

IOT Based Automation And Energy Management In Buildings

Dr.S.Parthasarathy^{#1}, Mr.N.Vimal Radha Vignesh^{*2}, M.Sivabalan^{*3}, P.Vasantha Vikash^{*4},
J.Yuvamareeswaran^{*5}, S.Saravanan^{*6}

^{#1} Professor, Department of EEE, K.L.N. College of Engineering, Pottapalayam, Sivagangai, Tamil Nadu, India

^{*2} Assistant Professor, Department of EEE, K.L.N. College of Engineering, Pottapalayam, Sivagangai, Tamil Nadu, India

^{*3*4*5*6} UG Students Department of EEE, K.L.N. College of Engineering, Pottapalayam, Sivagangai, Tamil Nadu, India

Abstract—

The demand for the electricity is increasing day by day. Depending on the rise of the demand the production of the electricity is also to be increased. Energy is to be conserved to meet out the demand and to reduce the electricity generation on the generation side. Lot of home appliances are made to run all the time even it is not needed. The energy can be greatly conserved when the generated electricity is efficiently consumed and if the appliances are made to run only when needed. The proposed work is mainly concentrated on the energy conservation and the home automation. If the running time of the appliances is reduced the rate of consumption of the energy is also reduced thereby reduced in the running cost and the conserved energy can be efficiently utilized to run other appliances. The proposed work is on the energy conservation and the home automation in the residential buildings. The running time of the air conditioner is reduced instead of running it for the whole day. Based on the surrounding temperature the air conditioner is made to turn ON and OFF either automatically or manually by using the android application. The surrounding temperature is get from the temperature sensor depending on this temperature value the ac is made to turn On or Off with the help of the microcontroller in the IoT platform. The testing made on the ac and the power consumed when it is made to run for the whole day and compared it with the power consumed by the ac which is made to run by this controller. With the help of the current sensor which is connected in the load side gives the rate of current consumed by the ac and the power consumed by it can be calculated.

Keywords — Smart home, Home Automation, Energy Consumption, Internet of Things.

I. INTRODUCTION

Ever since in 1970s the concept of smart home has been evolved and many researchers are still experimenting and involved in improving the concept of smart home. This concept of smart home has changed drastically from early 1970s to till now. This

is due to the improvement in electronic devices that are designed based on needs over the time and the expectation of the people on smart home also changed over a period of time. At present the modern smart home is automating the electronic devices present in the home and those devices having the capability of communicating among themselves are smart home. So the concept of smart home is a combination of ubiquitous computing and electronic devices and wireless sensor networks.

The Electrical energy generation is increasing day by day as there is increase in the demand. Increasing the production on the generation side is the only way to meet out this demand. All the buildings and the residential areas are well installed with many of the home appliances and these appliances are made to run for the whole day which will leads to the increase in demand. Most of the appliances are used unnecessarily and they consume lots of power. The concept of energy conservation must be developed and the energy generated is need to be conserved for the future utilization.

Energy conservation is a great deal in this mechanical world. As by reducing the unnecessary consumption of electrical energy by the appliances the energy can be greatly conserved and this energy can be used for another appliances thus it will reduce the energy consumption and it will decrease the demand on the load side and the need of production to meet out the great demand is also reduced. Energy conservation is done if the loads are made to turned off when they are running unnecessarily or the generated energy is utilized completely.

The high energy costs adversely affect all the sectors of the economy and a determined effort to reduce the energy consumption and cost therefore we need energy conservation and an energy efficient system in our homes as well as industrial and commercial sectors. Energy is one of the main safeties of the economic development of the country. Energy can also be conserved if it is properly managed utilizing the same energy for maximum

usage is the key to an efficient system. Conservation of electricity by the consumers is an easier way involving no cost to fill the gap. Conservation of electricity is becoming a vital element of economic growth giving benefit to the state as well as the accounts of the consumer. Conservation of electricity is essential due to the concern for fast depletion of the nonrenewable resources. Conservation of electricity necessary to save the environment and the earth from warming.

The proposed project work is mainly concerned on the energy conservation made by the home appliances and the home automation in the buildings through IoT. Using the home appliances effectively and made to turn it off when it is not necessary will conserve large amount of power than it consumes. It will help in conserving electrical energy by made the appliances with fully automated. Hence appliances can work on their own and also they can be controlled manually. The controlling of the home appliances is either done by manually or controlled by using the android applications. The proposed project work will reduce the energy consumption and thereby reduced the running cost. This project work will reduce the working time of the home appliance hence it will reduce the energy consumption and there by the running cost is also reduced.

