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REALIZATION OF A LOW COST SMART HOME SYSTEM USING TELEGRAM MESSENGER AND VOICE

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Abstract: We are heading towards digital era where machine to machine interaction takes place with the help of Internet of things. The appliances in the home, office and industry are becoming smart every day. This paper involves control of appliances using voice indoor, when in outdoor control using App MQTT. In addition, the devices can interact and status can be monitored and controlled using a messaging service called Telegram. We use open source hardware such as raspberry pi which is a palm computer to interface the appliances in the home.

Keywords: App, appliances, Telegram, voice recognition

1. Introduction

Home automation is the process of controlling electrical devices in our home or office. There are different types of home automation available like remote control, browser based, hand gesture, voice controlled home automation. In the internet world, people are mostly spending their time with apps so we don't need to shift to another apps to control the appliances in our homes. We can control the devices at home from anywhere with these apps [1]. It provides an interactive and user friendly interface on the client side, and the devices can be controlled and monitored very easy. Earlier days the internet has been widely used for processes such as surfing web pages, information search, chatting, downloading files.By the advancement of new technologies, controlling and monitoring services have been started to send over the internet which provides interaction with devices and machinery[12]. This system can be installed in several places like hospitals, labs, banks and other industries, which considerably reduces the cost and time along with maintaining security and convenience. Any physical parameters from the real world like temperature, humidity, pressure etc. can be monitored through the use of sensors connected to the Internet from any desired location in the world. We use apps like MQTT dashboard which connect to the servers and control the appliances and read the status of the sensors using MQTT protocol which is a machine to machine protocol especially used for device to device communication[13]. The telegram is a free and open source social messaging app which provides chatting service and bot service. by creating a new bot using the telegram app one can control the appliances present in the home or office by just chatting to the bot. we can configure the GPIO pins of raspberry pi to control different devices at home or office.it is very easy to control the devices at home because of its flexibility and easy to install. This app is used to communicate between the people but also, we are able to control the devices which also read the status from sensors and are logged to twitter and Gmail. Smartphones are used widely all over the world by many people.so just by chatting with the bot we can control any device at our home or office from any part of the world. The voice recognition technology is evolving and many applications such as google assistant, apple Siri, Microsoft cortana use voice recognition and responds to the user queries. we

use voice recognition service to control the home appliances directly through our voice.

2. Design Methodology

In this paper, we are proposing all the scenarios where control can be done indoor and outdoor environment. For outdoor we have Wi-Fi connectivity. Telegram messenger is used to control the appliances in the home and also read the status from sensors like temperature, pressure, humidity etc. which is frequently used to chat with people. MQTT dashboard app is used to take the user-defined inputs from the user and control the appliances using the node.js. Voice recognition service is used to control the appliances in home using voice instructions from the user within the home. Raspberry pi is used as central server to trigger all the outputs to control the home appliances which is shown in Fig.1

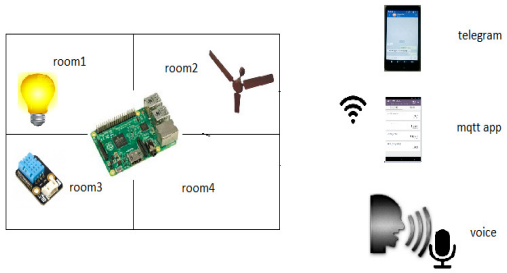

Figure.1 Block diagram

3. Implementation

3.1. Telegrambot based monitoring & control

Telegram is instant messaging application which we use daily for chatting with family and friends. The Free and Open Source nature of Telegram helped the developers to release set of APIs which are used for developing bots[14]. Bots are the applications which automates the tasks. By using this bot, it is made possible to chat with home appliances from anywhere on the world. In this paper, we developed one such bot running on Raspberry pi connected to sensors like temperature, humidity and home appliances like fans, lights, etc. The bot receives user instructions via telegram and responds to it accordingly. The instructions are strings which are programmed to respond to the user. The appliances are controlled by user defined string commands like lights on /lights off, all_lights on /all_lights off, etc. The sensor data can be logged by string commands like /gettemp, which is used to read the temperature readings and /gethum, which is used to read humidity readings etc. These strings are customized choice of user. Security is ensured in such way that a private token key will be generated and it is unique for each user. The bot responds only for user whose token key is registered. The bot checks the token key and gives access to user for controlling home appliances.Fig.2 illustrates the model that can be used to control home appliances using telegram app.

