A Smart WIFI Based Electrical Appliances Control System

Jeeva[1], S. Arun Cibi[2], M.Arunraj[3], N.Ashokkumar[4], S.Aiswarya[5]

[1, 2, 3, 4] Dept of Electronics And Communication Engineering
[5] Assistant Professor, Dept of Electronics And Communication Engineering

Abstract- *The old manual systems are nowadays replaced by digitization and automation. Devices are connected and controlled by the platform provided by IoT (Internet of Things). This project is about creating a light switching monitoring and controlling system, for judicial utilization of power consumption in an organization. It mainly focuses on controlling the on/off state of lights/fans in various blocks of a building using a computer. This lights/fans switching system will be greatly beneficial for workers to control the on/off state of the lights/fans, without wandering to the different locations of a building, particularly in case of large-sized buildings (for EX. our college). More users can be facilitated where the connections of the sensor are made. It is done by the admin, who controls the devices connected to the server. A lot of manual work gets minimized by this approach. This system will be implemented as a software module combined with a hardware module. First, the user has to login to the application and then select the blocks and floors, to monitor and control the on/off state of lights/fans. The control signal is sent to the WIFI router which passes the control to the WIFI module ESP8266 and then the switch controlling is done. The software uses a spring boot framework which works on both front and back ends. With the help of this system, an organization can optimize its power consumption which is the need of the hour.*

Keywords- WIFI module ESP8266, Arduino, Internet of Thing (IoT), Server

I. INTRODUCTION

In this digital world, all the manual works are getting automated. These smart things are emerging as a result of the Internet of thing which had come into existence from 2013. In the former stage, electrical appliances like heater, washing machine, air-conditioner had evolved, and this is controlled manually. These electronic appliances are controlled by the Internet of Things (IoT) in 2011. Internet of Things is a system of interrelated computing devices and digital machines. And it is also defined as the ability to transfer data over a network without requiring human interaction. IoT focuses mainly on reducing the manual work and thereby making digitalized constructions. IoT involves three layers namely perception layer, network layer and, the application layer. There is another layer lying between the application layer and network layer which is called the support layer. The communication technologies like WIFI, Bluetooth are interfaced with the smart sensors which are formed as a result of the device to device connection.

Internet of Things is enabled by the contribution of embedded systems, wireless networks and control systems. IOT pays the way for the interaction of the physical world into the computer and it results in improvement. Wireless protocols are preferred and it is developed by IoT to perform a set of tasks controlled by the remote application. Today wireless controlling is preferred over wired techniques. This paper describes how wireless network protocols are used in switching lights in big structures like apartments and educational institutions.

The lighting system is connected to the remote application in an ordered sequence. For example, in educational institutions, the lighting systems are controlled separately by providing separate controls. By using this ordered controlling we can control all the lighting systems Remotely. Lighting systems are connected to Wi-Fi module and Wi-Fi modems provides Internet access to the Wi-Fi module. The user commands over the internet will be obtained by the Wi-Fi modems. The user commands using computers and smartphones through browsers. The user should have a separate username and password so that only specific users can control it. Admin should have the key to add or remove users and primary control. User names and passwords are created using JDBC and JSP servlet. The front end of the control system is developed using HTML and CSS.
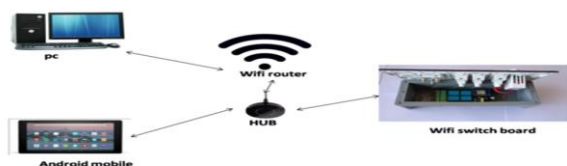

Fig 1.

II. SYSTEM ANALYSIS

The main feature of the model is turning off lights remotely. To control the lighting system the smart device (Computer or Smartphone) needs to be connected with the database. The designed model meets the requirements of controlling lighting systems by using a computer or smartphone through the browser. The major feature is that we can control the lighting system using a browser having an internet connection. The model provides absolute security. Not all can access the control only admin and verified users are allowed to access it. This model reduces the wastage of power. If a lighting system is not switched off properly the application indicates that the lighting system is not properly turned off.

