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Implementation of Cloud Connected Smart Plug with Energy Monitoring System

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Abstract

Internet of Things (IoT) is the expansion of web administrations. Employments of new advancements in IoT condition are expanding quickly. A Smart Home is additionally one of the uses of IoT. A Smart Switchboard constrains customer's execution in watching home settings and controlling home machines. This paper shows an approach to manage the progression of Smart Home applications by consolidating IoT with Web server and Cloud organize. The approach concentrates on: (1) implanting insight into sensors utilizing Energia stage [7]; (2) Creating collaborations with brilliant things utilizing Blynk-Cloud stage; (3) expanding information trade proficiency. At the point when these family unit gadgets in brilliant homes interface with the web utilizing legitimate design, then entire framework can be called as Smart Home in IoT condition or IoT based Smart Homes. Keen Homes contains family unit gadgets/home apparatuses could screen and control remotely. In addition, we execute three cases to show the approach's possibility and productivity, i.e., measuring home conditions, observing electrical machines, and controlling home robotization.

Keywords*: Smart Switch Board, Internet of Things, Blynk-Cloud Platform, Energia*

1. Introduction

Smart Switchboard System is an intelligent, energy conscious with a Wi-Fi connection that is able to monitor the energy consumed by appliances and also allows the user to control those electrical appliances from anywhere in the world using a smartphone or mobile device interface [1]. It can power up to six different appliances. The ordinary devices are thus made smart and operated efficiently. This can reduce the monthly electrical bills and makes the planet a greener place to live. Our Smart Switchboard is able to control up to six different appliances. Those household appliances will connect to the switch modules. It includes any sort of module which changes its position as it got flag. Change module associated with the gadget such that when it changes the express, the condition of family unit gadget interfaces with it will likewise change. Transfers can be utilized as a switch module. It is an electromagnetic gadget or regularly called as hand-off switch. It separates two circuits electrically and interfaces them attractively. In essential transfer there are three contactors which are typically Open (NO), ordinarily shut (NC), and normal (COM). COM is typically associated with the NC. At ordinary condition when family unit gadgets is not in working mode then hand-off is on NO state. When it gets flag then it changes the state to NC and the gadget will get on working state [6]. Switch Module will associate with the Smart Microcontroller. It will go about as interface gadget between family unit gadgets and Cloud Server.

Using a smartphone we can instantly know the weather condition of London or the stocks and oil prices in US market or make a video call to our family and friends anywhere on the globe. But we cannot control the electrical devices present in our home/office once we are out of the building. We don't know the energy consumed by an electrical appliance in our home/office. We have no way to know and switch OFF a light bulb or a washing machine or an air-conditioner that is left ON after somebody leaves the room. We cannot set power on/off scheduling for these devices.

2. Related Works and Methodologies Used

IoT based Smart Switchboard is described based on Layered Architecture. The shrewd Switchboard framework is separated into three layers: application layer, organize layer, and

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detecting layer. Starting from the bottom, sensing layer is responsible for data collection from all the home appliances and it sends data to the middle layer that is network layer. Network layer uses internet for sending data to the upper most application layer which has different applications on different level for different purposes. For information accumulation and information preparing at the detecting layer it utilized microcontroller – CC3200 from Texas Instruments is the world's first Wi-Fi ensured single chip microcontroller unit (MCU) shown [Figure 2(a)]. It includes a high performance ARM Cortex-M4 processor subsystem running at 80 MHz and a Wi-Fi subsystem. The Wi-Fi subsystem comprises of a committed ARM MCU, a 802.11b/g/n radio, baseband, and MAC with capable crypto motor for quick, secure Internet association. CC3200 chip supports Station, Access Point and Wi-Fi Direct modes. It also supports WPA2 personal and enterprise security and WPS 2.0. Multiple provisioning methods are supported including Smartconfig, AP mode and WPS. It incorporates inserted TCP/IP stack and numerous Internet conventions for simple web get to. It consumes very low power and according to TI, it can run for more than a year from a single coin-cell battery.

There are three major parts to this application. They are the device, cloud server and the mobile app. Each of these features and the technologies used in this project are explained below [2]. Blynk is a smartphone application that allows the developer to create a custom app according to the application shown Figure 1(b). It leverages the resources of a smartphone such as the touch screen to provide a set of widgets that assists to create a custom user interface to control the device remotely [9]. It consists of two main elements, an application running on Android and a library compatible with the Wiring framework with our project board.

