IoT Based Domestic Mechanization Framework over Cloud

Addis G. Zegeye[1], Amruth Ramesh Thelkar[2*]
[1]Lecturer, [2]Assistant Professor
Department of Electrical and Computer Engineering, Jimma Institute of Technology, Jimma, Ethiopia

*Corresponding Author: amruth.rt@gmail.com

ABSTRACT

The proposed work design and organization of web of things-based home computerization is basically a Web Convention (IP) based control plot that can be reached anyplace there is a web association that permits you to control any gadget distantly without contacting it genuinely. This paper centers on the standards of IP-based constructions, the Arduino Uno R3 microcontroller, and electronic interface applications. The basic thought is to utilize this framework to exploit the monstrous expansion of cell phones, PCs, and web availability to grow human presence and potential outcomes. The fundamental objective of this paper is to empower or impair gadgets at home, just as to decide the device's present status. Every client should enlist and get a username and secret key before they can work the apparatus. The machine is inherent proteus with an Arduino micro-controller and a hypertext preprocessor for the customer program. The proposed idea in this paper was finished and assessed effectively utilizing reenactment and equipment execution.

Keywords--IP, Internet of Things, Arduino Uno R3, Home Automation, Hypertext Preprocessor

INTRODUCTION

Ongoing homes will turn out to be progressively self-controlled and motorized as a result of the comfort it gives, particularly when utilized in a private home [1].A home mechanization framework is an implied that permits clients to control electric apparatuses of changing kind with the least human intercession [2].

IOT based home computerizations overcloud is a technique for controlling the home from wherever of the world with no impediment of distance from the home by the utilizing remote web. Many existing structure, grounded home mechanization frameworks depend on wired correspondence [3]. This doesn't make an issue until the framework is arranged well ahead of time and introduced during the actual development of the structure yet for previously existing structures the execution cost goes extremely high. Conversely, Remote frameworks can be of extraordinary assistance for robotization frameworks. With the headway of remote innovations like Wi-Fi, cloud networks in the new time, remote frameworks are utilized in consistently and wherever [4].The framework work through web associates the client to gadgets at home. The client can be anyplace on the planet and can handle the home machines through the web at a distant spot. The client who needs to get to his/her home from a far off place, he/she ought to need to introduce the customer programming and worker programming will be introduced at homes personal computer. Client will get to their home through this customer programming. We built up the Customer and Worker application on PHP (hypertext preprocessor). The Hypertext Preprocessor (PHP) is a programming language that permits web designers to make dynamic substance that cooperates with data sets. PHP is fundamentally utilized for creating online programming applications both Customer and Worker Applications are easy to use, anybody have a little information on a PC can undoubtedly utilize it [5].A Customer and Worker application will empower a client (customer) to send a solicitation to the Worker and accordingly worker will actuate or deactivate any gadget. We have appointed an IP address to our worker, so it very well may

be gotten to by utilizing a web cloud. The electrical machine of all home computerization can be controlled and worked with arduino and the customer application can be interfaced with the Arduino [6].

The Web of Things (IOT) is the interconnection of extraordinarily recognizable installed processing gadgets inside the current Web structure. Commonly, IOT is required to offer progressed network of gadgets and frameworks, and administrations that goes past machines correspondence and covers an assortment of conventions, different areas, and applications [7].

The interconnection of all these installed gadgets which additionally incorporates keen articles, is relied upon to lead in computerization in practically all fields empowering progressed, applications like a Smart Grid. Researches around the globe come across with some ideas and inventions related to proposed module of IOT automation.

DhakadKunal, DhakeTushar [8] Brilliant Structure alludes to lessen human endeavors as well as energy productivity and efficient. ASP.NET is utilized in which machines are associated with sensors and sensors give status of apparatuses to the web. Here electric apparatuses are worked by the site. The fundamental goal of home robotization and security is to help impeded and matured individuals that will empower them to control home apparatuses and caution them in basic circumstances.

Vinay sagar K N,Kusuma S M [4] this paper presents a Home Mechanization framework (HAS) utilizing Intel Galileo that utilizes the combination of cloud organizing, remote correspondents, to give the client controller of different lights, fans, and machines inside their home and putting away the information in the cloud. As a result, the device will adjust in response to sensor data. This framework is intended to be ease and expandable permitting an assortment of gadgets to be controlled.

Shweta Singh, Kishore Kumar Ray [9] Home robotization with IoT is turning into a reality now, and an assortment of players like, Apple, Amazon, Google, Samsung, are for the most part joining into this space to give the stage and answers for shrewd homes. Considering this, the present investigation tends to IoT ideas through orderly audit of insightful exploration papers, corporate white papers, proficient conversations with specialists and online information bases. The fundamental Target of this paper is to give an outline of a Web of Things, models, and essential advances and their utilization in our day-by-day life. Shrewd Structure alludes to decrease human endeavors as well as energy productivity and efficient.

Deepali Javale, Mohd. Mohsin, Shreerang Nandanwar [10] the superb target of this paper is to help disabled/old matured individuals. It gives fundamental thought of how to control different home machines and give a security utilizing Android telephone/tab. The plan consists of Android telephone with home mechanization application, Arduino Mega. The client can associate with the android telephone and convey control message to the Arduino Uber which thus will control other inserted gadgets/sensors.

Rajeev Piyare [11] this paper presents a minimal effort and adaptable home control and checking framework utilizing an implanted miniature web worker, with IP network for getting to and controlling gadgets and apparatuses distantly utilizing Android based advanced cell application. To exhibit the possibility and adequacy of this framework, gadgets like light switches, power plug, temperature sensor, and current sensor have been incorporated with the proposed home control framework.

This paper proposes another plan for the shrewd home utilizing a PC as a server and a website created by PHP. This paper utilizes the python code to interpret the signals from the database to binaries for Arduino hardware implementation.

