Domotics

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Abstract- *In the present era, the devices are getting smarter than humans. A normal device can be a smart device if it gets controlled by a controller. Generally, a digital controller is used to control the sensors. As per the proverb, appearances are always deceptive, combination of small sensors makes a huge change in the developing technology. In our project, a small room is taken to automate in two aspects: by using mobile phone and by using sensor signals. The sensors are placed both inside and outside the room and when the person enters, the light and fan turn ON. This is done by using a controller. If the person is too tired or if he/she fails to turn OFF the equipment and being lazy, he/she can turn OFF with his smart phone. This can be done inside the junction box which consists of electronic devices. Thus, the person will be pleased and feels safe and comfort.*

Keywords- Smart Device, Automate, Controller, Safe, Comfort

I. INTRODUCTION

In the developing world of smart technology, the home automation is not a difficult one. Home automation is the one which enables home lighting, security, operating electrical and electronic appliances efficiently. But, it has a lot of consequences. There are many ways to automate the home. The real time example is by controlling the device through his/her voice. The person registers his voice and while he commands, the action can be done using a controller [4]. This is same as Alexa, amazon echo and so on. But there is an issue after implementing in the home. The controller follows AND operation. i.e., the registered voice and the person voice must be same and identical. If the person's throat gets injected, his/her voice changed. So, the controller doesn't obey the commands given by his master [5]. So, the possible and the simplest way to control the home is to control it using the smartphone.

II. OBJECTIVE

The focus of the project is to help others to operate the home appliances using the smart phone and also to reduce the electricity wastage. This will be very useful and helpful for handicapped and also for elderly people. The main objective is to take care of several domestic appliances that might normally be difficult for those who are elderly or handicapped people to take care of. If the person is not in his/her room, the appliances will not operate. The proposed idea will allow a user with an android device to run a piece of downloadable software on any mobile device such as smart phones. The web page which was user created one, will allow the user to control a device that is connected to any home appliance when the Raspberry Pi 0w gets enabled. Sensors will be connected to the home appliances and also with Raspberry Pi 0w so that they can be monitored and can be controlled through smart phones. This will be easy and convenient to any user since he controls through the digital switch.

III. LITERATURE SURVEY

Existing Method

The first home automation werejust ideas, not a model. For more than decades, these ideas were exploded in science fiction. Some Prolific writers like Ray Bradbury, Paul Christian imagined a future where homes were interactive and seemingly ran themselves. In Ray's short story, "TherewillCome Soft Rains"he narrated the home automation and he just set his vision towards the upcoming years. The people were afraid after reading the short story and the crowd was pleased with his work [6].

Disadvantages of Existing Methods

Even though the project was very good to work, the major disadvantages are that they fail to implement in real time. The project was kept as a prototype and fails to monitor the data continuously. The forerunners of domotics will be very tedious for cloud analysis if there is any need for future implementation. The major mistake by the forerunners of domotics is the connectivity protocol [1,2]. The protocol was **Zigbee** which has a very small range compared with **Wi-Fi** [3]**.**

IV. PROPOSED METHOD

The motive of this project is to make humans to feel safe and comfort. Initially, an IR sensor was placed outside the

room along with magnetic reed switch. When a person opens the door, the reed opens and +5V DC goes to the sensors which are placed inside. The light and fan will be turned ON automatically when the sensor detects. Also, the person can turn ON the fan and light using webpage which will be displayed in his/her phone. This can be done by placing a junction box which consists of RPi, SMPS and two channel relay module. Thus, the automation can be done in two aspects. It can be explained in the following blockdiagram.

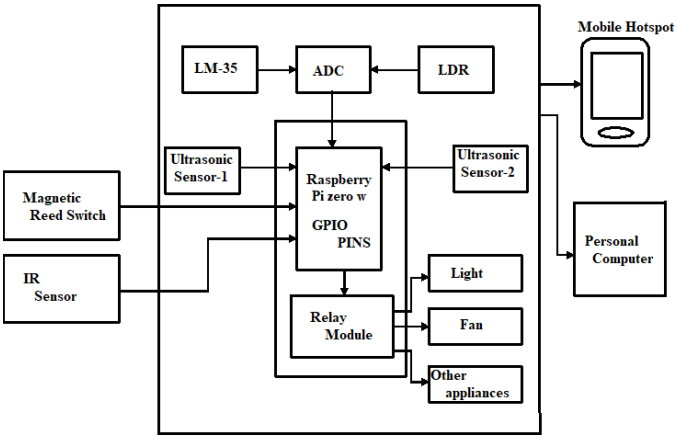

Fig.1: Block Diagram of Domotics

V. TECHNICAL DESCRIPTION

Detailed block diagram

The main electronic components are Raspberry Pi, relay, analog and digital sensors, an ADC converter and an appliance to control. The domotic scan be separated into two halves. The junction box automation and the sensors automation. Both areas can be explained in the following diagram.

