



COMPUTER NETWORKS (18CSC302J)

TOPIC – HOME AUTOMATION

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INTRODUCTION TO HOME AUTOMATION

- *Home automation is a wireless home appliance control system accessed by a remote device such as mobile phone (Android or ios) to allow a home owner to control , monitor and coordinate home appliances , without changing the home infrastructure.*



OBJECTIVES OF HOME AUTOMATION:

- *The main objective of this system is **to control the home appliances and electronic devices with the help of a supervisory system**. The supervisory system is designed in such a way that everyone can access it.*
- *Home automation systems are composed of hardware , communication and electronic interface that work to integrate electrical devices with one another.*

OBJECTIVES OF HOME AUTOMATION:

- *Another objective of home automation include that it can be regulated with the touch of a button. For any remote location , users can adjust the controls on home entertainment systems , limit the amount of sunlight give to houseplants , or change the temperature in certain rooms . Home automation system is often connected through computer networks so that the user can adjust settings on their personal devices*



LITERATURE SURVEY

S.NO	Paper Title	Summary	Methodology/ Algorithm used	limitations
1	Bluetooth based home automation system using cell phones:	In Bluetooth based home automation system the home appliances are connected to the Arduino BT board at input output ports using relay. The program of Arduino BT board is based on high level interactive C language of microcontrollers; the connection is made via Bluetooth. The password protection is provided so only authorized user is allowed to access the appliances. The Bluetooth connection is established between Arduino BT board and phone for wireless communication. In this system the python script is used and it can install on any of the Symbian OS environment, it is portable. One circuit is designed and implemented for receiving the feedback from the phone, which indicate the status of the device.	Wi-Fi based using Arduino microcontroller through IOT	high cost, less Secure, Remotely controlled

S.NO	Paper Title	Summary	Methodology/ Algorithm used	limitations
2	Zigbee based home automation system using cell phones	<p>To monitor and control the home appliances the system is designed and implemented using Zigbee. The device performance is record and store by network coordinators.</p> <p>For this the Wi-Fi network is used, which uses the four switch port standard wireless ADSL modern router. The network SSID and security Wi-Fi parameter are preconfigured. The message for security purpose first process by the virtual home algorithm and when it is declared safe it is re-encrypted and forward to the real network device of the home. Over Zigbee network, Zigbee controller sent messages to the end. The safety and security of all messages that are received by the virtual home algorithm. To reduce the expense of the system and the intrusiveness of respective installation of the system Zigbee communication is helpful.</p>	Smart Task Scheduling Based using Arduino and Android	Energy-efficient but not very-scalable

S.NO	Paper Title	Summary	Methodology/ Algorithm used	limitations
3	GSM based home automation system using cell phones:	Because of the mobile phone and GSM technology, the GSM based home automation is lure to research. The SMS based home automation, GPRS based home automation and dual tone multi frequency (DTMF) based home automation, these options we considered mainly for communication in GSM. The sensors of system convert the physical qualities like sound, temperature and humidity into some other quantity like voltage. The microcontroller analysis all signal and convert them into command to understand by GSM module. Select appropriate communication method among SMS, GPRS and DTFC based on the command which received GSM module.	Web service and android app Based using Raspberry pi	Autonomous, and less feasible

S.NO	Paper Title	Summary	Methodology/ Algorithm used	limitations
4	Wi-Fi based home automation system using cell phones	<p>Wi-Fi based home automation system mainly consist three modules, the server, the hardware interface module, and the software package. The figure shows the system model layout. Wi-Fi technology is used by server, and hardware Interface module to communicate with each other. The same technology uses to login to the server web based application. The server is connected to the internet, so remote users can access server web based application through the internet using compatible web browser. Software of the latest home automation system is split to server application software, and Microcontroller (Arduino) firmware.</p> <p>Server use database to keep log of home automation system components, we choose to use XML files to save system log.</p>	Android based using Arduino	Less feasible and less Effective