SYSTEM DESIGN ANDIMPLEMENTATION

The objective of the proposed framework is to add to the client who needs to control his/her home from distance when he/she can't ready to introduce actually to control his/her home effectively utilizing web. The plan of the paper is essentially separated into:

a) Transmitting Section (client application in computer or mobile phone).

b) Receiving Section (computer used as server in home and connected device).

Transmitting Section: consists of just customer application created in PHP that entrance the client to control his/her home with button key in his PC or cell phone. In the sending area since it needs security reason, in such a case that someone else get customer application, it need confirmation to utilize the framework or control his/her home. For the security reason singular client name and secret phrase are giving to verify clients. Furthermore, the client changes his/her secret word whenever they need. In the event that and just if the username and secret word

entered is right, they pass to controlling page of the application.

Receiving Section: Itcomprises of PC utilized as worker associated with web and part of the equipment segments like Arduino microcontroller, fluid precious stone showcase, transfer, and electrical apparatus.

DESCRIPTION OF SOFTWARE

In the framework block outline, which is appeared in Fig. 2, the client from anyplace can get to the user interface site page by entering https://ipaddress/control on their program. The page in the Fig. 1, the roar is shown on the screen of the client's PC or cell phone.
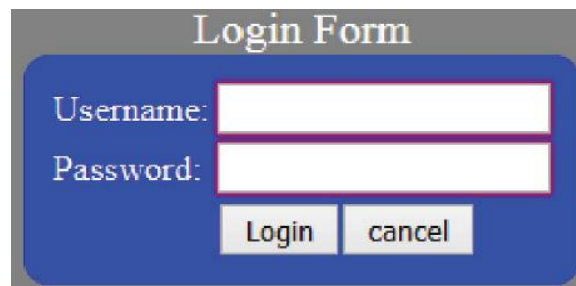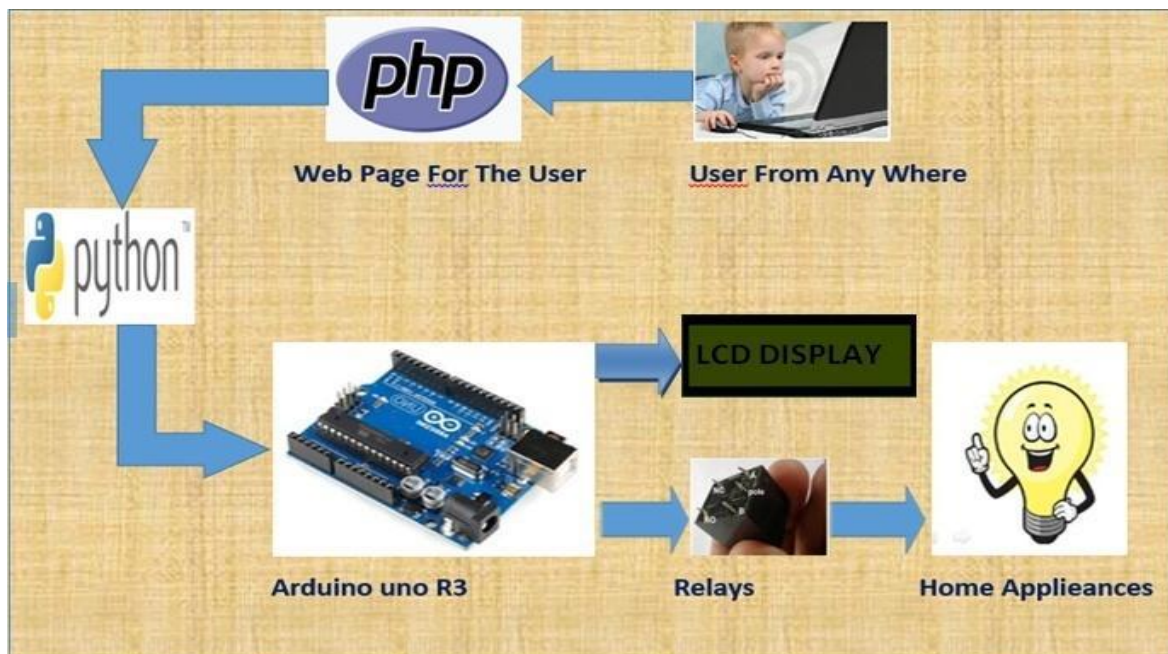

Figure 1: Login form page.

Figure 2: Block diagram of IOT system.

On the first page the log in page is displayed then the user enter username and password then click the login button, if it is

correct the switching graphics is displayed and if it is not correct,it displays your password or username is incorrect on the bottom of login

page. For now we have set "admin" as username and "admin" as password i.e. enter the password and username like in Fig. 3.
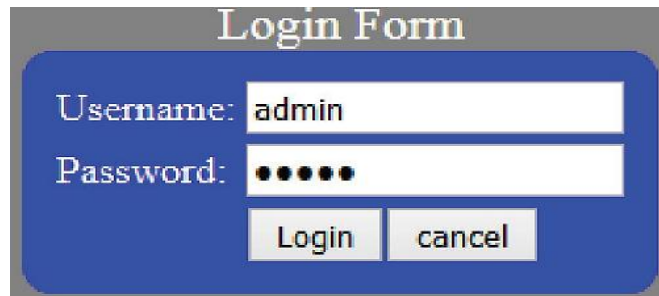

Figure 3: Filled Login form page.