The conserved power can be efficiently used to run other appliances. Lot of energy conserved helps to meet out the demand and greatly reduced the electricity being generated the generation cost of electricity is also reduced. Hence this proposed project work helps in energy conservation in the home and industries as well as the home automation is achieved either by controlling it manually by using the android application or it can be controlled by using the microcontroller. The sensors play the major part the proposed project consists of the two sensors temperature sensor and the current sensor. Temperature sensor is used to measure the surrounding temperature and the current sensor is used to detect the current taken by the appliances.

II. LITERATURE REVIEW

Saito and others developed, in 2000 a home gateway system for interconnecting home network consisting of IEEE 1394 AV network and X10 power line home automation network with Internet. This provided remote access functions from Internet for digital AV appliances like Digital Video Camera, Digital VCR connected to IEEE 1394 network and home appliances like TV, desk lamp, electric fan connected to X10 controller.

Al-Ali and Al-Rousan developed, in 2004 a Java based home automation system via World Wide Web. The home appliances were controlled from

ports of embedded system board connected to PC based server at home. Alkar and Buhur implemented, in 2005 Internet based wireless flexible solution where home appliances are connected to slave node. The slave nodes communicate with master node through RF and master node has serial RS232 link with PC server. The nodes are based on PIC 16F877 μ c. PC server is formed of a user interface component, the database and the web server components. An Internet page has been setup running on a Web server. The user interface and the Internet front end are connected to a backend data base server. The control of devices is established and their condition is monitored through the Internet.

Tan and Soy developed, in 2002 a system for controlling home electrical appliances over the Internet by using Bluetooth wireless technology to provide a link from the appliance to the Internet and Wireless Application Protocol (WAP) to provide a data link between the Internet and a mobile phone. However, technical details relating to the controller are not revealed.

III. PROJECT DESCRIPTION

Air conditioning is defined as a process, which controls the temperature, purity, and circulation and controls its moisture content (Humidity). Most of air-conditioning in India is about cooling i.e. removal of heat from an enclosed space. There are two types of heat which plays an important role are sensible Heat and Latent Heat. Any heat generated within the space to be conditioned forms a load on the system. The main heat generator within the space is people, lights and fans and other electrical appliances. Heat also enters from outside, such heat also contributes a significant load on air-conditioning system. Heat from outside can be through walls, Roofs, doors and windows.

One major energy conservation techniques in AC is, using an Inverter AC. The initial investment is more than a non-inverter one, but on a long run, it will provide significant savings on your electricity bill.

- 1.To conserve the electrical power by reducing the continuous running time of the AC and make it to run based on the surrounding temperature.
- 2.To make home appliances fully automatic.
- 3.To monitor ,control and calculate the energy consumed by any commercial buildings using the IoT Platform.
- 4.To make the appliance fully automated and control of the things using the IoT.

IV. ALGORITHM AND FLOWCHART

- ✓ Turn ON the supply to the air conditioner and the controller.
- ✓ Get the surrounding temperature from the temperature sensor.

- ✓ Set the two temperature limits maximum temperature as T1 and the minimum temperature as T2.
- ✓ If the temperature lies within the temperature limits, then go to the app control or else perform the default OFF condition.
- ✓ If the temperature exceeds the temp T1, turn ON air conditioner and decrease the surrounding temperature to T2.
- ✓ If the temperature reaches the T2 after some time delay turn OFF air conditioner.
- ✓ Turn on ac when the temperature reaches the T1 and repeat the same process till the supply to the ac and the controller is made OFF.