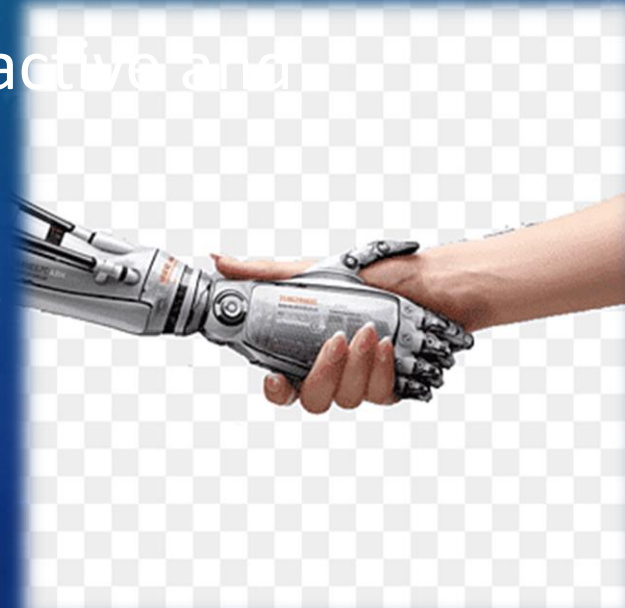
S.NO	Paper Title	Summary	Methodology/ Algorithm used	limitations
5	Home automation using RF module:	<p>The important goal of Home Automation System is to build a home automation system using a RF controlled remote. Now technology is accelerating so homes are also getting smarter. Modern homes are deliberately relocating from current I switches to centralized control system, containing RF controlled switches. Today traditional wall switches situated in various parts of the home makes it laborious t for the end user to go near them to control and operate. Even further it turns into more problematic for the old persons or physically handicapped people to do so. Home Automation using remote implements an easier solution with RF technology. In order to accomplish this, a RF remote is combined to the microcontroller on transmitter side that sends ON/OFF signals to the receiver where devices are connected. By operating the stated remote switch on the transmitter, the loads can be turned ON/OFF globally using wireless technology.</p>	Cloud Based Using Zig Bee Microcontroller	Less Convenience, safety is not there, and Power saving For very less duration