If you enter the correct password and username you can access the switching graphics as shown in Fig. 4. This illustrations configuration contains a few highlights like showing the current status of home apparatuses, exchanging catches and the logout button put on the right base corner of the plan graphics, if you press this catch you return to the login structure and need to fill the clear fields in continue to the following area.
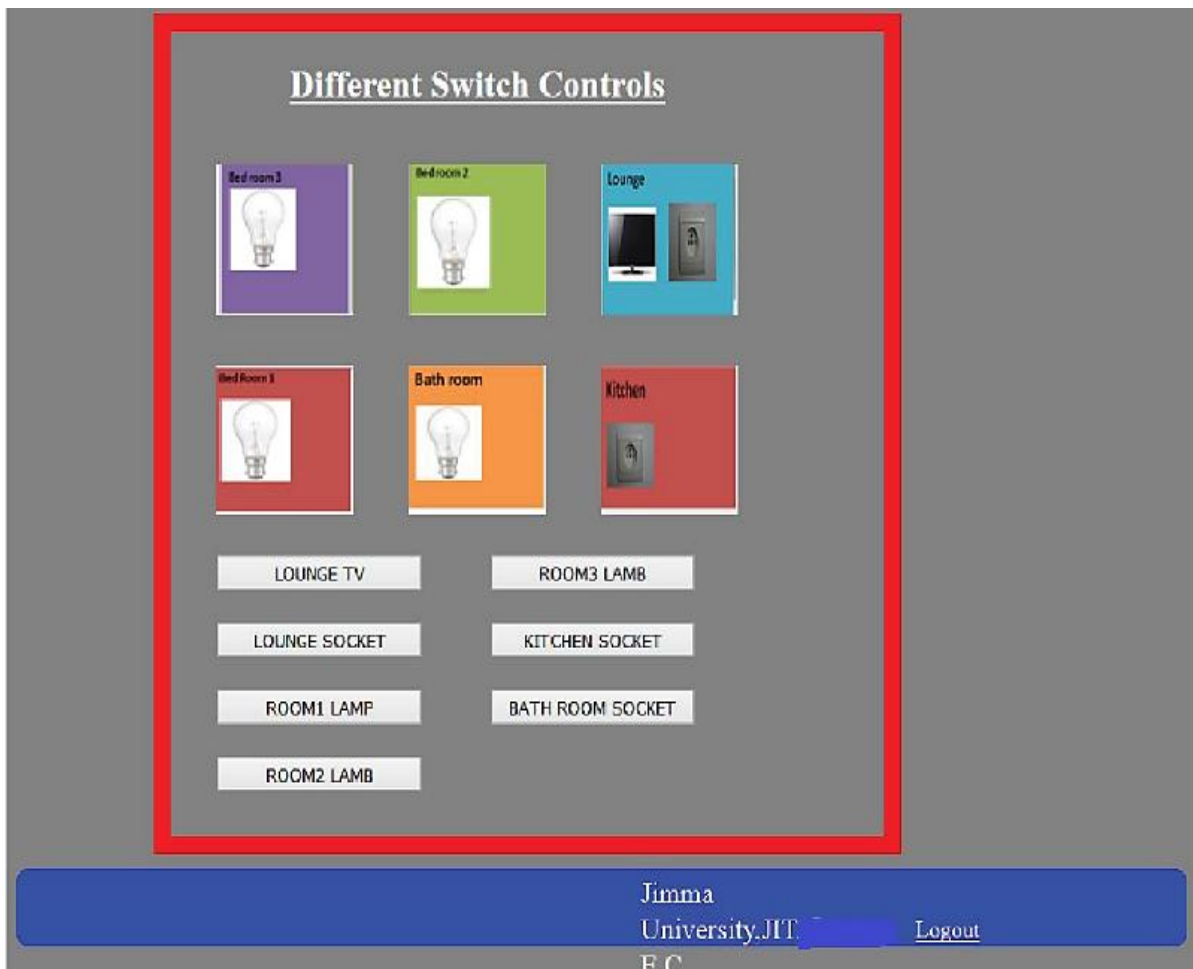

Figure 4: Controlling page when enter right password.

If you enter incorrect password or username the message "incorrect password or username" is shown at the lower part of the login structure as demonstrated in Fig. 5, and you can't ready to get to the switching graphics.
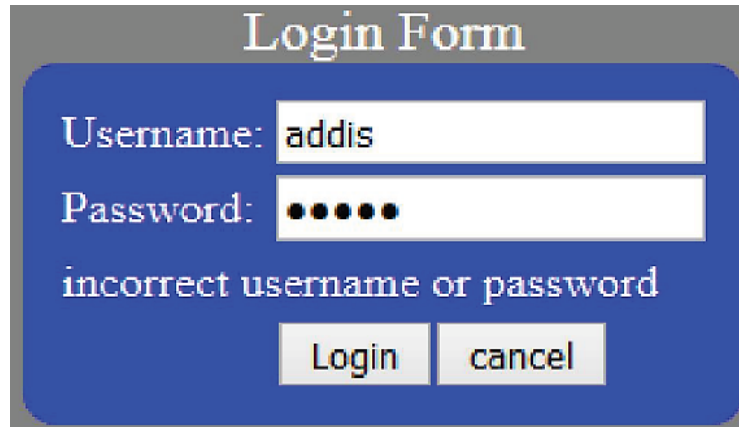
Figure 5: Login form page when user enters wrong username or password.

Data Base Design

We have created a database called control which has two columns and 8 rows as shown in Fig. 6. Each individuals home appliances are listed in the first column under the column name "name" and on the second column the present status of the appliances stored by using binary numbers "0" and "1".

Figure 6: Database design.

From Fig. 6, for example if you take the second row which contain "LOUNGETV" on the first column and a binary value "1" on the second column means that the lounge television is now "ON" and if you take the fifth row which contain "KITCHENSOCKET" on the first column and a binary value "0" in front of it shows the kitchen socket is now not available. In short the binary values "0" and "1" are indicating "OFF" and "ON" state of the appliance respectively.

