



Smart Home using Blynk App Based On IOT

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Abstract—By the virtue of blooming automation industry and wireless connectivity, all the devices within the home can be connected. Today's World is moving to digitalization where everything is made easy and comfortable for people i.e. Young youth as well as senior citizen. Smart Automated House Application using IOT (Internet of Thing) is a system where basic house facility can be handled by device from any place such as ON and Off of Light, Fan. One can handle all this things with help of device ESP8266, Android Application, Internet Connection. This paper include functionality of node esp8266 are connected with either of above given house application like fan, light, water pump, gardening with help of coding and hosting online with web server. All the functionality is handled by Mobile App created in android application, from which house application are controlled with help of internet. This paper is clarifying that monitoring of circuit devices through wireless using arduino and controlling using App Blynk. According to requirement of need one can connect multiple device like sensors, appliance and many more till 8.

Keywords—Wireless Control, Internet of Things(IoT), Home Automation, ESP8266, Blynk, Mobile App.

I. INTRODUCTION

IoT (internet of things) in recent years have become lifestyle of human being with great potential[7]. Even it is focusing on different task that are requirement of human intelligence. In today's scenario IoT has opened doors to that cover up all requirements of human dealings in their daily life. Example like purchasing of goods, monitoring of resources and remotely control them from any corner of the world. Think about a world were personal refrigerator will provide you list of all your stuff required for upcoming few days base on your present utilization in it. Even envisage your fridge is interactive with Home automation refers to remotely monitoring the conditions of home and performing the required actuation. Through home automation, household devices such as TV, light bulb, fan, etc. are assigned a unique address and are connected through a common home gateway. These can be

remotely accessed and controlled from any PC, mobile or laptop. That can drastically decrease energy consumption and get better the living environment as well as enhancing the indoor safety .

Along with the quick developments in technology, the devices in the recent past are becoming smarter. The real-world appliances are being prepared with intellect and computing capability so that they can configure themselves accordingly. Sensors attached to embedded devices along with the low power wireless connectivity can facilitate to remotely monitor and control the devices. This forms an integral component of Internet of Things (IoT) network. IoT also helps in transferring of data from sensors through wireless network, achieving recognition and informational exchange in open computing network. Things that we are using in our daily life are becoming smart with the current technologies but it isn't sufficient until we connect them to act with the dynamic environment and in addition to make their own inter-network, that is, machine-to-machine communication . The Objects like electronics devices, softwares, sensors, actuators, home appliances and vehicles are connected to a wireless network. Internet of Things is considered as a wireless network of these objects and they can exchange data through light weight protocols like MQTT, CoAP etc. There are so many types of radio modules out of which GSM, 3G, WiFi, Bluetooth, ZigBee, etc. are common. However, owing to the surging number of WiFi hotspots and range sufficient to perform the required control and monitoring, WiFi is chosen as the mode of communication in the prototype and the devices are controlled through Blynk App implemented using ESP8266 .

II. LITERATURE REVIEW

Smart cities based on IoT [3] technology are becoming more and more popular. Initial goal of IoT was to connect physical devices to internet. Then, Web of Things (WoT) become prominent to easily connect sensors to the web, get the data to and from the web that has been created by the devices .

The READY4 Smart Cities aims at dropping energy utilization and CO2 emission in the cities making use of ontologies and associated data. The project is actually intended to produce and supply energy-related data such as climatic, pollution, traffic, activity etc. But it doesn't encompass vital IoT domains like healthcare, smart farm etc. and neither does it mention need to incorporate a reasoning engine to analyze IoT data.

The STAR-CITY project is deployed in four cities: Dublin, Bologna, Miami and Rio. They use semantic web technologies to identify and forecast road traffic Jams. As per the design, they have used six heterogeneous sources: road weather conditions, weather information, Dublin bus stream, social media feeds, road works and maintenance, and city events. They use Semantic Web Rule Language (SWRL) rules such as heavy traffic flow. The project is mainly focused on the traffic investigation.

The City Pulse project is intended for public parking space availability calculation, real time travel planner, air pollution counter-measures, and opting efficient routes and public transfer. The project is aimed on large-scale analysis and real-time processing.

The Smart Santander project deployed 20,000 sensors measuring hotness, moisture, particles, CO and NO2 for monitoring parks and gardens irrigation, outdoor parking are organization, traffic intensity monitoring, and smart metering.