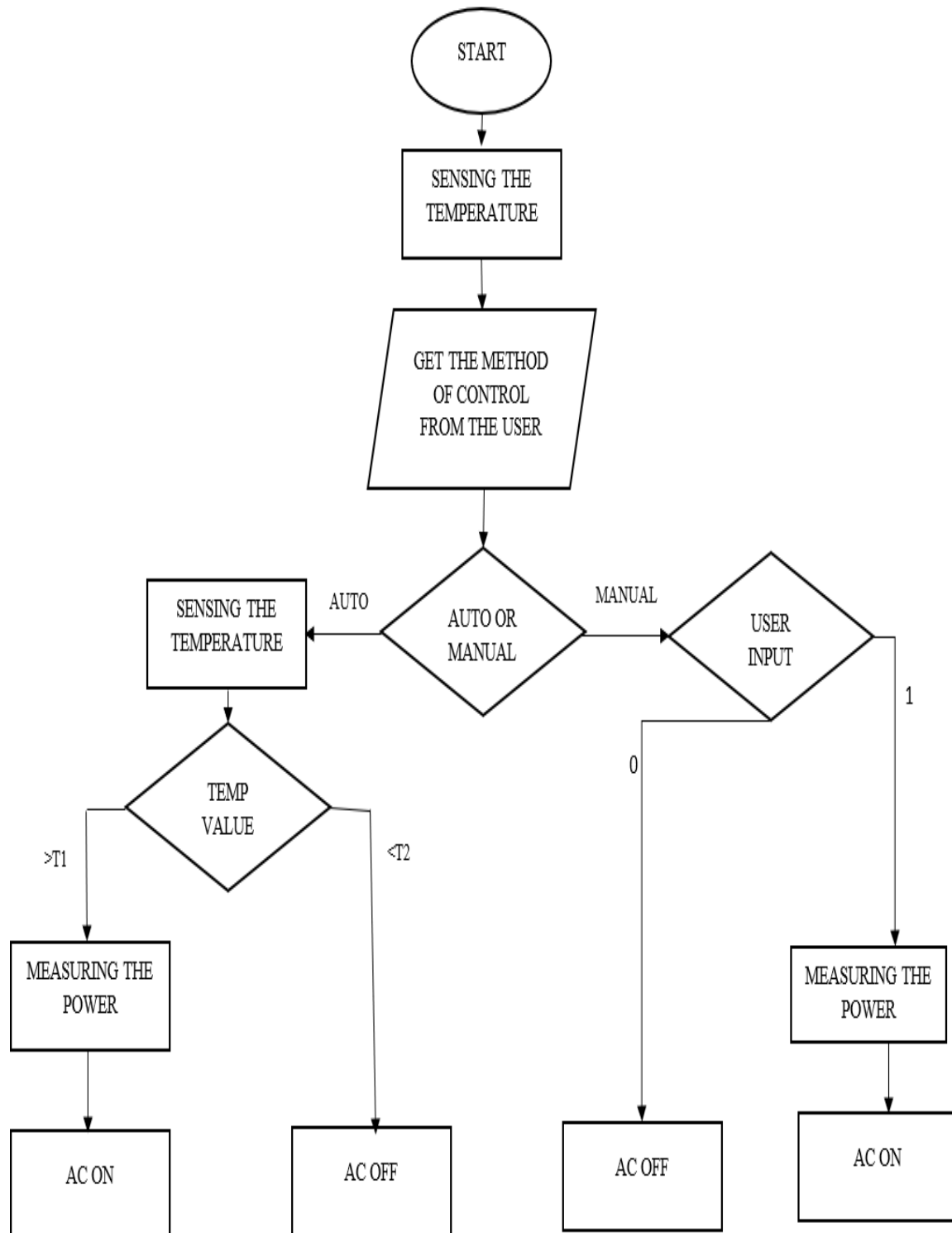


Figure 1. Flow chart of the proposed work

V. OUTPUT SCREENS



Figure 2. IoT Home Page

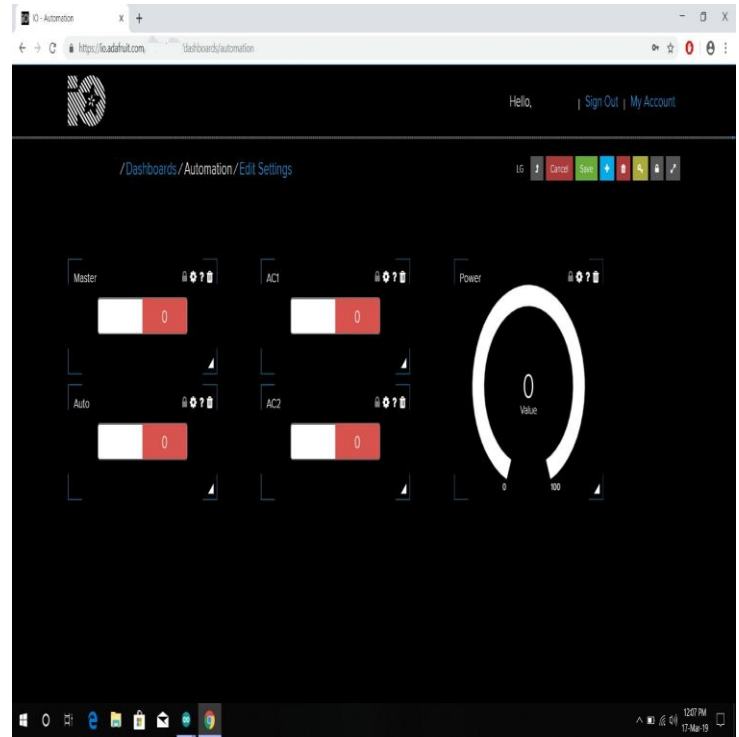


Figure 4. Automatic Settings.