OVERVIEW

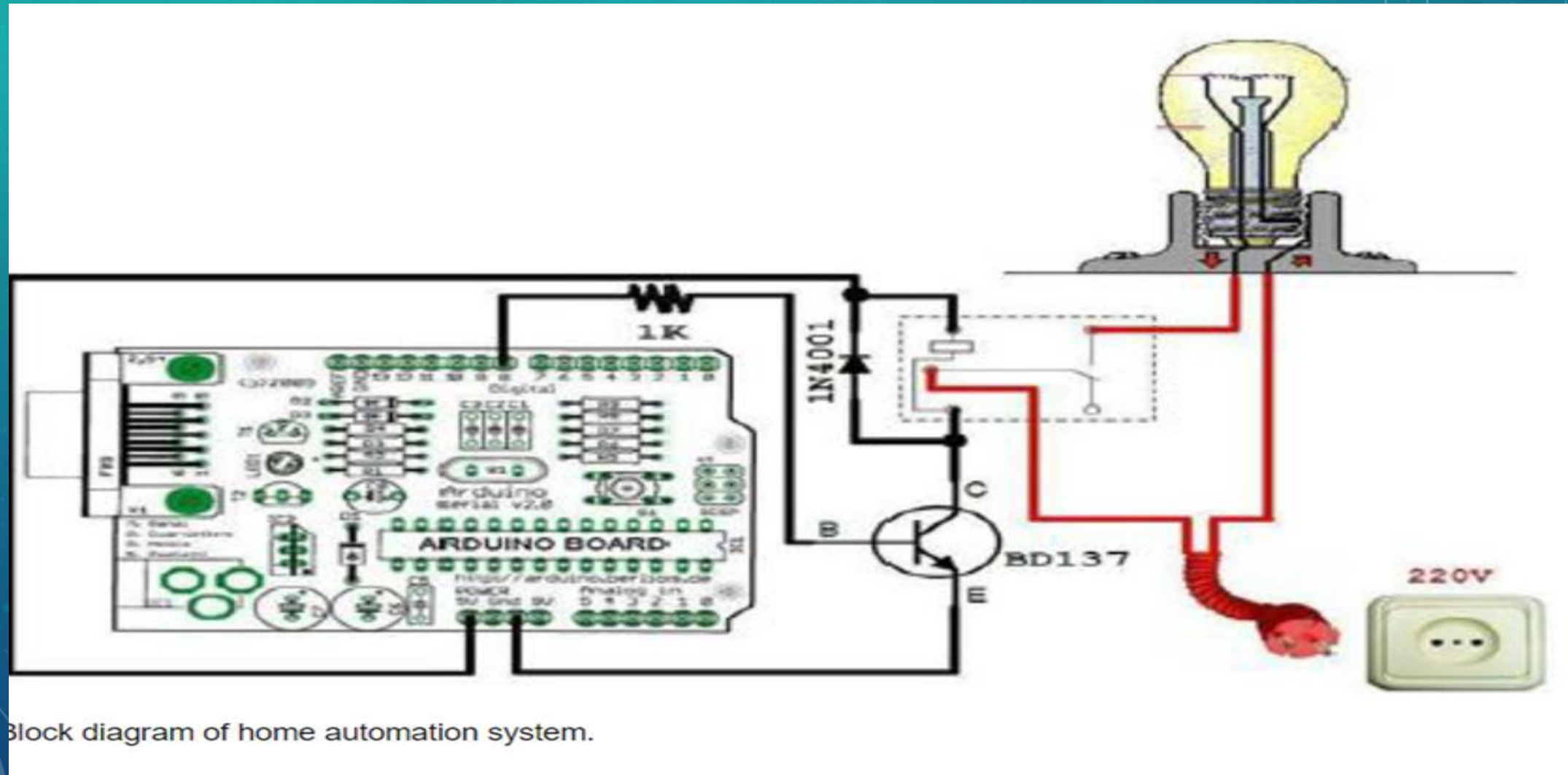
- With the evolution of Internet of Things (IOT) all these manually controlled electrical and electronic devices can be controlled automatically. In 2011 it was predicted that IOT'S application will focus on mainly on the smart city construction and digital agriculture construction. China Communication Standards Association gives three layer structure of IOT: The first layer is the sensing layer mainly used for collecting information; The second layer is the network layer used for information transmission and processing; The third layer is the application layer used for storage and decision making . The main concept of IOT is that it can create a virtual connection between a hub or a network and electronic and electrical objects.

OVERVIEW

- . This virtual connection helps to control, locate, and track down these connected objects. On the basis of device-to-device connectivity concept the development of smart sensor together with communication technologies such as Wi-Fi, Bluetooth etc. and supported by cloud computing technologies, IOT has become reality and it's goal is to make devices more aware, interactive and efficient for a better and safer world



ARCHITECTURE DIAGRAM:



