ENERGY SAVING AND TRACKING USING SENSOR AUTOMATION

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Abstract : The home automation system has brought about a big transition in the lifestyle of people by making it convenient as well as easing their regular tasks or daily chores. From controlling lights of your house to the ones in your parking area, fans, TV or AC's or any other kitchen appliances to controlling the curtains according to your mood. Be it watering the plants in your garden or checking water overflow and even checking your security systems and locks. All this through motion sensing, mobile app or voice control has made the lives of people innovative and pretty reposing. It has provided easy accessibility from anywhere, anytime through multiple devices. In this project we will be discussing as to how does home automation systems help in smart energy saving and tracking. Your house energy can now be monitored through your mobile phones. All the usage information you need is handy, right within your smart power monitor app. The app is connected to all the appliances of your house and tracks watts and optimizes energy consumption to save cost. On just a tap of your finger you can get the review about a particular device or the whole day's activities of multiple devices. Now you can easily get hold of the loopholes of excessive energy consumption in your house. This will really help you to control the waste of energy and reducing your electricity bills. The mobile app presents a comprehensive, user-friendly dashboard of electricity usage in real time. User instantly gets notified with fed alerts. You get detailed overview of the energy consumption with analysis of individual device usage. Interactive & customized graphs give you visual access to instant data.

Keywords: Home Automation System ,IoT, Raspberry pi, ESP8266, Sensor, MQTT, Voice

1. INTRODUCTION

At present the effort of human being in terms of labor is declining to accomplish any task because of automation technology. It is shaping to simplify our day to day life. Automation has emerged as a driving role to control the system. It decreases the need of our participations. It is one of the most predominant advanced of technology.Home automation ensures less labor to accomplish any work for which a human needs to apply huge effort. For this, automation is introduced in industrial purpose to reduce labor quantities and incorporating efficiency during work. Besides, the system is reducing muscular and mental requirements of work. For availing such kind of facility from automation this technology is brought for household purposes. Home automation in this century plays a vital role in home along with office. For implementing the technology less requirements needed in terms of services the system provides. Generally, the system requires less circuitry and for controlling the system needs internet or some other available means. For a great number of people, the driving force behind creating a smart home is its capability to save energy and money with automated heating and air conditioning system. Smart thermostats quickly and precisely automate the heating and cooling of the home. This really helps in reducing the electricity bill. The lights and appliances connected with the automation use less energy by powering down when not in use and these are the ones that consume a lot of electricity as very few of us are responsible enough to bother about switching them off.Coming on to the lights of our house which are the most important entity of our house. How about if they turn on and off as per your need that is

they can sense your presence and absence and operate accordingly.

2. HOME AUTOMATION

The Home Automation System (HAS) is extension of current activities performed inside the home and this Home Automation System (HAS) can be developed easily now a day's, because of powerful computational devices and wireless sensor network(WSN), to provide user friendly and cost fairly home automation system. In home automation system (HAS), different technologies like Wi-Fi, Bluetooth and ZigBee are used for communication, and different devices like smart phone, tablet and laptop used for controlling various appliances. The home appliances like fans, lights, switches are remotely controlled through a main control board. By using of the Internet of Things (loT), the developing of home automation are going to become simpler and more popular.