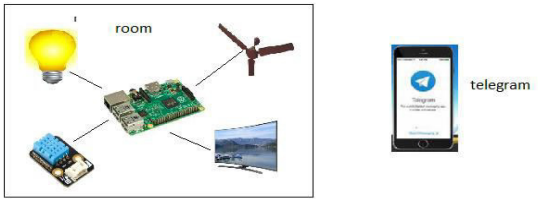

Figure.2. Telegrambasedmodel

3.2. Browser-based control and updates on social media platforms

The node-red is a visual tool for wiring the internet of things which provides wiring of hardware devices, application program interfaces and web services in different possible ways and it is a web based flow editor which helps to wire together flows easily using several range of nodes in the palette. Nodes can be easily dragged and dropped on the workspace and wired using wiring tool and deployed in single click [8]. User can control the appliances in the home by using the MQTT dashboard interface and it logs notification to Gmail and twitter when any intruder uses the appliances in home. Fig.3 illustrates the browser based model for controlling the home appliances.

Figure.3Browser based model

3.3. Voice recognition

Voice recognition technology is widely used in present day applications because of its flexibility to interact with people. Many Speech to text engines like google voice, amazon Alexa, Siri, Cortana were developed for effective communication with the people. In this paper, we are using one such voice recognition service to control the appliances [3]. The microphone is used to take the input command from the user and take action according to it. Fig.4 illustrates the voice based model for controlling the home appliances [2].

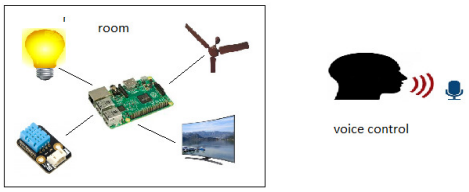

Figure.4 Voice based model

4. Results & Discussion

4.1 MQTT based hardware

The following result shows the hardware setup of controlling the buzzer using raspberry pi as main hardware module which can be accessed through MQTT app.

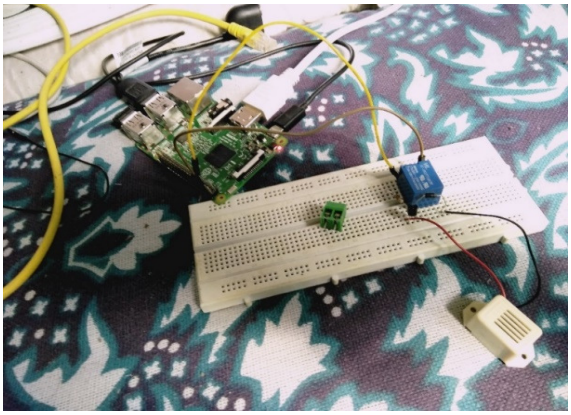

Figure.5 Hardware controlling buzzer using MQTT

4.2 Message published in Twitter

This result shows the received messages in twitter when an appliance is switched on by the user which is connected to the MQTT.

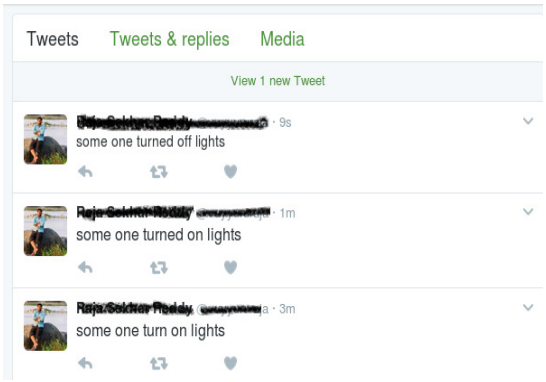

Figure.6 Messages received on twitter

4.3 Message published in Gmail

This result shows the received messages in Gmail when an appliance is switched on by the user which is connected to the MQTT.