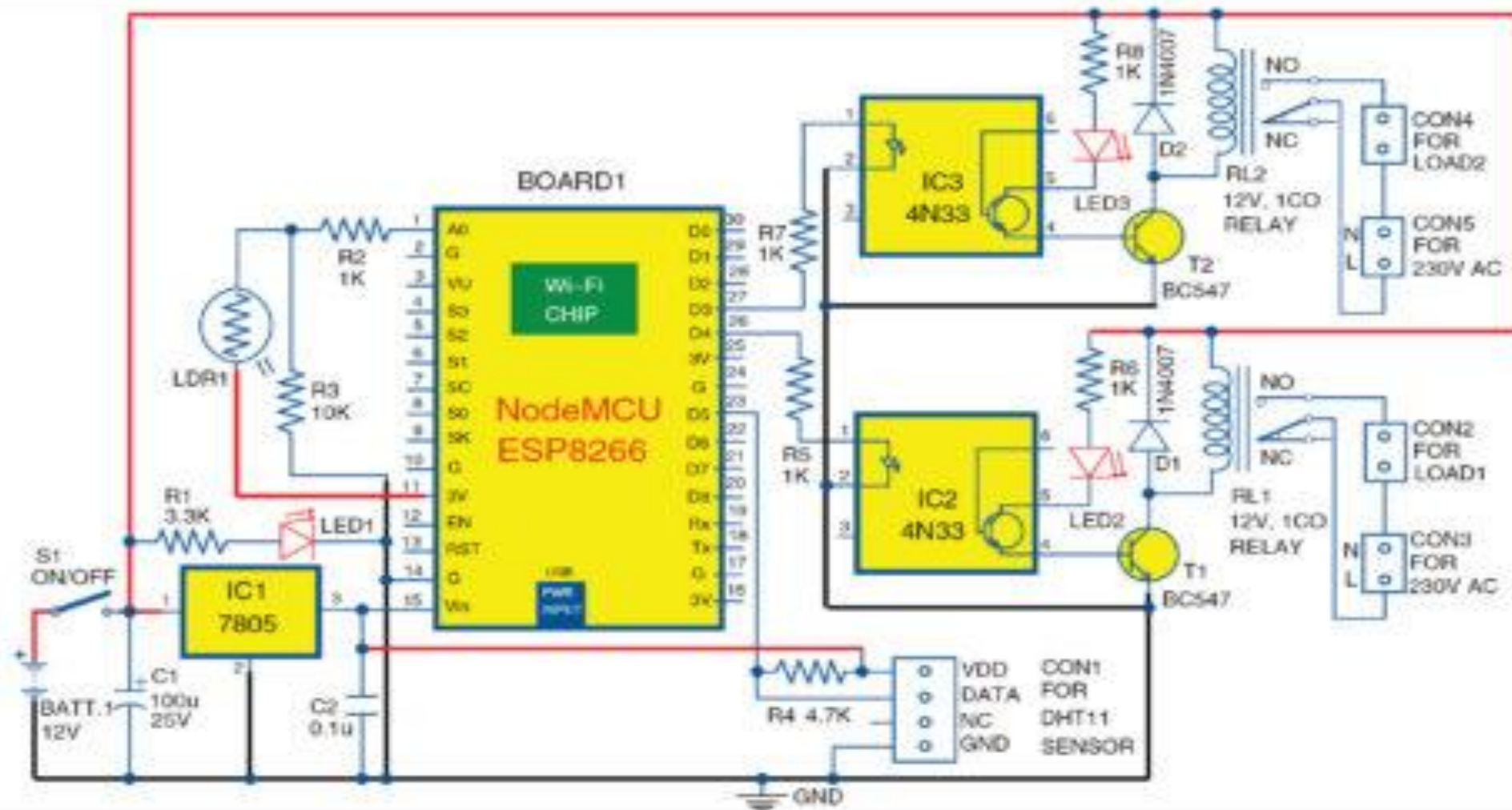
Block diagram of home automation system.