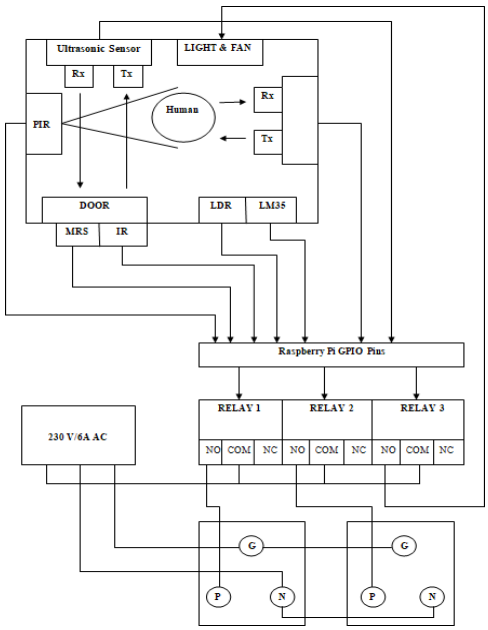

Fig. 2: Detailed block diagram of Domotics

Initially, IR sensor and Magnetic reed switch are placed outside the room. Inside PIR, Ultrasonic sensor and LM35 will be placed. When a person enters the door, the IR detects and this will initiate the rest of sensors. Then the supply goes to the magnetic reed switch. The working of magnetic reed switch was reversed for the opening and closing. When the person enters the room and closes the door, the reed switch and the IR sensor comes back to their initial stages. The Ultrasonic sensors check the person's location and position to actuate the relay for turning ON the light and fan. The LM35 and LDR are used to check the temperature and light intensity of the room and turns ON the fan and light as per the ambient temperature. Since the Raspberry Pi is a digital controller, it turns on the light and fan with the help of an ADC which is MCP 3008. It converts the analog value into digital ones. The Raspberry Pi controls the overall operations of the sensors and the switching is done using with the help of phone by opening the PHP page which is connected with phone's hotspot. So, the person feels pleasant and comfort.

The junction box in this project is the most needed tool to make the components automated. The setup was an assembly box which consists of the electronic gadgets which were mentioned above. The wiring of electronic components inside the junction box can be seenbelow.

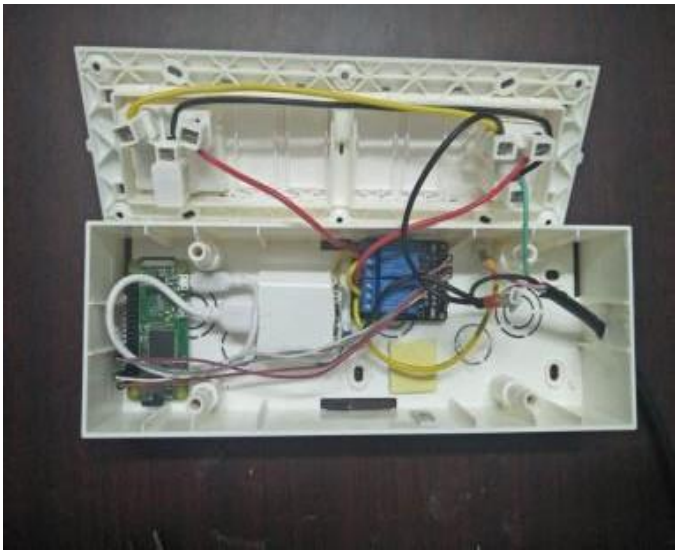

Fig.3: Junction box view

The five steps for the junction box to get automated are as follows:

- The Electronic Part
- Installing and Usingthe Wiring PiLibrary
- Installing a Webserver
- Controlling with PHP
- Interfacemaking

After developing the code, the following PHP page gets generated [7]. The controller which is present inside the junction box is connected to the user through hotspot.

Fig.4:Web page

Sensor Interfacing

The cardboard setup consists of only digital sensors i.e., Magnetic reed switch and an IR sensor. The relay module was placed when the Reed opens and the IR gets disturbed. Since it is a first prototype, no analog sensors were placed in the cardboard. The analog sensors were checked later and included in thedesign. Generally, the sensors are not placed directly in the room. A trial check was done by placing the sensors with the cardboard and the obtained output fulfils the requirement. After obtaining, the sensors are kept in the room. The sensors follow OR operation as per the program. This makes a huge advantage that if any sensors fail, the other works according to the program i.e., the sensors produceredundancy.