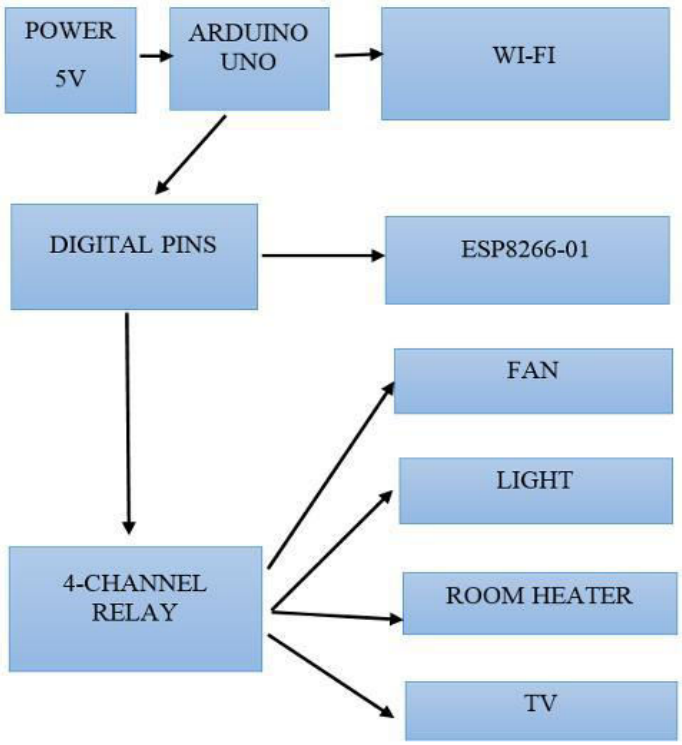


Figure: 2.1 Home Automation System

3. COMPONENTS

- ESP8266
- Raspberry Pi
- Passive Infrared Sensor(PIR)
- Water Overflow Sensor
- Moisture Sensor
- Relay
- Flame Sensor

- **Raspberry Pi** is main components of home automation. Raspberry Pi is a microcontroller that has potential to work same as computer. It runs with the Python programming language, and is a great way to learn about hardware hacking and coding. we need a Raspberry Pi board. The version of the board or the model (A or B) doesn't really matter, but keep in mind that you will have to connect it to your local network, so we need a Wi-Fi dongle if for using the a model which Doesn't have an Ethernet port[8]. In this paper, we used a Raspberry Pi 3 model B with the Wi-Fi dongle. The Raspberry Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools.

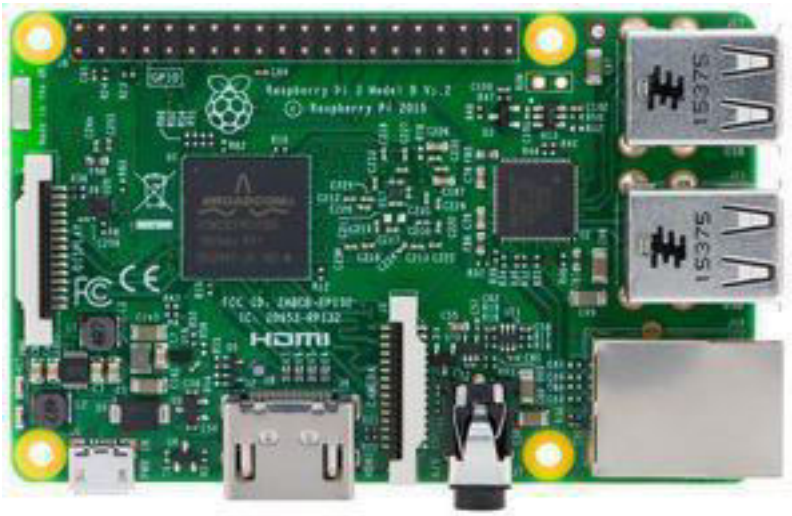


Figure: 2.2 Raspberry Pi

- **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. The IDE is a desktop application that you use to write, compile, and load code for Arduinos. You can think of it as a glorified text editor (with syntax highlighting) that also compiles and uploads the code for you. Here you can find plenty of example code, configurations, and help documentation to help set up all of the Arduinos you buy. The IDE is not required as you can also write, compile, and load code using the Mac/Linux command line, but this is usually reserved for more advanced users.