CON4
FOR
LOAD2

CON5
FOR
230V AC

CON2
FOR
LOAD1

CON3
FOR
230V AC



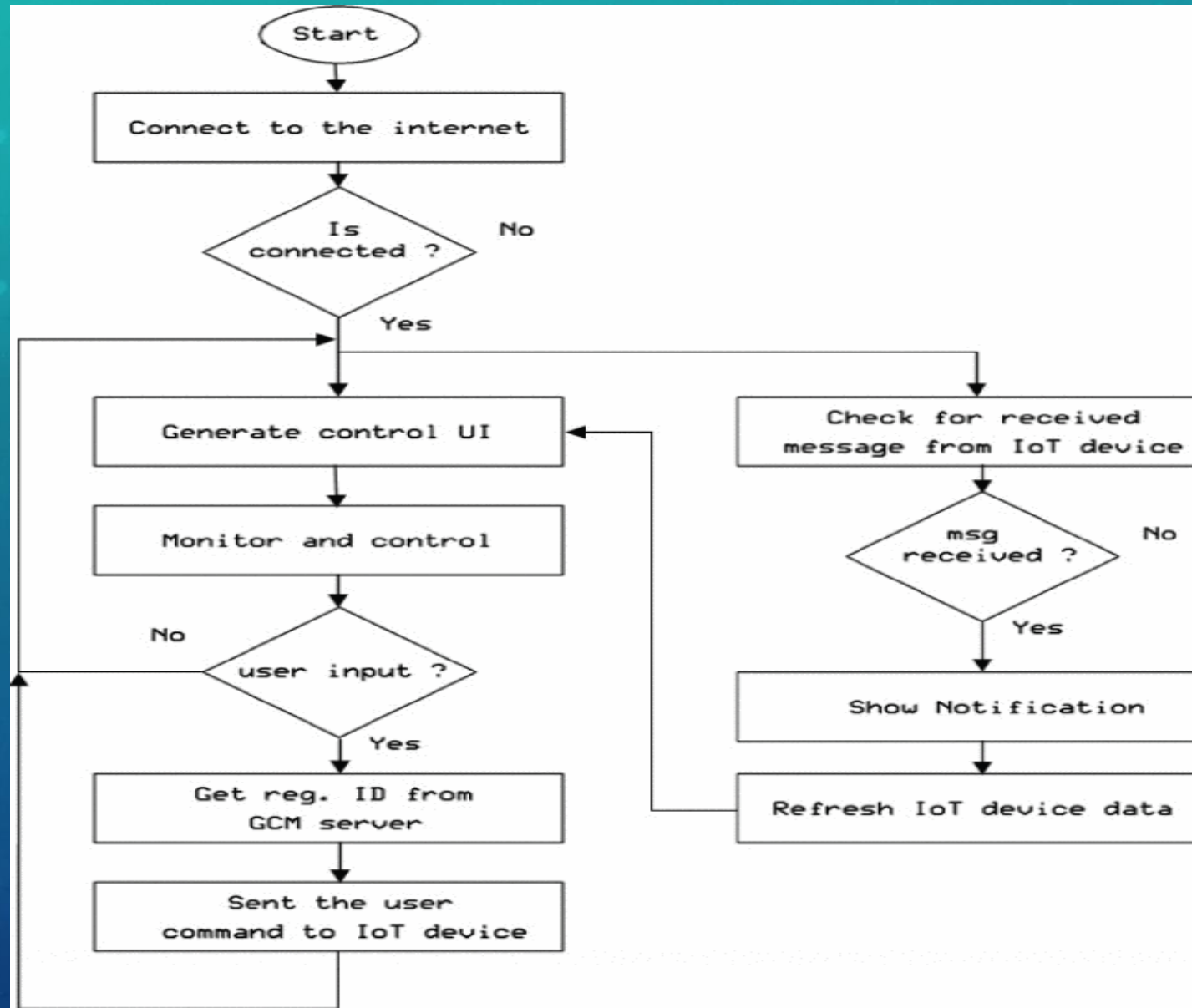
MODEL EXPLANATION

- The PHP programming language is used to create a point to-point web socket and a web application. After creation of such a socket, it is connected to the Amazon cloud server with the help of the internet connection. Now as the whole system is now online, it will look for the received messages from the connected IOT devices as shown . Ones the data is received, it will show notification and will refresh the data after certain interval. This refreshed data will be send to the control user interface. The control user interface is everything that the user has to act upon. The received data in the control user interface is shown in the monitor or on the control screen. Now to change the status of any devices the user needs to obtain the registered id from the Google Cloud Messaging (GCM). To register the user needs to send a request to the GCM.

