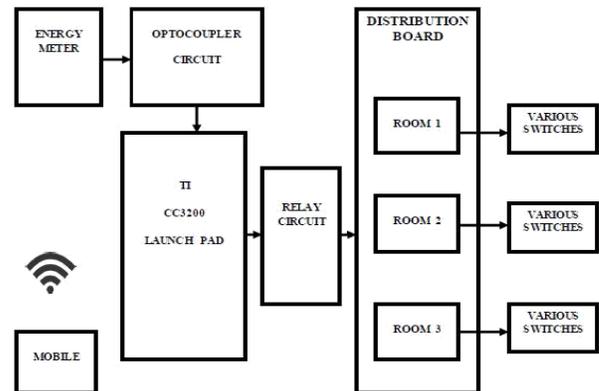


Figure.2 Schematic Diagram

3.2.1 IMPLEMENTATION

The system is developed as mentioned in the schematic diagram shown in Figure 4. The embedded auto remote system for smart plug approach to reduce the unwanted energy consumption has been designed with Texas Instruments kit CC3200 Launchpad and Energia IDE. The Optocoupler circuit in the schematic is connected to one of the GPIO of CC3200. The Optocoupler circuit is interfaced with the CC3200 as shown in Figure 4. Pin 11 (GPIO 6) of CC3200 is connected to the Optocoupler IC base pin. Pin 21 (5V) and Pin 22 (GND) of CC3200 is connected to of power supply circuit. The GPIO pins of the CC3200 are connected to input pin of relay circuit. The relay circuit is powered by 12v power supply circuit to 12v DC and GND pin. The 230v power lines are connected with common terminal pin of relay module, and it is switched NC to NO

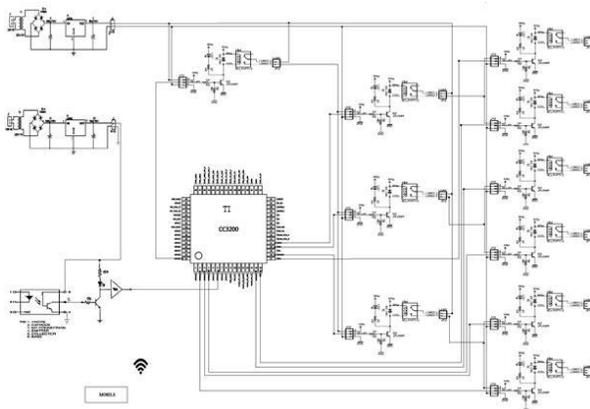


Figure.1 Block Diagram

4. EXPERIMENTAL RESULTS

4.1 EXPERIMENTAL SETUP

The device is designed using CC3200 launch pad. It has an ARM cortex-M4 at 80 MHz and an inbuilt Wi-Fi. It comprises of opto coupler circuit and relay switches for switch ON/OFF of Main Power, Distribution Board and specified electrical appliances. This system automatically counts the consumed value of electrical appliances energy consumption and it is uploaded to user webpage with help of Wi-Fi network. The user can be visualized in his smartphone with the help of webpage. The webpage have various control touch buttons to switch OFF/ON of the specified switches of electrical appliances, Distribution Board switch control and Main Power control switch also present. When the consumed value reaches the preset values, the alert message pop on the webpage screen, by this way user can identified the extreme consumption and controls the power outlet remotely.

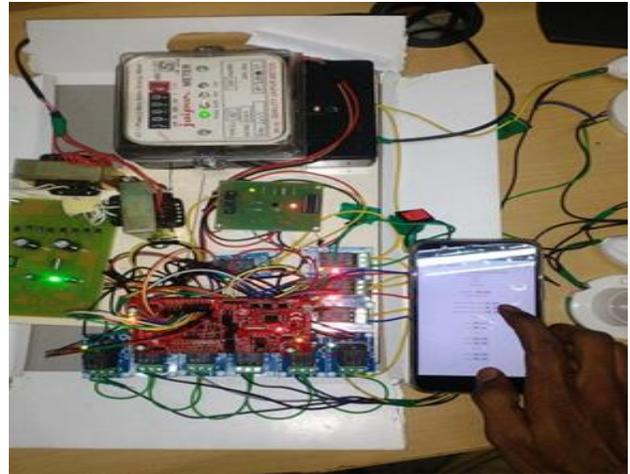


Figure 5. The Distribution Board Power ON



Figure 3. Experimental Setup

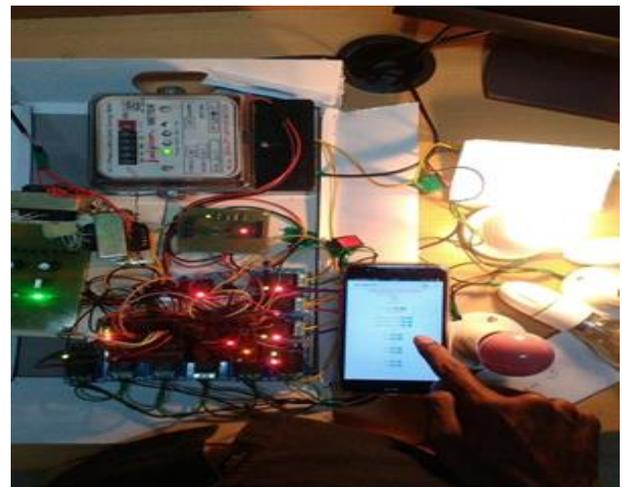


Figure 6. The Room Switches Power On

4.2 RESULTS



Figure 4. Main power Switch ON



Figure 7. . Webpage to Remotely Control

CONCLUSION

Design and implementation of a system using auto remote controlling is proposed. In this system the consumption is counted and the advantage of smart switch it is used to control different outlets per single outlet besides monitoring it. The system gives the alert message to the user mobile for remotely controlled of specified electrical appliances switches and also controlled power outlets of MCB i.e. distribution board for various rooms. This reduces the unwanted power consumption at home and saves energy.

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