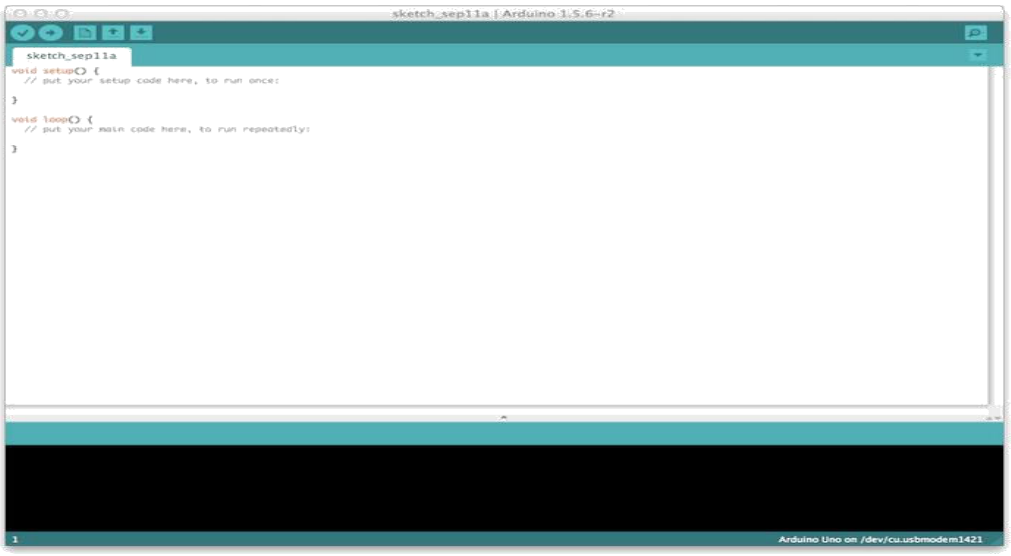


Figure: 2.3 Arduino IDE

4. PROBLEM STATEMENT

- ❑ No record of history
- ❑ Graphical representation of data overtime
- ❑ All components does not used same system
- ❑ Does not send notification (Push Notification) through MQTT

5. PROPOSED METHODOLOGY

We use a centralized server to store and monitor the data. This data can be monitored with time and user activity. Showing graphs is important to view the critical data at glance. That's why we utilises graph to show the data. This is a sensor specific system to a generalized sensor which is commonly available in market at cheaper price. Sending the notification on right moment is important and push notification is fastest and most effective way to convey the same. Even images can be attached along with push notifications. To keep the things optimised send frequent data with loads of sensor its important to keep the protocol as light as possible so it can send the feedback and also provide the QOS of the same.

5.1. ENERGY SAVING AND TRACKING

The energy rates have become paramount. All Individuals and organizations, both are searching for ways to reduce and control the consumption of energy. IoT provides a way to monitor energy usages not only at the appliance-level but also at the grid level, house-level or even at the distribution level. Smart systems such as Meters & Smart Grids are installed at various organizations to monitor energy consumption.A more tangibly measurable benefit that smart home technology has been shown to provide is numerous ways of conserving energy. One of the top scientific and technological concerns of the modern day is finding ways to be more energy efficient .The Internet of Things provides us with a method of having electrical appliances within a home provide information on the energy they are consuming. “By understanding the electricity footprint they consume, residents are able to make intelligent choices about energy. Through detailed energy monitoring, electricity – wasting actions can be avoided and energy-inefficient devices can be managed better” . Your house

energy can now be monitored through your mobile phones. All the usage information you need is handy, right within your smart power monitor app. The app is connected to all the appliances of your house and tracks watts and optimizes energy consumption to save cost. Most of the time we are too lazy to walk up to the switchboard and sometimes we forget. We can obviously save a lot of energy by turning off the unnecessary appliances and with a home automation system, you can do so from anywhere with a single click. It gives a control from anywhere and home automation gives a control of the entire house over the smartphone. It makes sure that **energy usage is being optimized without compromising with the comfort and convenience** of a user.

5.2. SYSTEM DESIGN AND IMPLEMENTATION

The proposed HAS can control the following

- ✓ Lights, Fans, Air Conditioners (on/off/adjust)
- ✓ Doors and Door locks
- ✓ Windows
- ✓ Curtains/ Blinds (if present)
- ✓ Other/all appliances
- ✓ Shutters (for security and rainwater harvesting)
- ✓ Regulate Water (for watering plants)