The status of the system is updated over a specific time by the server. The refreshing time of the system is updated according to the user specification. Sometimes the lighting system can be turned off or on manually on the switchboard that is not connected to the server. In that case, it updates the information to the user. We can also check whether there is a power supply to the lighting system. Since no intruder can enter into the application as previously said that there are a username and password for users.
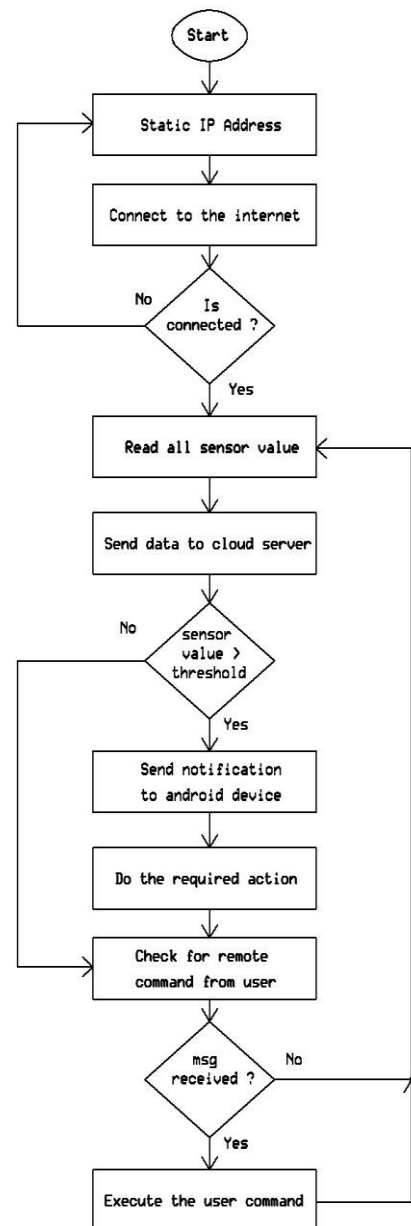
Fig 2 .Network Architecture

The server is the main part of IoT based operations and it is the heart of all functions. Data storage, sensor feedback, and control use the server especially the cloud server. The server and IoT devices connections need to be created. There are many ways to connect the server and the devices. Among those connections, a point-to-point connection is a way we have chosen. After the connection, we would be able to send and receive data. The database stores the received data, as it is along with the server. It enables the user to go through the stored data anywhere at any time with the web browser support. Google cloud messaging is the concept used in connecting the computer or smartphone to the main server. At the time of installation unique login id and password is given to the user for the security purpose. Verified

user can go through the data of the device connected with the main server with the help of the login id and password and change the status of IoT devices connected with the main server but the admin can access the data of all the devices connected and can change the status of any devices connected to the main server. The proposed model provides easy control and 100% security.

This section describes the Control and Management of the System which is done by Software Driver. We have developed two separate Control Systems; one is running on the webserver via WIFI and the other is running on the Embedded-board. Embedded-board is the normalized one which we can see in our homes. It is called a Manual Based Control System (MBCS). The main function of this System is to communicate with and control the circuits connected to the home appliances. The second System, the control and management engine, resides on the home server and is based on Java components. It is called a Java-Based Control System (JBCS). The JBCS System consists of a collection of Java Server Pages and Java Bean components. Building the JBCS engine using JSPs has many advantages. This System requires several dynamic home pages and user interfaces. In this situation, JSPs are more powerful and preferred. Java Server Pages technology provides an easy way to create dynamic web pages and simplify the task of building web applications.
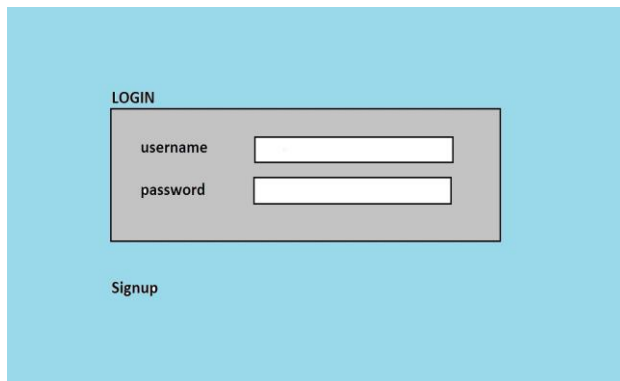