MODEL EXPLANATION

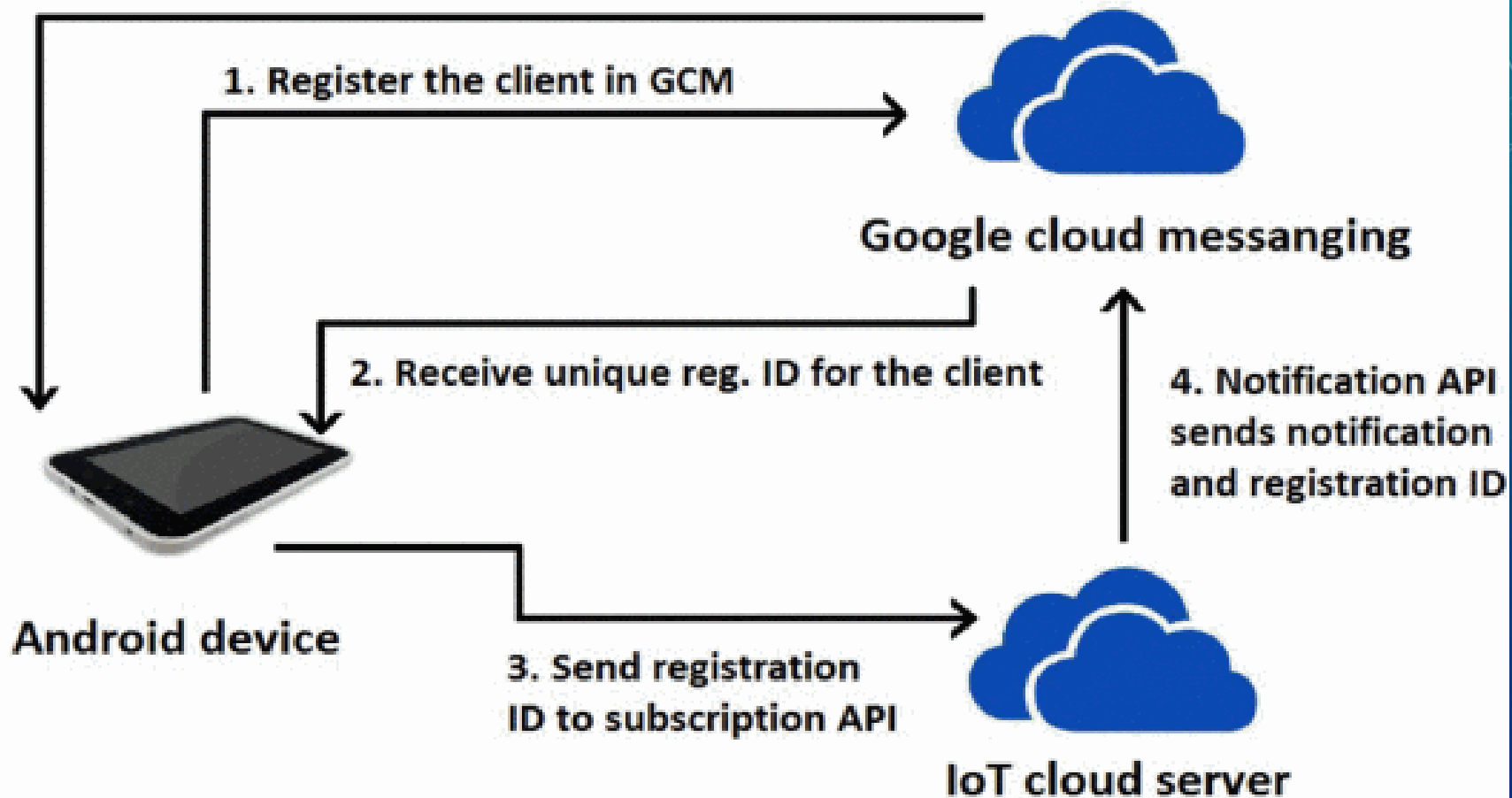
- In response to that the GCM will send the registration id and a unique password shown. The registration id is then send to the subscription API which sends notification and registration id to the GCM. The GCM in turn sends the notification to the client having that registration id. As now the user has the registration id, the user can send command to the connected IOT devices. As the user login, the user can control all the electrical and electronic devices in every section of the house. By entering to each window as shown in fig. The user can change the status of each appliances and can control the security system. This cycle continues until the server or the connected IOT devices is not connected with the internet.