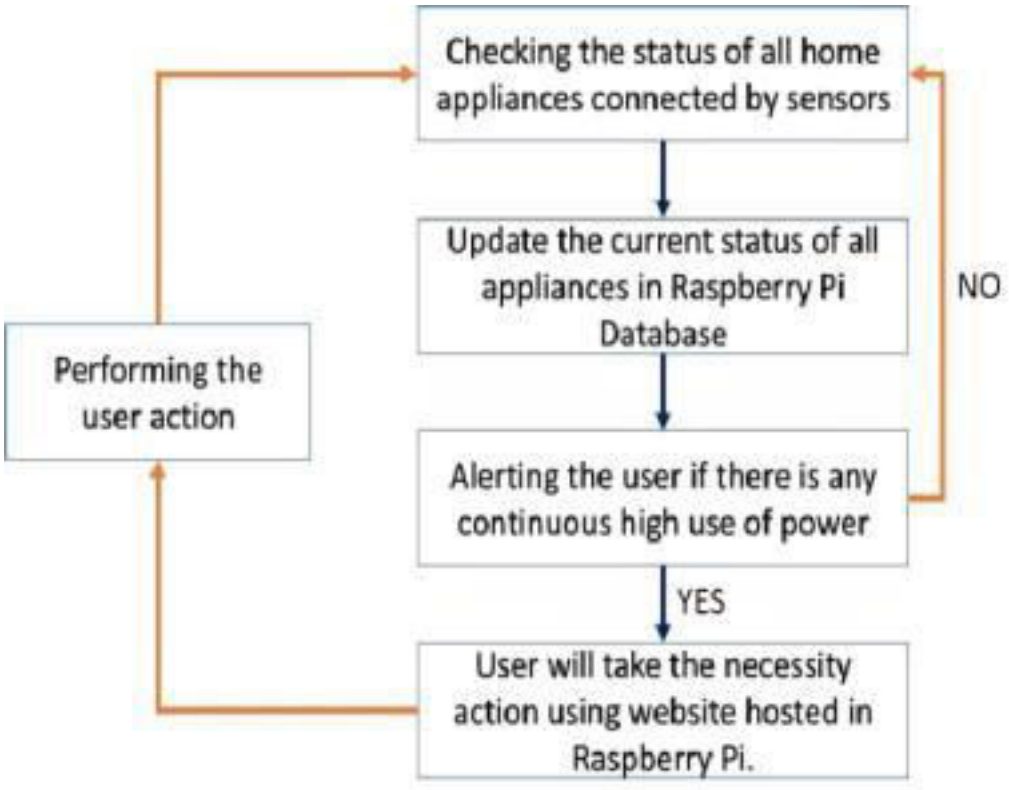
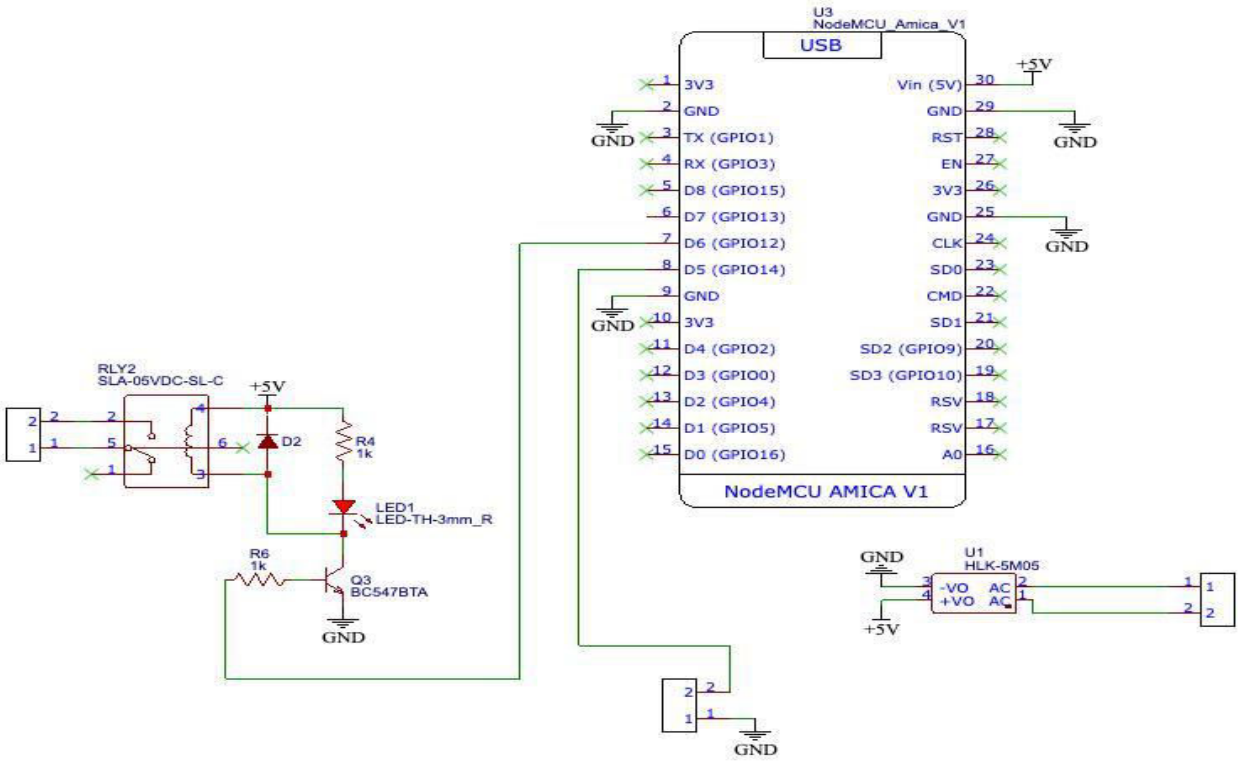
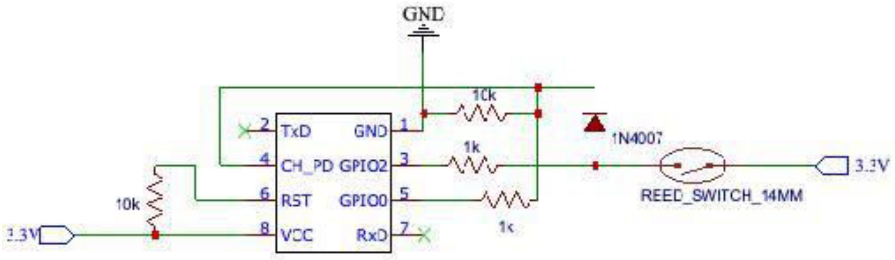