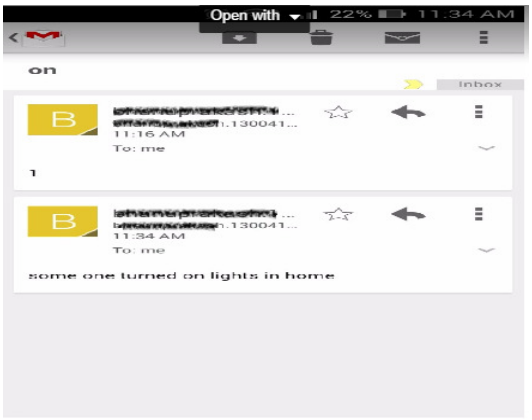

Figure.7 Messages received on Gmail.

4.4 Data publishing in Telegram app

The following result shows the sensor data that is received from the temperature and humidity sensors and also the status of the appliance. By this we can know how much temperature can be measured, manipulated and varied according to given atmospheric conditions.by default we assume to 222k and then it is gradually increased and decreased in proportion. Using devices like temperature and sound sensor we peform the following operation.

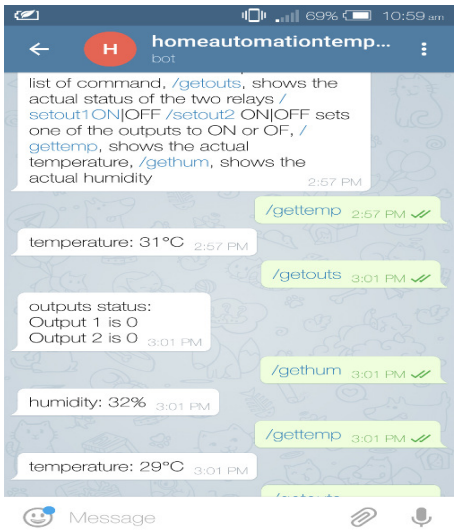

Figure.8 displaying sensor data and status of output lights

4.5 Hardware

The following result shows the hardware control of lights using the telegram app with which we send the user commands to turn on & off lights.

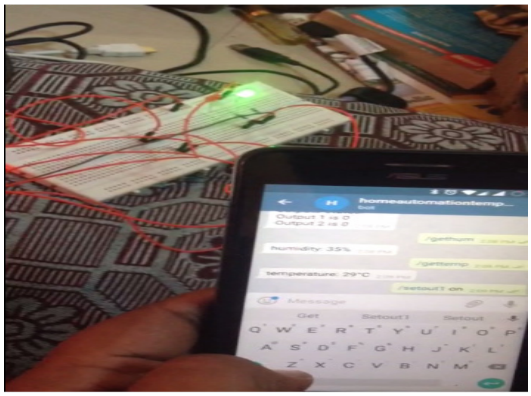

Figure.9 controlling lights using telegram app.

4.6 Voice control

The following result shows the hardware implementation of voice control home automation model using raspberry pi connected with speaker and microphone .In this input is given as voice signal which is then modulated and given to a deviceit demodulates the signal and supplies to the user.

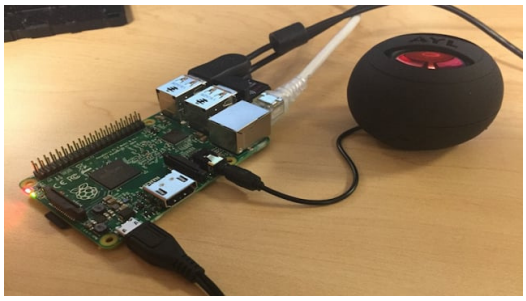

Figure.10 voice based model

5. Conclusion

The smart home system proposed through this paper was experimentally proven to work with the support of the various methods implemented like voice, Telegram and app. Control of appliances achieved through these methods with voice in home and remotely through apps anywhere on the world. The designed system not only monitors the status of sensor and logs date to Gmail and telegram whenever needed. This will help the user to analyse the conditions in the home anytime anywhere. The system is like a plug and play which can be mounted anywhere in the house with less cost and more security. This only is possible by using open hardware and free and open source software.

6. Future Scope

Further we are developing this project to integrate with different API's using Jasper. We use voice recognition not only to control the appliances in home or office but also make the system to interact with the user. The system can be made to tell the date, time, mail notifications, reading news, wiki search of particular phrase, weather forecast, adding events to a calendar etc. voice recognition has lot of scope to integrate into new levels of technology. This voice system helps the physically disabled persons to control everything without moving their legs and hands. This system can be converted into digital assistant to interact like a virtual human being. The users can setup and configure this system very easily in less time.

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