MODEL EXPLANATION



FUNCTIONAL BLOCK DIAGRAM:

5. Send notification to the client having the registration ID



RESULT


- The IOT system we have developed is tested by installing smart sensor units and setting up a server for few houses. After installing the smart sensor units, the user needs to install the software to his/her laptop or smart android phone. After proper installation of the provided software the user needs to sign-up on the home automation server. Once the user is registered, a unique user id and a password is provided to the users of each house in which the sensor units are installed. After the user id and the unique password are obtained user can login from our android application. When user start the android application first a login page will appear as shown . It was observed that the user can successfully login.

RESULT

- As soon as the user login, a home page will appear in which the user could keep a track of all the electronic and electrical devices which are connected with the server as shown. Our designed model of home automation can also controlled by using any web browser. To operate home automation system user need to go web-page of home automation system then a login page as shown will be appeared. By login in this page the main home automation page as shown will showed. From this page user can control his/her home appliances and change the security settings. This was possible due to the database present with the server which stores all the data received from the server. A threshold value is provided to each sensor connected. If the sensor parameter exceeds the threshold value provided an automatic alarm is triggered.

OUTPUT SCREENSHOTS:

18:58 35%



User Name

Password

LOGIN

18:57 35%

Name: Shopan Dey [LOGOUT](#)

Temperature: 30 'C
Humidity: 79 %

HALL ROOM

BED ROOM

DINING

KITCHEN

SECURITY SETTINGS

OUTPUT SCREENSHOTS:

Light 1	<input type="button" value="On"/>	<input type="button" value="Off"/>	<input checked="" type="radio"/>
Light 2	<input type="button" value="On"/>	<input type="button" value="Off"/>	<input type="radio"/>
Power socket	<input type="button" value="On"/>	<input type="button" value="Off"/>	<input type="radio"/>
Fan	<input type="button" value="On"/>	<input type="button" value="Off"/>	<input type="radio"/>

SECURITY SETTINGS	
Active automatic light controller for garden	<input type="checkbox"/>
Active door security sensor 1	<input type="checkbox"/>
Active door security sensor 1	<input type="checkbox"/>
Active door security sensor 1	<input type="checkbox"/>
Active door security sensor 1	<input type="checkbox"/>
Active motion sensor 1	<input type="checkbox"/>
Active motion sensor 1	<input type="checkbox"/>

OUTPUT SCREENSHOTS:

LOGIN

username

password

Signup

USER NAME: SHOPAN DEY

Temperature: 35° C

Humidity: 79 %

Active automatic light controller for garden ☐

Active door Security sensor 1 ☐

Active door Security sensor 2 ☐

Active door Security sensor 3 ☐

Active door Security sensor 4 ☐

Active motion sensor 1 ☐

Active motion sensor 2 ☐

HALL ROOM

Light 1 ☐ On ☐ Off ☒

Light 2 ☐ On ☐ Off ☐

Power socket ☐ On ☐ Off ☐

Fan ☐ On ☐ Off ☐

BED ROOM

Light 1 ☐ On ☐ Off ☒

Light 2 ☐ On ☐ Off ☐

Power socket ☐ On ☐ Off ☐

Fan ☐ On ☐ Off ☐

DINING

Light 1 ☐ On ☐ Off ☒

Light 2 ☐ On ☐ Off ☐

Power socket ☐ On ☐ Off ☐

Fan ☐ On ☐ Off ☐

KITCHEN

Light 1 ☐ On ☐ Off ☒

Light 2 ☐ On ☐ Off ☐

Power socket ☐ On ☐ Off ☐

Fan ☐ On ☐ Off ☐

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