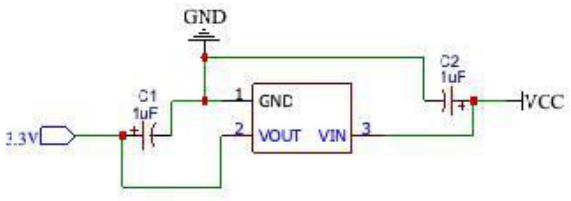
Figure: 5.1 Algorithm For Surveillance System

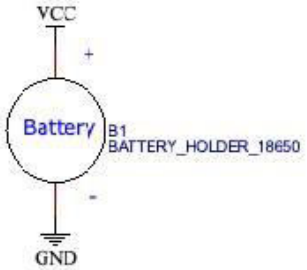
➢ WATER MOTOR CIRCUIT DIAGRAM



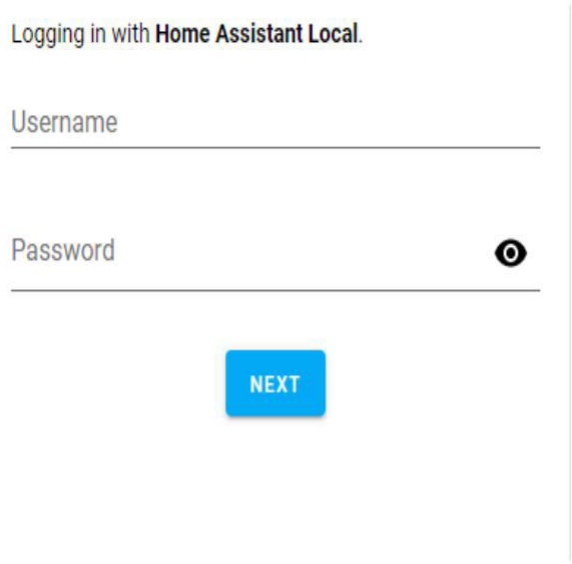
➢ DOOR CIRCUIT DIAGRAM







6.RESULT


Logging in with Home Assistant Local.
Username
Password
NEXT


Home Assistant
HOME
LIVING ROOM
NEHUL
Water Tank Full
Dressing Room PIR
Balcony Door
Nehul Room Enterance PIR
UNK
Nehul Agrawal
yr Symbol
Balcony Door Battery
Balcony Door Voltage
Sun