Fig 3 Login Page

Clients Give his/her requests to the web browser. JBCS grants access to controls the Lights/fans in different blocks. The First Login page will be displayed. It will be asking the client to give the user name and password. After giving these details, the Client needs to click the Login Button. If the details are invalid, the Login page is again redirected with the trying message. If the given details are valid, the next JPS page will be opened. This page Consists of Pictorial representation of Different building blocks. The client needs to select the blocks where the lights/fans are to be switched on/off. Next JPS with Floor details of the respective selected blocks will be displayed. Next JPS Consists of

Pictorial Representation of lights/fans with ON/OFF buttons and locations (for example: classrooms, corridors, etc.,). Once the particular light is turned ON/OFF, the respective digital signal is sent to the WIFI and replayed is turned on to run a light/Fan. Operations are clearly explained in the below table. Most of the farmers in our country use traditional farming methods in cowshed. This traditional farm tends to lack of proper management in maintaining the health and milk production. All the activities in cattle farming like feeding the cattle, providing water and temperature control inside the shed are done manually. So a huge manpower is needed for all these factors.

JAVA COMPONENTS	FUNCTIONALITY
login.jsp	This page allows user to give user-ID and password.
Processing.jsp	Above parameters (user-ID, password) are sent to verify java and Displays Verifying to client.
verify.java	The java class used to check whether the given used ID and password is Correct and Gives access to user to next page.
Blocks_Selection.jsp	Enables the Pictorial representation of blocks
Floors_Selection.jsp	Enables the Pictorial representation of Floors of the selected blocks
JAVA COMPONENTS	FUNCTIONALITY.
Blocks.java	A java class which includes get methods of different blocks and gets the methods of respective blocks selected by the user
Floors. java	A java class which includes get methods of different Floors and gets the methods of respective floors selected by the user
Switch.jsp	Enables the Pictorial representation of Devices with location.
Switch_Selection.java	A java class which includes set and get methods of different lights/fans and sent digital signals to WIFI module.
status.jsp	Status which Displays whether the devices turned on /off.

REFERENCES

[1] Pavithra, D., & Balakrishnan, R. (2015). IoT based monitoring and control system for home automation. 2015 Global Conference on Communication Technologies (GCCT).

[2] Kodali, R. K., & Mahesh, K. S. (2016). A low-cost implementation of MQTT using ESP8266. 2016 2nd International Conference on Contemporary Computing and Informatics (IC3I).

[3] Dey, S., Roy, A., & Das, S. (2016). Home automation using the Internet of Things. 2016 IEEE 7th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON).

[4] Binti Mohd Arifin, N. A., & Thamrin, N. M. (2018). Development of Automated Microcontroller-Based Lighting Control System For Indoor Room Implementation. 2018 4th International Conference on Electrical, Electronics and System Engineering.

[5] Kumar A., Shareef A., Harn K.T, Kar P, & Panda S.K (2019). A Complete Hardware Setup for Smart

Lighting System. 2019 IEEE International Conference on Sustainable Energy Technologies (ICSET).

[6] Xu, W., Zhang, J., Kim, J. Y., Huang, W., Kanhere, S., Jha, S., & Hu, W. (2019). The Design, Implementation, and Deployment of a Smart Lighting System for Smart Buildings. IEEE Internet of Things Journal.

[7] Viani, F., Polo, A., Garofalo, P., Anselmi, N., Salucci, M., & Giarola, E. (2017). Evolutionary Optimization Applied to Wireless Smart Lighting in Energy-Efficient Museums. IEEE Sensors Journal.