III. IOT ARCHITECTURE

The physical layer consists of the devices that are to be controlled. The sensors to sense the surrounding environmental conditions are also connected to this layer. The data link layer consists of IoT [3] gateway router (here, we have used arduino as router gateway), device manager and various communication protocols. This layer links the home appliances to the web-server or cloud via Wi-Fi communication. Raspberry pi is used as private server to store the sensor data and also it sends data to the end users upon request. In this system, raspberry pi falls under database/server layer. The application and presentation layer consist of web protocol. This layer constitutes either designing of a webpage for accessing the devices connected to the perception layer via PC or laptop computer, or building an android or iOS mobile application if

the devices are to be

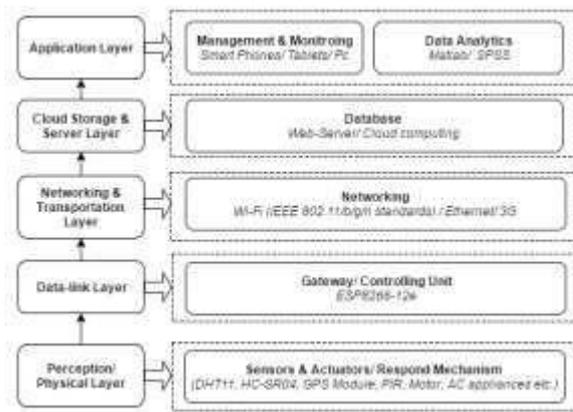


Figure 1 IoT Architecture [5]

controlled and monitored via smart phones.

IV. RELATED WORK

The system is divided into two major parts: software and hardware design. Hardware configuration involves arranging microprocessor, microcontroller, sensors and actuators whereas software portion encloses programming that is written and uploaded in each of the microcontrollers and microprocessor. The system consists of microcontroller connected to sensors and electrical devices that are to be monitored and controlled. This section shows how different hardware components are set up. The specifications and information regarding various components used in this system are descriptively explicate below.

The main aim of Smart Home is useful in order to provide better energy utilization, efficiency, comfort and to provide better true security. Nowadays Smart Home automation is more used in India because of the cost and the easily getting devices. Also, devices for the automation are easily available. The main objective here is to present a Small IOT system designed and created by utilizing WLAN network based on ESP8266. The System is able to control home electronics devices by the mobile phone via internet. Results from test of the system show proper control and monitoring functions can be performed from a device linked to a network.

A. Arduino

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

Features of arduino are as follows:

Table I Configuration of Arduino

Type	ATmega328P microcontroller
CPU	16 MHz
Memory	32KB FLASH, 1KB EEPROM

	2KB SRAM
Input	6 Analog input pins
	14 Digital input/output pins
Power	5 V DC
Modulation	Pulse-width modulation

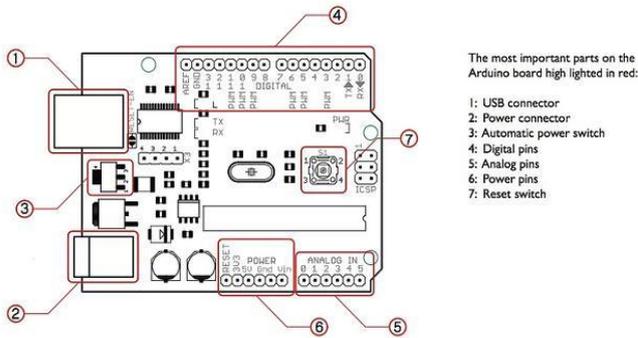
Figure 3 Blynk App working Diagram[10]

B. Blynk

Blynk is an internet of things platform which allows controlling electronic devices remotely using its iOS and android apps. It provides dashboard by which user can create graphic interface using different widgets. Blynk can also store and display sensor data. Blynk provides libraries for most of the popular hardware platforms like Arduino, ESP8266, Raspberry pi, SparkFun etc.

