Home Automation and Security using Raspberry Pi and Whatsapp

Pamarthi Kanakaraja, B. Srikanth Deepak, K. V. Jaya Nikhil, Y. V. S Pavan Rakesh, K. Naga Venkatesh

Abstract: This paper presents an ingenious remotely sensible system that controls the home appliances by using WhatsApp. This is an IoT based model designed and developed by using Raspberry Pi-3. In this proposed system of home automation, the feasibility of executing certain important tasks with higher controllability and remote access have been incorporated. Home appliances such as lights, fans, air conditioners, power driven electrical and electronic commodities etc., are made to control from any part of this world, using a mobile phone with WhatsApp installed in it. For ensuring this functionality, a web interface has been developed using the Raspberry Pi, as a web server for operating and controlling the home appliances through any Wi-Fi accessible mobile device with WhatsApp feature.

Index terms: Dht11sensor, Mobilephone, Pirsensor, Raspberry pi, Thingspeak, WhatsApp

I. INTRODUCTION

Now-a-days, automation has become prevalent and predominant in various environments. In general, the automation techniques are conventionally implemented either by using microcontroller or a computer. Taking into consideration of the throughputs and the efficiencies of Microcontrollers, it is quite understandable that, microcontrollers alone cannot handle the automation processes by running multiple programs simultaneously with appreciable speeds. Also, it is difficult to handle both the appliances and surveillance at a stretch. Keeping in view of the above crises, the optimum alternative has been the Raspberry Pi for implementing the automation of home appliances along with surveillance, based on its reliability. Several varieties of works have been proposed in the recent past regarding the automation of home appliances. A few are, [1] VineetPratap Singh has worked on Facebook based home appliances security control and monitoring using Raspberry Pi-3 for controlling the home appliances through Facebook (May 2017).

[2] M. P. Sathish has published home automation through e-mail using Raspberry Pi saying that e-mail can be used as a media to control the home appliances remotely (September 2015).

In this proposed work, the Raspberry Pi-3 Model B has been interfaced to WhatsApp application using yowsup libraries and hence the home appliances are made to control remotely through mobile phone installed with WhatsApp. This collaboration of WhatsApp and Raspberry Pi-3 has produced an exotic set of results and it is relatively secured when compared to social networking sites like Facebook.

The Raspberry Pi is a single board computer which contains GPIO and USB ports. Using these ports, the appliances can be efficiently controlled and the appropriate judgments for tuning the functionalities of these devices can be made with the help of sensors and cameras. Raspberry Pi can be used for multiple purposes, based on the requirement.

II. METHODOLOGY

This paper explains about the controlling of home appliances through WhatsApp by using communication protocol interfaces with Raspberry Pi as the processing unit. The server interfaced with the help of relay board, controls the functionality of the appliances. Raspberry Pi-3 is loaded with a SIM card, as well as a memory card, for the purposes of communication and data storage respectively. Followed by, the WhatsApp libraries (yowsup) are installed in Raspberry Pi-3 for establishing a link through WhatsApp. This enables the remote control of Raspberry Pi-3, where, commanding can be done from any part of the world to activate or deactivate the home appliances without physical presence at home. Hence, compact messages such as “switch on fan”, “switch on light”, “switch off all” etc., can be used for communicating the automation system from remote places through WhatsApp and so, the acknowledgements shall be received from Raspberry Pi-3, once the operation are performed based on the given commands.
Raspberry Pi and its specifications:

Source:
https://www.silverlineelectronics.in/raspberry-pi-3-model-b-armv8-with-1gb-ram.html

Circuit Diagram:

Fig.1: Raspberry Pi-3

Source:
https://www.silverlineelectronics.in/raspberry-pi-3-model-b-armv8-with-1gb-ram.html

Fig.2: Fundamental steps of proposed system

Apart from the home appliances, DHT11 (temperature and humidity) sensor, PIR sensor and C270 web camera are interfaced to the ports of Raspberry Pi-3 for continuous monitoring and analysis of the surrounding conditions. DHT11 sensor measures the temperature and humidity levels inside home and shall be reporting the automation system, if the temperature / humidity crosses a certain threshold, for communicating the same to the remote user. The C270 web camera takes the snapshots of the room, if PIR sensor detects any movements of human beings / animals / objects, and sends them to the remote user’s WhatsApp number, for getting recommended to take the appropriate actions. This can also be used in the industries, for exploring and identifying any changes in the room temperatures in various critical chambers. Any sorts of abrupt changes can be reported on the spot to the remote user through WhatsApp and shall act as per the user’s commands. This eliminates the damage of equipment in the industries and also lives at times.