Status Sender PHP Design

In this section all the status of the appliances is extracted from the database as a single string in order to make suitable to send to the Arduino. For example, it extracts like "1110100" from the above data base table. If the user presses the buttons on the switching graphics it changes the entire values of the string immediately. The methodology of the system is generalized by the flow chart shown in Fig. 7.
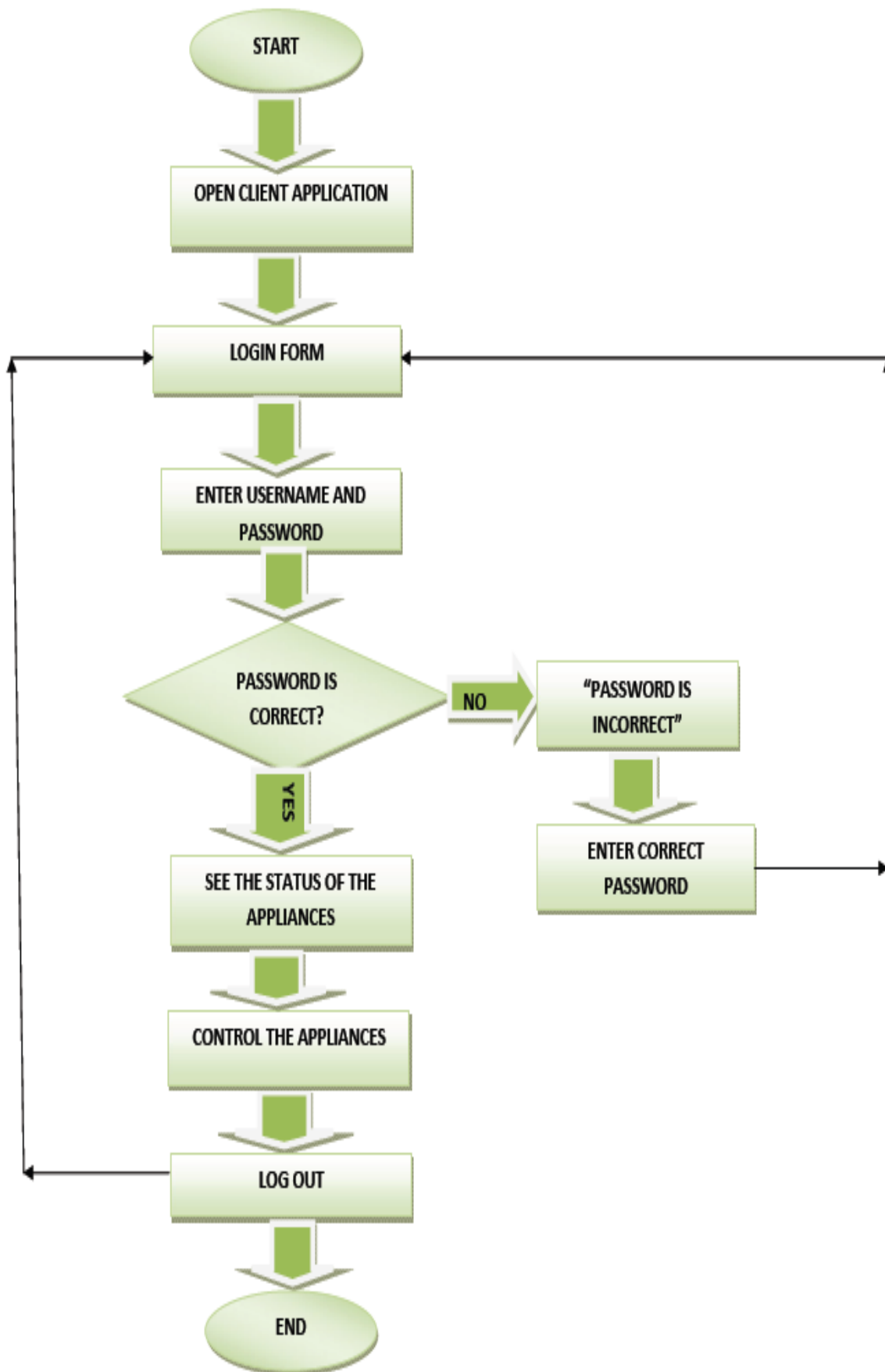
Figure 7: *Flowchart for Proper Operation of the System.*

