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Automation of Appliances Using IoT

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ABSTRACT

Technology is a never-ending process. To be able to design a product using the current technology that will be beneficial to the lives of others is a huge contribution to the community. This project presents the design and implementation of a low cost but flexible and secure cell phone based home automation system. The design is based on a standalone Arduino BT board and the home appliances are connected to the input/ output ports of this board via relays. The communication between the cell phone and the Arduino BT board is wireless. This project is designed to be low cost and scalable allowing variety of devices to be controlled with minimum changes to its core. Password protection is being used to only allow authorized users from accessing the appliances at home remotely.

Keywords: Appliances Automation, Arduino, IoT.

I. INTRODUCTION

In present world of technology, all the things are going computerized and automated from machinery to simple paperwork every process and system has to do something with computer, i.e. they are in some or the other way connected to computers.

Keeping that in our mind we are designing our project 'Appliances Automation' which will be a small working model of an automated and mobile controlled system.

It will demonstrate how we can control devices and control all the operations through mobile remotely. It will become more managed and automated due to comfort it supply, especially when installed in a private lab. The device automation is a means that give users access to control appliances. Many well-accepted lab automation systems are based on wired network.

Wireless systems can be of great importance for automation systems. With the wireless practical application such technology as Wi-Fi, networking in recent past years, Wi-Fi systems are used everywhere.

II. METHODS AND MATERIAL

1. GSM:

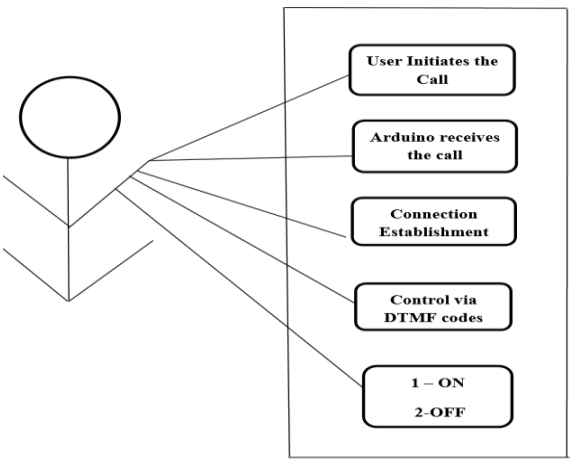

Fig 1: Use case diagram of GSM Module.

- In this module user initiates the call with their respective GSM cell phones.
- Arduino receives the call according to the range of the calling.
- The connection is been established with the proper range.
- Controlling is been done via the DTMF (Dual Tone Multi Frequency) codes.
- According to our demand, we can set the controlling of the different appliances through it.
- In our module, we have been set the ON to one keyword and OFF to two keyword we can change it according to our need.

2. GPRS

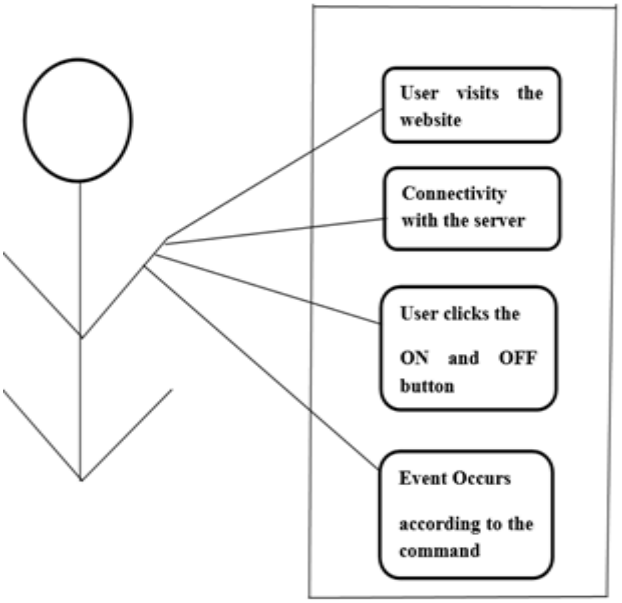

Fig 2: Use case diagram of GPRS

Module

- This module user goes to the respective website and click on the server connectivity as soon as the connection is been established the end user clicks the ON and OFF button according to the command.
- Then the event occurs to the respective commands as the end user gives into it.
- As soon as the event occurs the data is immediately uploaded to the server and the data in the server is been enhanced.

3. Temperature and Humidity Sensor

The DHT11 temperature range is from 0to50 degrees Celsius with +-2 degrees accuracy. While the DHT11 humidity ranges from 20to80percentage with 5% accuracy. DHT11 is a low-cost digital sensor for sensing temperature and humidity. This sensor can be easily interfaced with any micro-controller such as Arduino, Raspberry Pi etc… to measure humidity and temperature instantaneously.

4. Curtain Control System:

- We can close and open our curtains directly from the mobile.
- We can choose for one or two curtains and even set how far they should be opened.
- We can also set timers to open and close them at a fixed time. If you want to, you can always continue to open and close them manually.