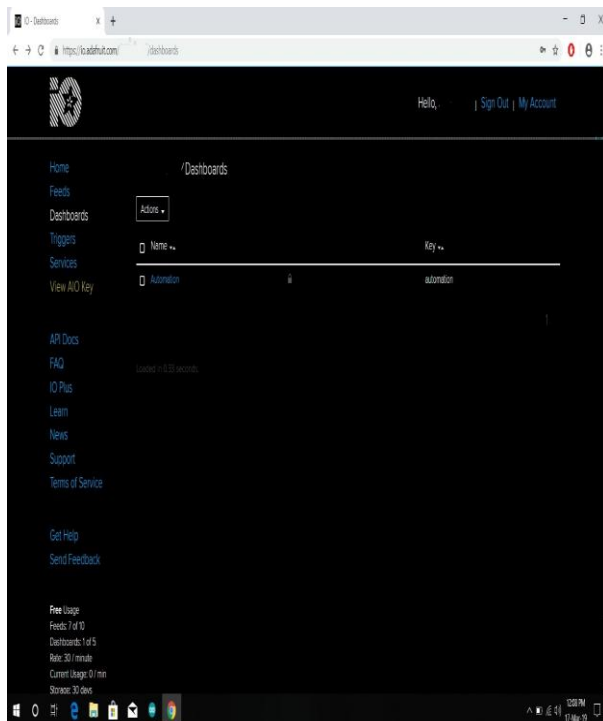


Figure 3. Dash Board

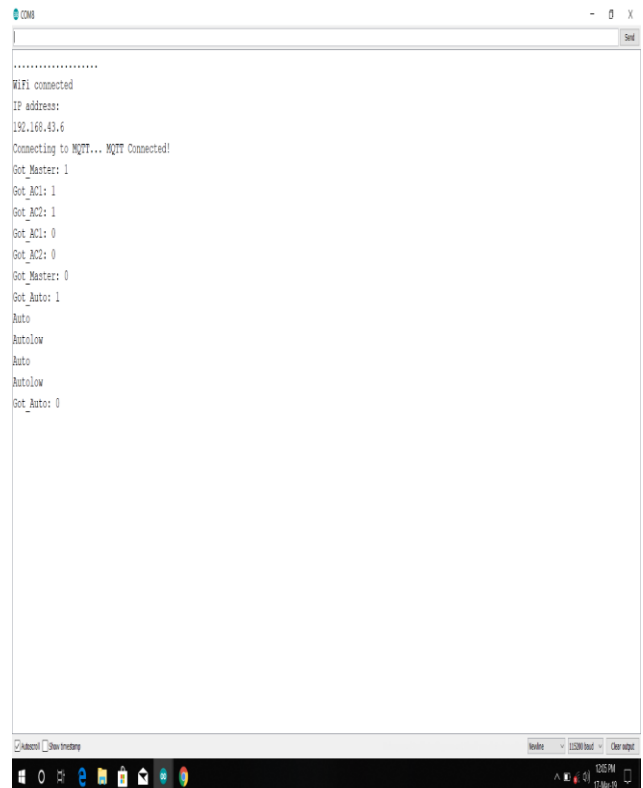


Figure 5. Serial Monitor for arduino

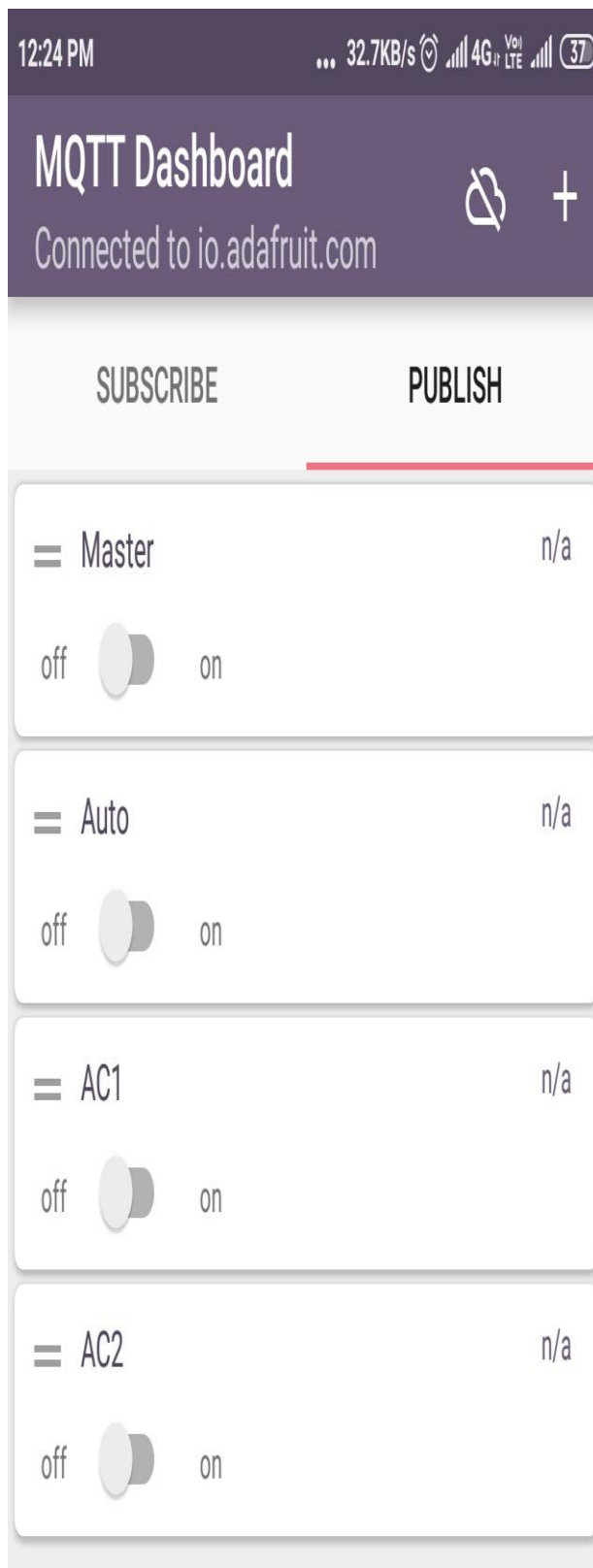


Figure 6. DashBoard with switches

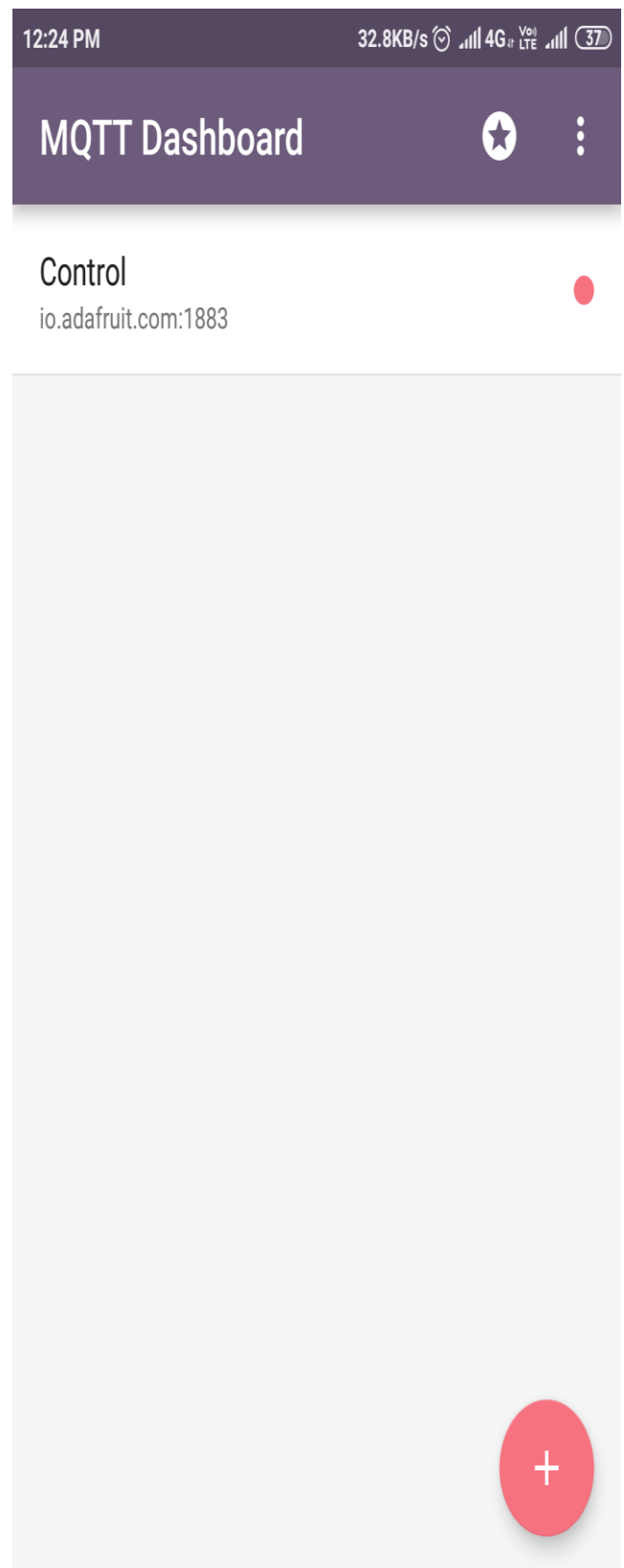


Figure7. Dashboard Control

VI. CONCLUSION

A. Conclusion

The home automation using Internet of Things has been experimentally proven to work by connecting simple appliances to it. These appliances were successfully controlled remotely through the internet. The designed system instigates a process according to the user's requirements, for example switching on a fan when it gets hot. Sensors can be implemented to store data which can later be used to analyze the system at hand.

B. Future Scope

The next phase for the Home automation market will occur based on a few key improvements in the technology available in Automation, such as improvement in Wireless Automation solutions as well as lowering of price points