DESIGN SIMULATION AND WORKING METHODOLOGY

The circuit diagram which represents the system is designed in proteus as shown in Fig. 8.
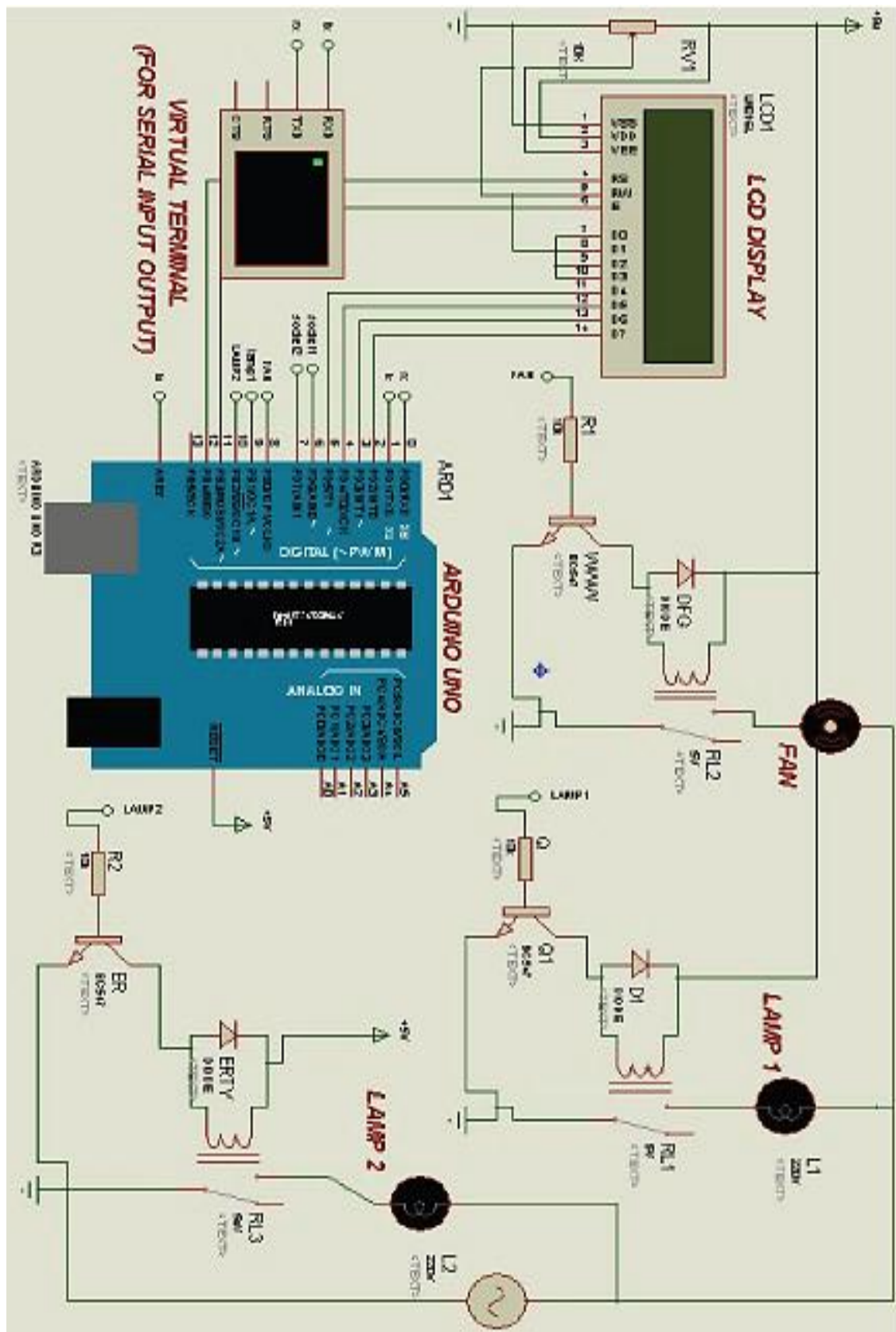

Figure 8: Circuit diagram of IOT system.

In the above circuit diagram, the paper uses virtual terminal instead of **phyton** and **php** for serial communication between the arduino, the user and the appliances. First load the program to the arduino and click the button "run" then the virtual terminal serial communication display is open on the run page then give binary numbers as a string like "10101",the program which is loaded to the arduino change the string in to substring and then to integer in order to control each and every pins of the arduino at which the appliances are integrated to it. When the user give "1" means make the arduino pin high and "on" the appliance but when the user give "0"

it makes the arduino pin low and "off" the appliances. By changing the binary input to the virtual terminal, we can control the appliances.

SIMULATION RESULTS AND DISCUSSION

When the binary input from the user is "11111", all output pins of the arduino gets "high" and the fan, TV, lamp 1 and lamp 2 are "on". The LCD display and virtual terminal displays the present status of the appliances as shown in Fig.9.
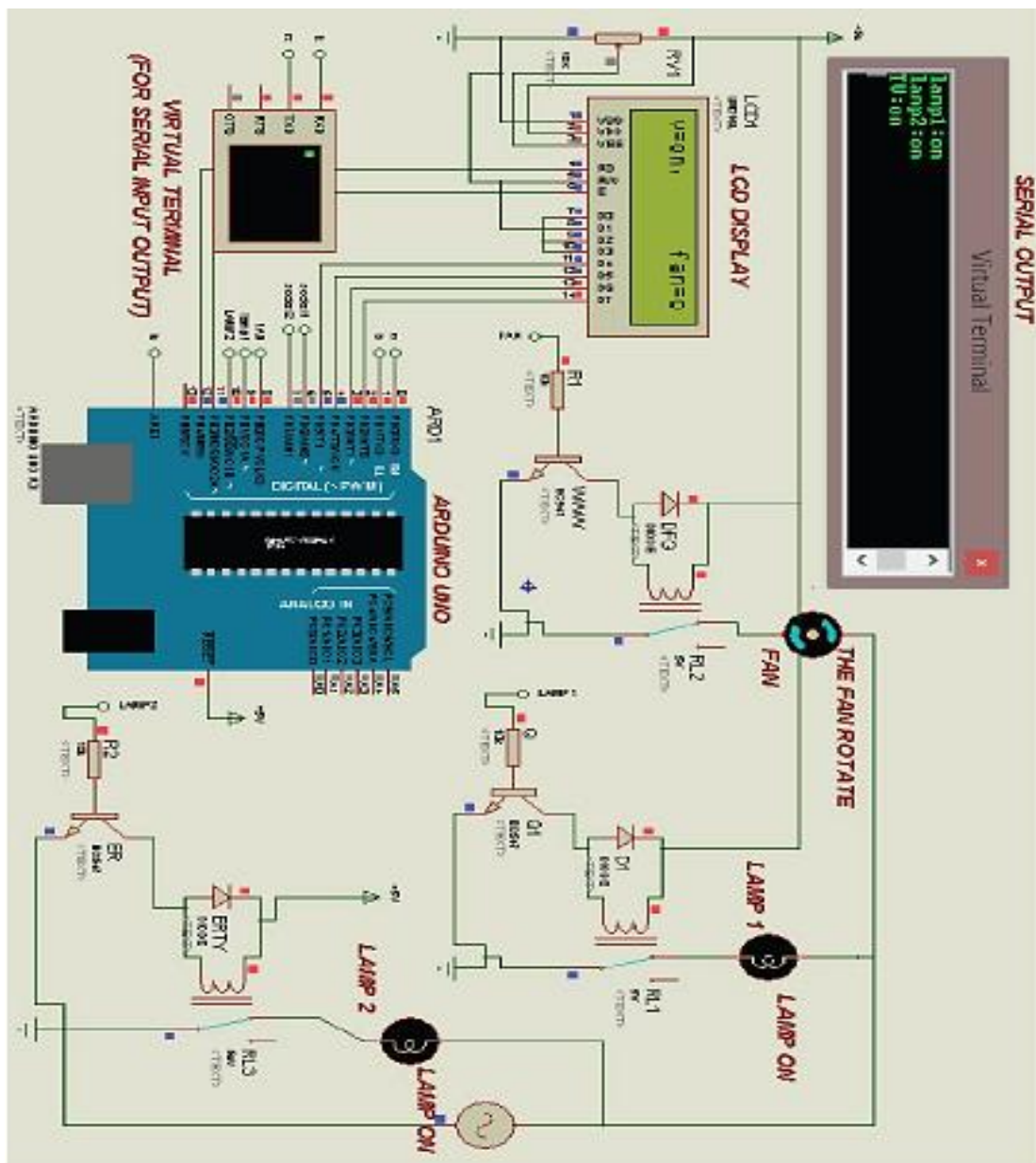