Sunny
Home
29.6°C
Air pressure: 1016.3 hPa
Humidity: 52 %
Wind speed: 17.6 km/h (S)
Thu 12 PM 31.7 °C
Fri 12 PM 31.6 °C
Sat 12 PM
Sun 12 PM
Mon 12 PM


History
Showing entries for
November 27, 201
Period
1 day
Off Dressing
Off Dressing
Off Hall auto
Off Hall auto
On IFTTT we
On neksha rc
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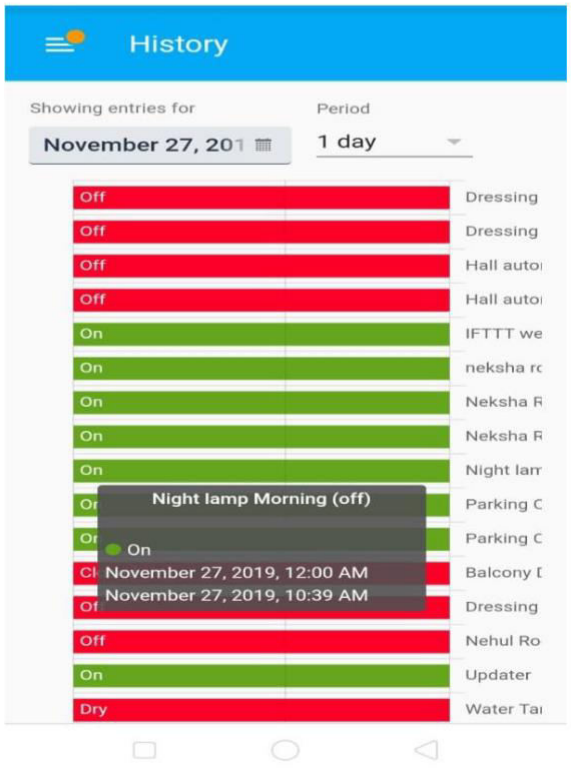
Off Nehul Ro
On Updater
Dry Water Tai