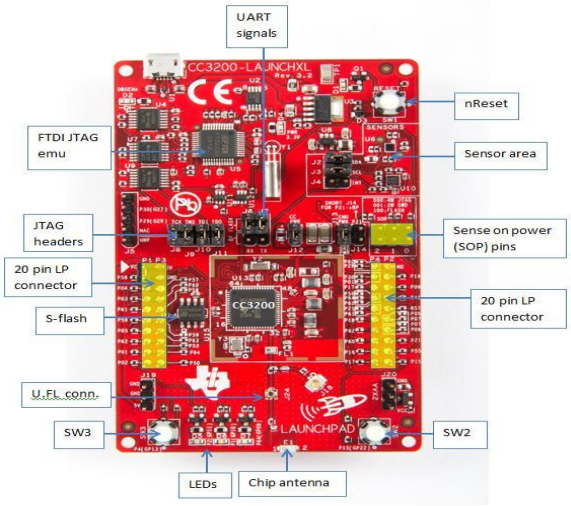

Figure 1(a). TI-CC3200 Launch pad

Figure 1(b). Blynk App

The device uses a hall-effect based AC Current sensor and a transformer based AC voltage sensor to find the instantaneous power consumption [4]. This value is the sum total of all the energy consumed by all the devices currently powered from it. This data can be monitored in real-time from the mobile app .Power Scheduling feature allows the user to create and set the on/off timings for each device. It can be used to simulate presence of persons in home and keep the burglars away. Occupancy detection feature which is used sharp IR Sensor to identify the visitor counts in order to limit the loads. Based on the visitor count we can reduce the wastage of power and the Electricity Bill. Blynk shown in Figure 1(c) acts as a middle man and handles the data translation between the device and the smartphone app [8]. Once the project application is registered the server issues a token which must be included in the main project code. It also enables the device to communicate between each other and also between other web applications over internet [3].

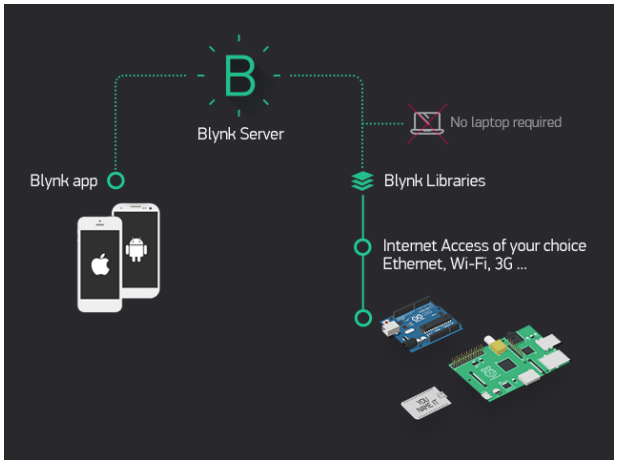

Figure 1(c). Blynk-Cloud Platform

Before associating the gadget to a get to access point, it needs to join the system safely. The process of connecting a new Wi-Fi device (station) to a Wi-Fi network is called as Wi-Fi provisioning. The provisioning process involves loading the station with the network name referred to as SSID and its security credentials. The user needs to send the predefined password. Although there are other methods such as Access point method and WPS method, here we are going to use SmartConfig method for Wi-Fi provisioning our device because of its ease of use. SmartConfig is a TI proprietary provisioning method designed for headless SimpleLink devices such as Smart Switchboard device. It utilizes a portable application to communicate the system accreditations from a cell phone, or a tablet to an unprovisioned Wi-Fi gadget [5]. After the system certifications are gotten by the SimpleLink gadget, it associates naturally to the system. User can download the android mobile app from Google Play.

3. Conclusion

IoT has numerous applications in various territories. It has been made for Smart Switchboard System. This paper investigated Smart Switchboard through sorting out IoT with Web server and Cloud Platform. Our approach included introducing learning into sensors using Energia organize, empowering interchanges with savvy things using Cloud organizations for basic access in different ranges, and upgrading data exchange viability. The approach was reasonably utilized for showing associations for measuring home conditions, checking electrical machines, and controlling home robotization. The foundation can be received for or adjusted to different applications.

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