Figure 9: *System is in on state.*

When the binary input from the user is "10100", the fan and lamp2 "on" and the TV, lamp 1 and are off. The LCD display and virtual terminal displays the present status of the appliances as shown in Fig. 10.
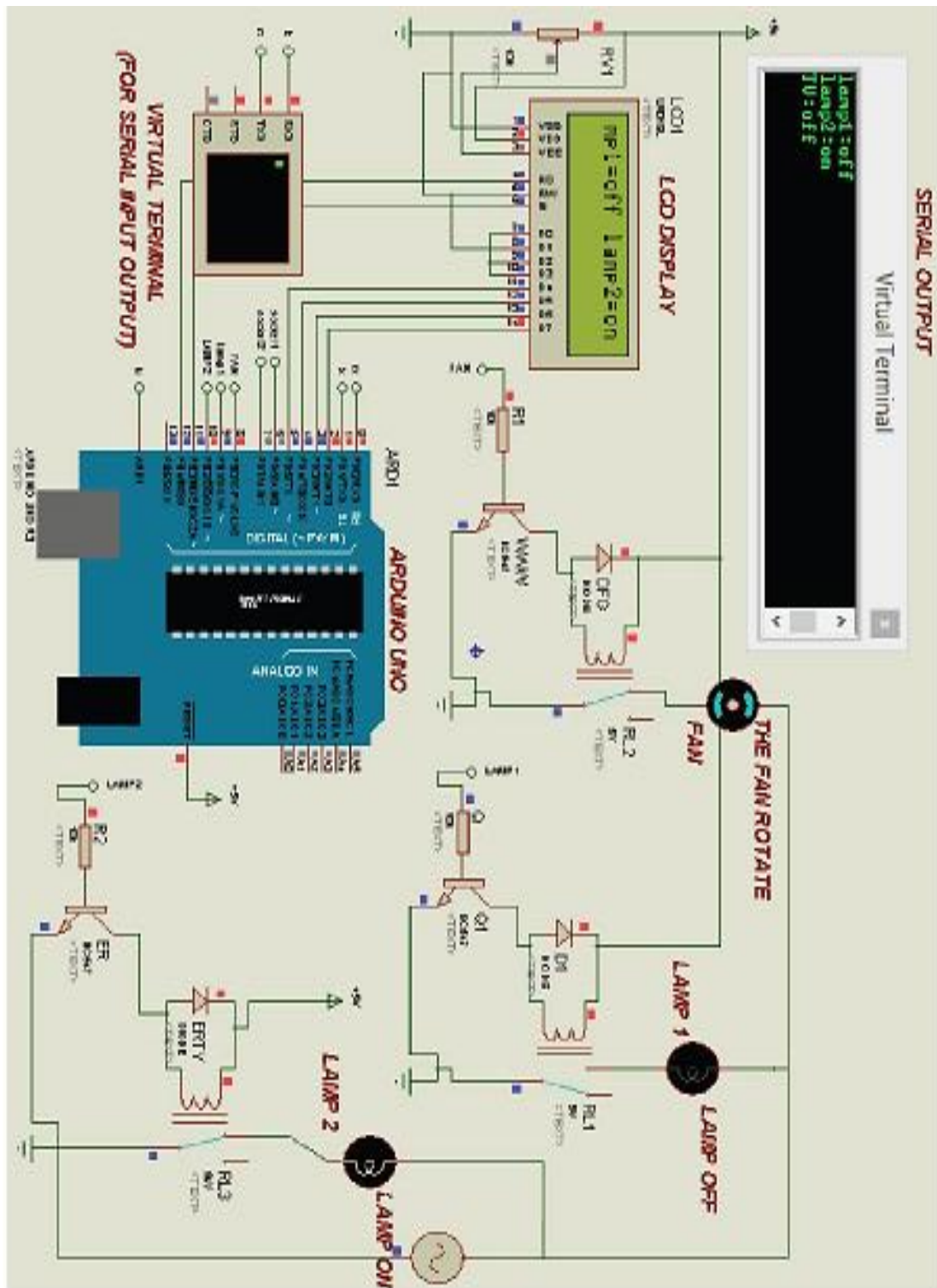

Figure 10: Lamp1 and TV are on and fan is off.