History
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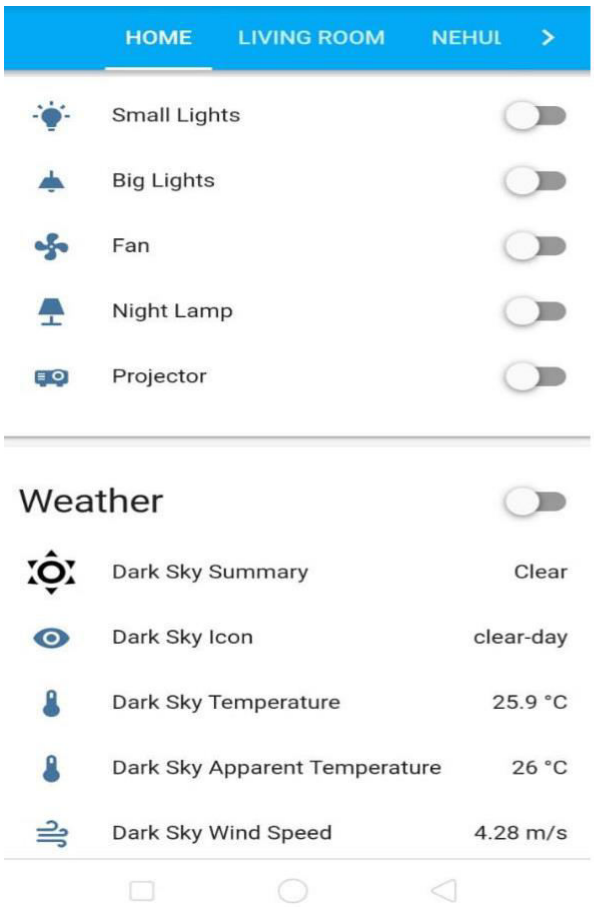
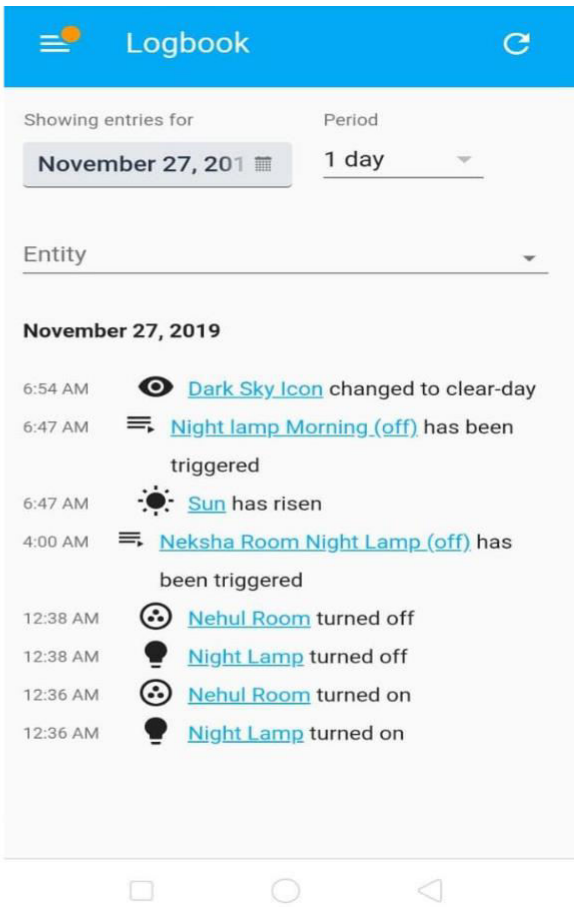
November 27, 201
Period
1 day
Night lamp Morning (off)
On
November 27, 2019, 12:00 AM
November 27, 2019, 10:39 AM





7. Conclusion

This work focuses on the design of a smart and secure home automation system using IoT devices. This system can help the elder and disabled persons for maintaining a comfortable and secure life. This is operated in touch mode and voice command mode. This system is controlled and monitored using android mobile phone. In this system, fire alarm security are also provided. This system saving energy and tracking. This system is designed to inform the users as soon as possible in emergency conditions. This system can be a better solution for the design of smart and secure home. This work provides users with an easy to use in mobile and pc for which they can remotely access and control their home appliances and security. In future we intend to provide a wireless relay connection and wireless sensors which can be movable and can be operated and which can be used in company and instates for Security to the whole building with one single system. This provides a full security support for homes. The voice controlled home automation using Raspberry Pi is projected for the easy use and control of electronic devices by old age and disabled people. This project provides a basic system of home automation which can be easily implemented and used effectively.

REFERNCES:

[1]Priyal Sunil Doshi "Home Automation System Based on Voice Recognition" IRJET Vol. 5 June-2018. [2]R. Chittibabu, K. Kranthi Kumar, K.Vikas, G Mahesh Reddy "Smart Home using Internet of Things" IJITEE vol. 8 April 2019.

[3] Majid Al-Kuwari, Abdulrhman Ramadan, Yousef Ismael, Laith Al-Sughair, Adel Gastli, Senior Member "Smart-Home Automation using IoT-based Sensing and Monitoring Platform" IEEE.

[4] J.Chandra mohan, R.Nagarajan , K.Satheeshkumar , N.Ajithkumar , P.A.Gopinath , S.Ranjith kumar, "Intelligent Smart Home Automation and Security System Using Arduino and Wi-fi", IJECS, Vol.6, March 2017.

[5] Surinder Kaur, Rashmi Singh, Neha Khairwal, Pratyk Jain, "HOME AUTOMATION AND SECURITY SYSTEM", ACII, Vol.3, July 2016.

[6] Lohan, Vibha, and Rishi Pal Singh. "Home Automation using Internet of Things." In Advances in Data and Information Sciences, pp. 293-301. Springer, Singapore, **2019**.

[7] Murray, Christopher, and Cory Sorice. "Home automation system." U.S. Patent 7,082,339, issued July25, **2006**.