DHT11 Sensor:

Source:
https://potentiallabs.com/cart/buy-dht11-sensor-module-online-hyderabad-india

DHT11 Sensor is a digital temperature and humidity sensor. It is used to measure both temperature and humidity. It uses a Thermistor to measure the surrounding air and depicts humidity and temperature. For every 2 seconds the sensor changes the data and gives new data. It consumes 3.3 to 5v of power.
PIR Sensor:

Fig.5: PIR Sensor
Source: https://www.seeedstudio.com/PIR-Motion-sensor-module-p-74.html

PIR sensor is a motion detector sensor. PIR Sensor means Passive Infrared Sensor with two slots each one made up of IR sensor measure the infrared light radiating from objects when a warm body like human or animal passes through it the PIR sensor depicts the motion. They are commonly used in restricted areas to detect the motion for security purpose and they are also used in security alarms.

SEQUENCE FLOW DIAGRAM:

At first, the DHT11 sensor and camera get initialized then it checks both the temperature and humidity if temperature greater than or equal to 50 degrees centigrade or humidity less than or equal to 40% or if both happens then takes the snap and sends the picture through WhatsApp to the user.

Table.1: Varying of pulse among temperature and humidity values.

| S. NO | Temperature (T) | Humidity (H) | T||H |
|-------|----------------|--------------|-----|
| 1.    | 0              | 0            | 0   |
| 2.    | 0              | 1            | 1   |
| 3.    | 1              | 0            | 1   |
| 4.    | 1              | 1            | 1   |

Initially, the PIR sensor and camera gets initialized. Later, the PIR sensor checks the motion and if the PIR sensor raises to high pulse, then the web camera takes the snap and sends the picture to the user through WhatsApp else process goes to the starting step and repeats continuously.

III. RESULTS

This System is executed and the outcomes have been confirmed for all intents and purposes. It encourages the client to screen and control the home apparatuses associated through WhatsApp.

Results are as follows:
The outcomes have been acquired through ThingsSpeak. In the wake of marking into the ThingsSpeak account and creating the necessary fields, an API (Application Programming Interface) key has been produced and through this the can get the diagrams.
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Fig.9: Graphs for both temperature and humidity

Fig.10: Graph for Humidity for certain period of time.

Fig.11: Graph for Temperature for certain period of time.

The ThingsSpeak has produced the data base for both temperature and humidity in .CSV format.

Table.2: Database of both temperature and humidity with respect to tie.

<table>
<thead>
<tr>
<th>Time</th>
<th>Temperature</th>
<th>Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:05</td>
<td>26</td>
<td>50</td>
</tr>
<tr>
<td>12:06</td>
<td>25</td>
<td>49</td>
</tr>
<tr>
<td>12:07</td>
<td>26</td>
<td>48</td>
</tr>
<tr>
<td>12:08</td>
<td>27</td>
<td>48</td>
</tr>
<tr>
<td>12:09</td>
<td>28</td>
<td>49</td>
</tr>
<tr>
<td>12:10</td>
<td>29</td>
<td>50</td>
</tr>
<tr>
<td>12:11</td>
<td>30</td>
<td>51</td>
</tr>
<tr>
<td>12:12</td>
<td>31</td>
<td>52</td>
</tr>
</tbody>
</table>

IV. CONCLUSIONS

In this automation world, due to overclocking and future expansion capabilities, Raspberry Pi has been proved to be an easy and economically efficient platform for implementing the home automation system and also in reducing the human intervention. The current system supports efficient power usage, as well as, remote controlling of the home appliances.

REFERENCES

1. Vineet Pratap Singh, Prof. Urmila Deshmukh, Prof. Anjali M. Patki. “Facebook Based Home Appliances Security”
3. And Communication Engineering.
8. Yasiri Amri, Mukhammad Andri Setiawan “Improving Smart Home Concept with the Internet of Things Concept Using Raspberry Pi and Node MCU”

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