When the binary input from the user is "00000",all output pins of the arduino gets "low" and the fan, TV, lamp 1 and lamp 2 are off. The LCD display and virtual terminal displays the present status of the appliances as demonstrated in Fig. 11.
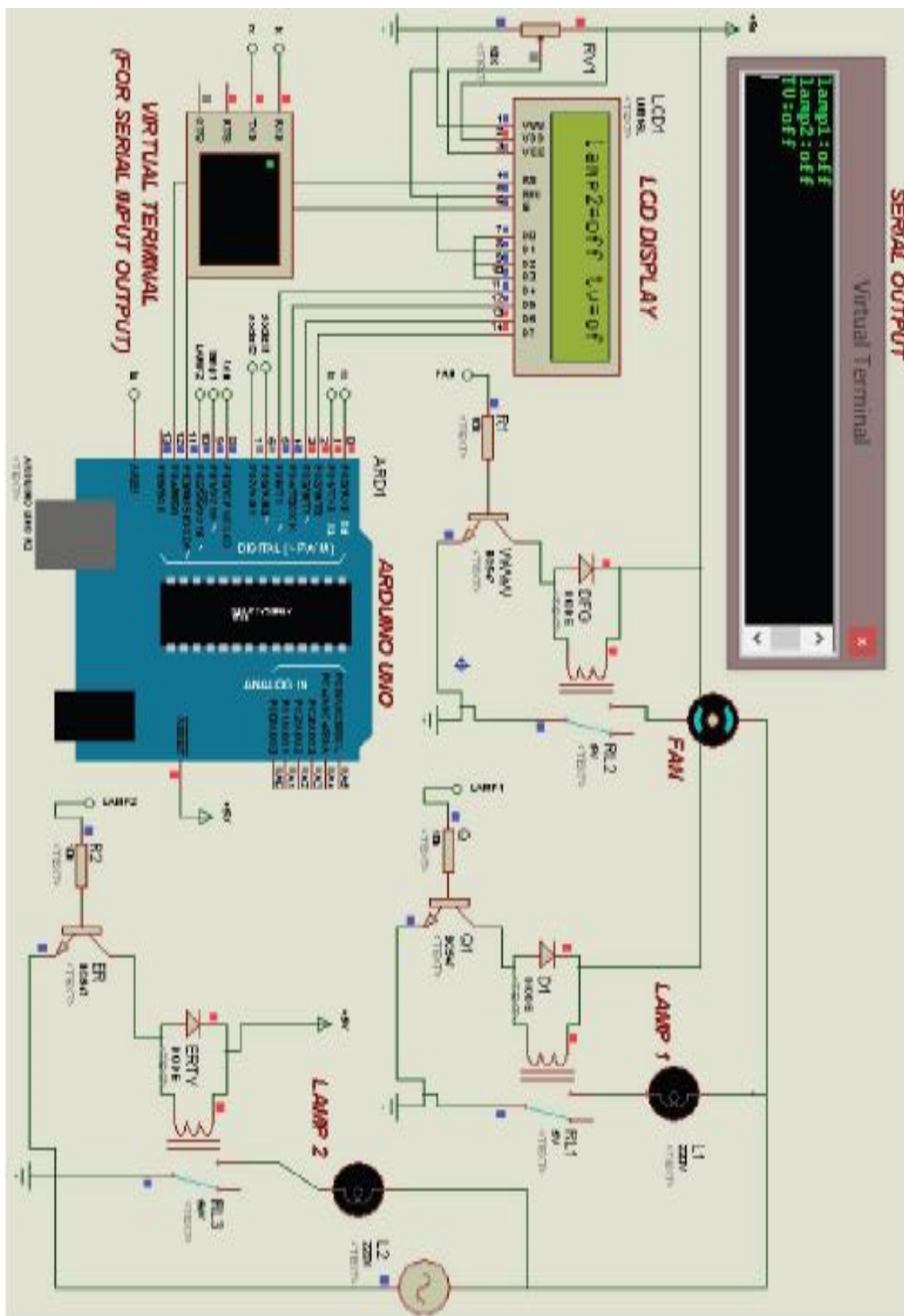
Figure 11: System is in off state.

Hardware Implementation Result
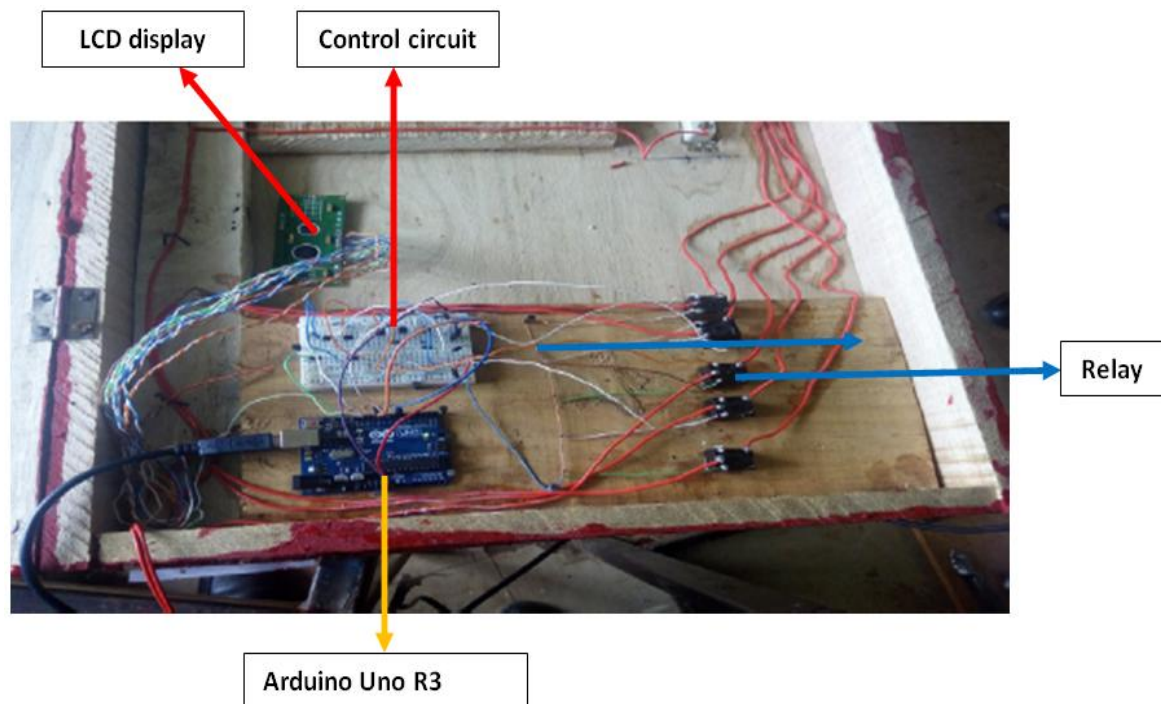The internal circuit installation of our hardware is shown in Fig. 12.