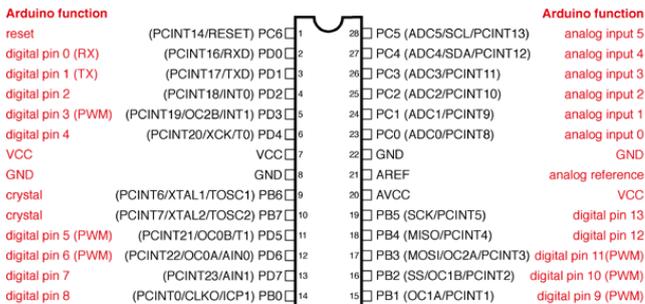
In the Blynk three most important components are App, Server and Libraries. App can help to create the interface. Server is responsible for all the communication between app and the hardwares. And Libraries enables communication for hardware with the server using commands.

Arduino is the main components in the above diagram. It is connected with external power source with cable. Next important component is relay. Here we use 5V DC relay as switch. Using the relay, we can convert DC power to AC. Relay is connected with aurdino and bulb. Using the blynk app we can operate the all devices using the blynk server. In blynk app different button are added, using those buttons we can on/off the switch.



The most important parts on the Arduino board high lighted in red:
 1: USB connector
 2: Power connector
 3: Automatic power switch
 4: Digital pins
 5: Analog pins
 6: Power pins
 7: Reset switch

Atmega168 Pin Mapping



Digital Pins 11, 12 & 13 are used by the ICSP header for MOSI, MISO, SCK connections (Atmega168 pins 17, 18 & 19). Avoid low-impedance loads on these pins when using the ICSP header.

Figure 2 Arduino Pin Diagram[2]

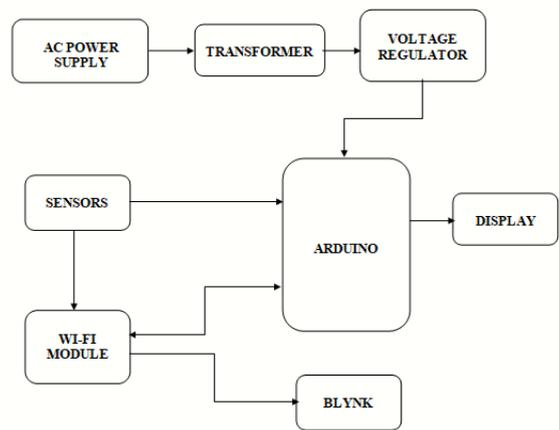


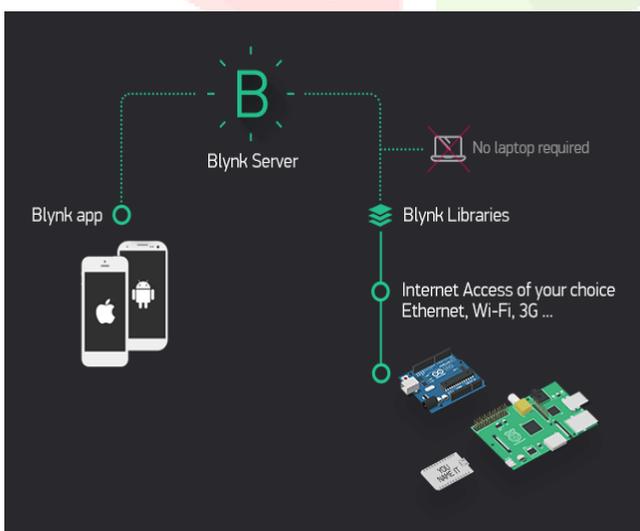
Figure 4 Schematic Plan of the Project

C. User Interface

The graphical interfaces in smart phones and tablets are designed in the form of android and iOS applications by putting buttons, graph-plotter, LCD and sensor-value display. The user can simply download the app, log in and then monitor and control her entire home appliances. The interface should enable the user to look at the device status and regulate them.

V. WORKING OF THE SYSTEM

The system consists of three isolated sub-systems: first subsystem consisting of Blynk App module to get the status of the equipment, second sub-system you can attach multiple sensors DHT11 temperature sensor to measure temperature, PIR sensor to detect motion and ultrasonic sensor to measure the distance, and the third sub- system consisting of a master microcontroller which function as the central coordinator that communicates with other subsystems via Wi-Fi. The master microcontrollers also interfaced with a relay module to control the appliance sat the site. The sensor data are fetched to the user interface facilitated by smart phones or tablets from the various sensors using a aurdino as the private server.