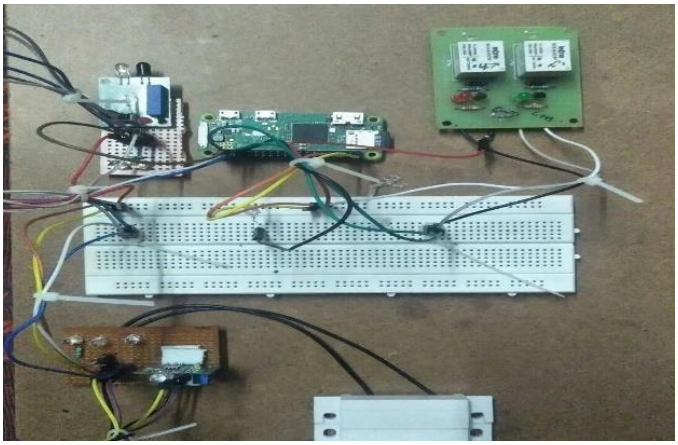

Fig.5: Cardboard Setup

Flow Chart of sensor flow

The supply is given and the web page displays after the phone gets connected with Raspberry Pi through hotspot. Whenever the button presses, the relay gets actuated through GPIO pins of Raspberry Pi and when it goes high, the supply gets ON and any load which is connected will gets charged/turned ON. This is the simple explanation for the junction box working.

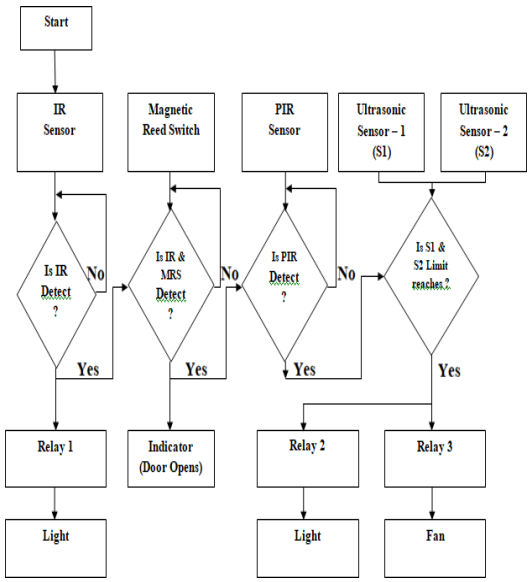

Fig.6: Flow Chart of Sensor's Work

An IR sensor detects the person if he/she opens the door and the indication gets activated. When an IR detects, a relay which will be placed inside the room, gets actuated and a small bulb gets glowed for a particular time. There may be possibilities that the person may come inside or not. If the object is not present inside the room, the person neednot to come inside. So, to stop this, a bulb will be placed. When he enters, the ultrasonic sensors 1 and 2 checks the distance of the person.If both the measured distances are not same, they'll wait to get the same values. If the values are same, then the value is again compared with the PIR sensor. When the values get same, the value is treated with LDR and LM35. These two analog sensors are used for the efficient control of light and fan. When both the values gets high, the relay will be actuated which results in turning ON the fan and light. Thus, the automation can be done in two aspects to make the humans easier and very muchpleasant.

VI. RESULT

The working of junction box and the sensor actuation was taken individually and the php file works as per the coding. The sensors are worked according to the programme. The sensors are placed inside and outside of the cabin. The results are placed in the following tables.

Table 1: Door opens

Ultrasonic – 1	Ultrasonic – 2	PIR	Relay
>limit	>limit	0	0
>limit	>limit	1	1
>limit	<limit	0	1
>limit	<limit	1	1
<limit	>limit	0	1
<limit	>limit	1	1
<limit	<limit	0	1
<limit	<limit	1	1

The above table shows the results of the domotics when the door gets open. The results get varied when the door gets closed. The results for the door closed can be viewed in the following table. The sensors value also gets varied.

Table 2: Door closes

Ultrasonic – 1	Ultrasonic – 2	PIR	Relay
>limit	>limit	0	0
>limit	>limit	1	0
>limit	<limit	0	0
>limit	<limit	1	1
<limit	>limit	0	1
<limit	>limit	1	1
<limit	<limit	0	1
<limit	<limit	1	1

VII. CONCLUSION AND FUTURE SCOPE

Thus, the automation makes the humans feels pleasant. The domotics will be patterned as a project and the rural people will be happy and this project will be a magic to them.

The energy calculation is one of the important parameters to make the domotics project to the next level. If the energy calculations are done inside the cloud, then the domotics reaches its next level of IoT in which it can be accessed anywhere in the world.

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