as the market begins to accept Home automation usage in larger volumes. As with any industry, as Automation for residences become common place, the market will eventually be crowded with several players, multiple product offerings and competitive pricing.

REFERENCES

- [1] G. Kortuem, F. Kawsar, D. Fitton, and V. Sundramoorthy, "Smart objects as building blocks for the internet of things," *Internet Computing*, IEEE, vol. 14, pp. 44-51, 2010.
- [2] [2] S. Hilton. (2012, 14 January). Progression from M2M to the Internet of Things: an introductory blog. Available: <http://blog.bosch-si.com/progression-from-m2m-to-internetof-things-an-introductory-blog/>
- [3] C.-H. Chen, C.-C. Gao, and J.-J. Chen, "Intelligent Home Energy Conservation System Based On WSN," presented at the International Conference on Electrical, Electronics and Civil Engineering, Pattaya, 2011.
- [4] R. Piyare and M. Tazil, "Bluetooth based home automation system using cell phone," in *Consumer Electronics (ISCE), 2011 IEEE 15th International Symposium on*, 2011, pp. 192-195.
- [5] Wikipedia. (2012, 12th December). Home automation. Available:http://en.wikipedia.org/wiki/Home_automatio
- [6] Y. Liu, "Study on Smart Home System Based on Internet of Things Technology," in *Informatics and Management Science IV*. vol. 207, W. Du, Ed., ed: Springer London, 2013, pp. 73-81.
- [7] M. A. Al-Qutayri and J. S. Jeedella, "Integrated Wireless Technologies for Smart Homes Applications," in *Smart Home Systems*, M. A. Al-Qutayri, Ed., ed: InTech, 2010
- [8] C. Chiu-Chiao, H. Ching Yuan, W. Shiau-Chin, and L. Cheng-Min, "Bluetooth-Based Android Interactive Applications for Smart Living," in *Innovations in Bio-inspired Computing and Applications (IBICA), 2011 Second International Conference on*, 2011, pp. 309-312.
- [9] J. Potts and S. Sukittanon, "Exploiting Bluetooth on Android mobile devices for home security application," in *Southeastcon, 2012 Proceedings of IEEE*, 2012, pp. 1-4.