Figure 12: *Internal circuit of hardware.*

When the hardware installed at first time or initially all states are at off state on the controlling switch, all output pins of the Arduino gets "low". As shown in Fig.13, the fan, stove, TV, lamp 1 and lamp 2 are "off". The LCD display and webpage displays the present status of the appliances.

Figure 13: *All appliances are at off state.*

When the user presses all buttons on the controlling switch, all output pins of the Arduino gets "high" and the fan, stove, TV, lamp 1 and lamp 2 are "on". The LCD display and webpage displays the present status of the appliances. This is shown in Fig. 14.

Figure 14: All appliances are at ON state.

When the user see the status of the appliance and want to on lamp and stove, he/she press the buttons on the controlling switch , pins of the Arduino that are connected to the appliances gets "high" then stove, lamp 1 are "on". The LCD display and webpage displays the present status of the appliances. This is demonstrated in Fig. 15.

Figure 15: Lamp1 and stove are on.

CONCLUSION

Wireless technologies are continually evolving, with the newer technologies being introduced and older technologies being replaced by newer with the improved versions. By introducing the concept of wireless technology in the field of communication we can make our communication more efficient and faster, with greater efficiency we can control our home easily from anywhere in the world using internet.

The main objective of this paper was to develop IOT based home automation over cloud. The proposed plan in this paper has been effectively finished and tried with joining of the highlights of each equipment part for its turn of events. We consider this paper as an excursion where we obtained information and furthermore acquired a few bits of knowledge into the subject which we have partaken in this report. We can control our home from everywhere of the world easily using Ethernet this make our life comfortable. This makes this paper appropriate and valuable.

The internet are one of the major communications medium for controlling and transferring message signal to far area and some other features can be added as future improvement of this paper. This can be achieved by using more port microcontroller.

Also we realize that this paper saves time, energy and flexibility of our life.

ACKNOWLEDGEMENT

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper.

REFERENCES

1. Dey S, Roy A, Das S. (2016). Home automation using Internet of Thing. *IEEE 7th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON),*(pp. 1-6), New York, USA, IEEE, Available at: https://doi.org/10.1109/UEMCON.2016.7777826.
2. Bhat A, Sharma S, Pranav KR, Monika Rani HG. (2017). Home automation using internet of things. *International Research Journal of Engineering and Technology (IRJET),* 4 (07), 917-920, Available at: https://www.irjet.net/archives/V4/i7/IRJET-V4I7215.pdf
3. Lohan V, Singh RP. (2019). Home Automation using Internet of Things. *Advances in Data and Information Sciences*, 39, (pp. 293-301). Springer, Singapore, Available at: https://link.springer.com/chapter/10.1007/978-981-13-0277-0_24.
4. Vinay sagar K N, Kusuma S M (2015). Home Automation Using Internet of Things. *International Research Journal of Engineering and Technology IRJET*, 02 (03), 1965-1970, Available at: https://www.irjet.net/archives/V2/i3/Irjet-v2i3317.pdf.
5. Cui W, Huang L, Liang L, Li J. (2009). The Research of PHP Development Framework Based on MVC Pattern. *Fourth International Conference on Computer Sciences and Convergence Information Technology*, (pp. 947-949), Seoul, Korea, IEEE, Available at: https://doi.org/10.1109/ICCIT.2009.130.
6. KejelaAdaneDulecha, Amruth Ramesh Thelkar 2021. Blood Pressure, Heart Beat and Body Temperature Measurement by Using GSM and Low-Cost Microcontroller with Health Care Announcement. *Journal of Control and Instrumentation Engineering*, MAT Journals, 7(1), 1-18, e-ISSN: 2582-3000, Available at: https://doi.org/10.46610/JOCIE.2021.v07i01.001.
7. Salunke MB, Sonar D, Dengle N, Kangude S, Gawade D.(2013). Home automation using cloud computing and mobile devices. *IOSR Journal of Engineering*, 35-7. Available at: 10.9790/3021-03223537.
8. Kunal D, Tushar D, Pooja U, Vaibhav Z, Lodha V. (2016). Smart home automation using IOT. *International Journal of Advanced Research in Computer and Communication Engineering*, 5 (2). Available at: https://www.ijarcce.com/upload/2016/february-16/IJARCCE%20131.pdf.
9. Singh S, Ray KK. (2017). Home Automation System Using Internet Of Things. *International Journal of Computer Engineering and Applications.* Special Edition, ISSN: 2321-3469, 1-9, Available at: https://www.academia.edu/download/60759529/fb16cb33198b207305e562135f4b0866b5fc20191001-119993-vgasqy.pdf.
10. Javale D, Mohsin M, Nandanwar S, Shingate M. (2013). Home Automation and Security System Using Android ADK. *International Journal of Electronics Communication and Computer Technology (IJECCT).*3 (2), 382-385, Available at: https://europub.co.uk/articles/8342/view.
11. Piyare R. (2013). Internet of things: ubiquitous home control and monitoring system using android based smart phone. *International journal of Internet of Things*, 2 (1), 5-11, Available at: https://www.rajeevpiyare.com/publications/10.5923.j.ijit_.20130201.02.pdf