Basically, control of turning ON or OFF the whole system is at owner's hand. As the system gets powered up, it searches for the preset SSID (Service Set Identifier) and connects automatically to the Internet otherwise remains offline and performs the automated-controlling job that doesn't require commands from the owner.

Sensors accumulate disparate ambient-conditions and transmit them to the Microcontroller which processes the data transmitted by each sensor separately and then concurrently send the acquired data to the web server. The readings of each sensor can be accessed by the user from any place at any time. Additionally, all the sensors data are logged per second for future data analysis purpose.

The system can operate in two modes automatic mode and manual mode. When it is set at automatic mode, all the home appliances like fan, heaters etc. are automated to operate as per the surrounding environmental conditions sensed by the sensors. On the other hand, when it is set at manual mode, the user can locally or remotely monitor and control each of the home appliances via her smart phone or from her office desktop PC. To recapitulate, the surveillance and control of entire household appliances is under her finger tip.

Beyond auto-manual mode of operation, some of the activities like regular water level (in water-storage tank) inspection and turning ON or OFF the water pump, ringing alarms when detecting human-presence at the door which can also be used for security by installing the motion detectors on home or office so as to alert owner remotely. The user doesn't need to switch these devices at regular interval as they are self run under the commands of the microcontroller continuously round the clock.

Similarly, some of the alert signals and warnings like house on fire, gas leakage, intruder's detection etc. are wirelessly conveyed and notified about the situation to the house owner via e-mail and phone notification. Using GPS, the owner can track and locate her car at any moment from anywhere. To sum up, IOT provides greater extent of security-physical as well psychological.

VI. RESULTS AND APPLICATIONS

Relay module system connected to the home appliances to be controlled and linked to one another via Wi-Fi using Arduino with ESP8266 Module. For user interface, IOS version

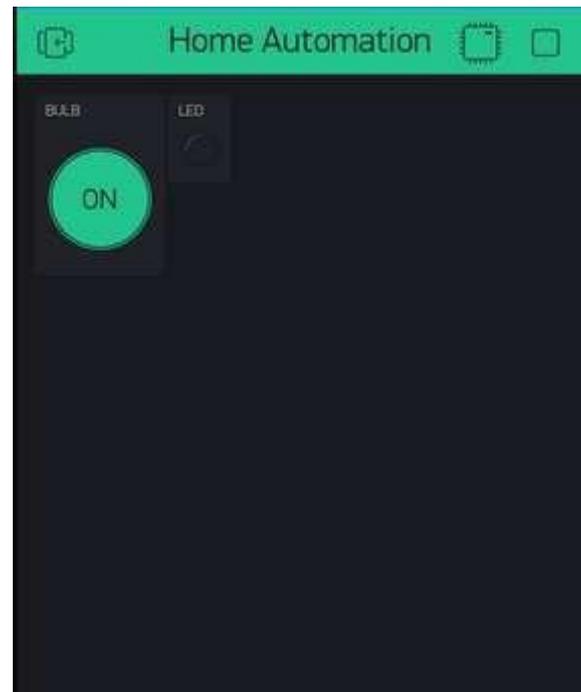


Figure 5 Screenshots showing appliance switch

of Blynk app with custom designed layout and buttons was used to facilitate monitoring and controlling various connected things.

The screenshots of the results of the designed system obtained on android application are shown in Figure 5.

By pressing virtual button on the smart phone, the home appliances can be controlled from any remote location. One advantage of this app is that it can be shared within all the family members of the house. When one-member switches ON or OFF an appliance, the action will be apparent to all other members sharing the app. Similarly, real-time as well as historical data of measurements of temperature, humidity, GPS location, distance -measure etc. can be obtained from anywhere using the app.

Further, this system can be employed in many places such as banks, hospitals, laboratories, traffic stations, residential apartments, house, streets, poultry farms, greenhouse etc. In a nutshell, this system can be used at multiple fields and areas in order to make them operate smartly

VII. CONCLUSION AND FUTURE WORKS

This paper has introduced a home management system. This paper is mainly focused on overcoming everyday problems faced by the people in world where regular power cut-off, unmanaged urbanization, lack of manpower in agriculture and farming, etc are blatantly evident. Our prototypical system is applicable to real-time home security, automation, monitoring and controlling of remote systems.

This implementation provides an intelligent, comfortable and energy efficient home automation system. It also assists the old and differently abled persons to control the appliances in their home in a better and easier way.

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