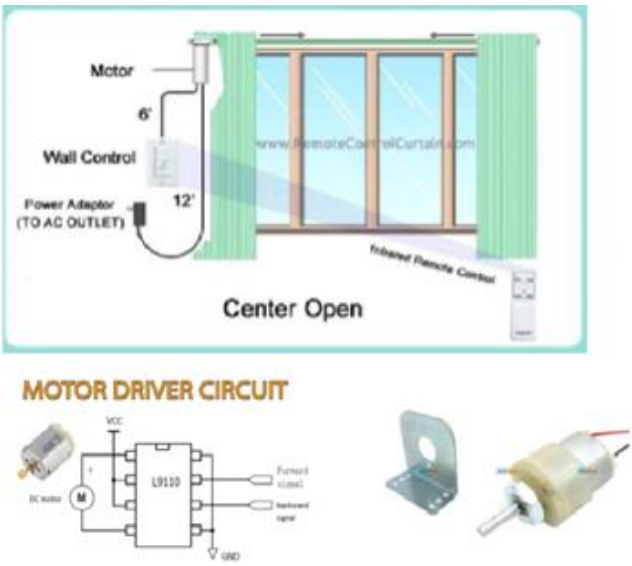

Fig 3 : Curtain working

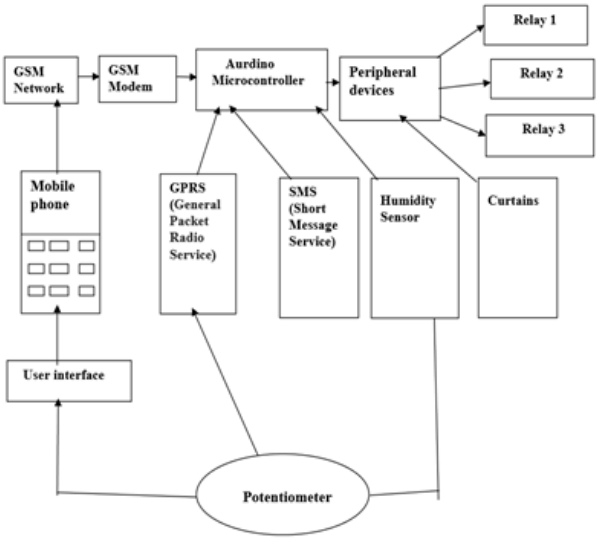

Diagram shows over view of modules.

Material required:

- Arduino Uno: The digital and analogue input/output pins are equipped in boards that may be interfaced to various expansion boards and other circuits. Serial communication interface is a feature in this board, including USB, which will be used to load the programs from computer.

- Voltage regulator: It is used to maintain a constant voltage level and used for regulating AC or DC voltages. A voltage regulator contains negative feed-forward design or it may also contain negative feedback control loops.

- Sensor: It is capable of sensing the current room temperature and humidity and therefore it is called as a sensor .As we give call to the GSM module it receives the call after 3 rings and gives us the message of humidity and room temperature.

- Relay: The relay driver IC that you use will have the following characteristics, 25A rated collector current, High voltage outputs – 230V, Output clamp diodes, Inputs compatible with various types of logic.

- Micro Controller: The Arduino Uno R3 is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analogue inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

- GPRS: GPRS is a packet switching technology that stands for General Packet Radio Service. It can provide idealized data rates between 56-114 k bit per second. A number of technologies such as SMS rely on GPRS to function. With the GSM shield, it is also possible to leverage the data communication to access the internet. Similar to the Ethernet and Wi-Fi libraries, the GSM library allows the Arduino to act as a client or server, using http calls to send and receive web pages.

- Temperature sensor: The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 device does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾ °C over a full –55°C to 150°C temperature range.

- GSM Module: GSM is an international standard for mobile telephones. An acronym stands for Global System for Mobile Communications. The Adriano GSM shield is a GSM modem. From the mobile operator perspective, the Arduino GSM shield looks just like a mobile phone.

- Arduino LCD: The Liquid Crystal library allows you to control LCD displays that are compatible with the Hitachi HD44780 driver. There are many of them out there, and you can usually find them

by the 16-pin interface. Liquid crystal displays (LCDs) are a commonly used to display data in devices such as calculators, microwave ovens, and many other electronic devices.

- Arduino Buzzer: A buzzer or beeper is an audio signalling device,[1] which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

  Types of Buzzers:
  - Electromechanical
  - Mechanical
  - Piezoelectric

III. RESULTS AND DISCUSSION

➢ Configure mode:

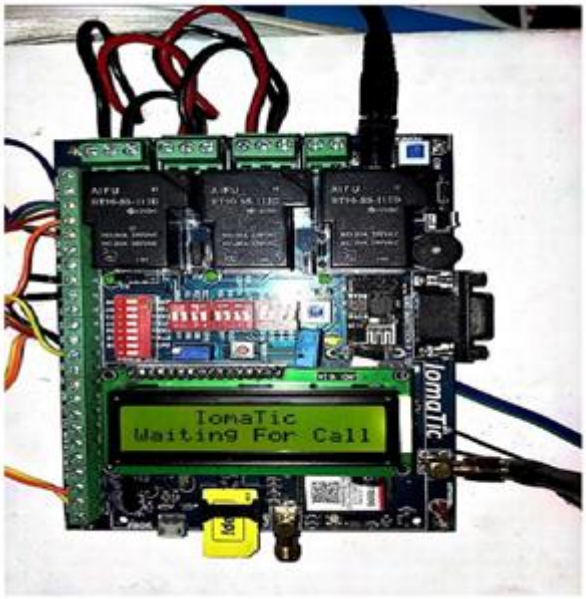

Fig 4: configure mode

First we have to select the GSM mode using regulator and the LCD mode will display GSM MODE which means we have switched the mode to GSM mode now we can and we will the button which is present in the board which will confirm the select the GSM mode and the connection will be established within few seconds and the LCD will display a message “waiting for call”.

➢ Connection mode:

Fig 5: Connection mode

As we know that, we are using GSM mode so it will require a GSM shield for GSM connection to be establish between the client and the Arduino board so we are using a SIM card so that the user can contact to the Arduino board. After calling on that number while ringing it will display a message “ringing...”

➢ Handling mode:

Fig 6: Handling mode

After two to three rings the call will be received by the board and it will display the message that "call received " which means that the call has been successfully connected between the client and the Arduino board now the user can control the appliances through his mobile phone successfully.

- Controlling mode:

As we know that we are successfully connected the call with the Arduino board. Now we can control the appliances easily.

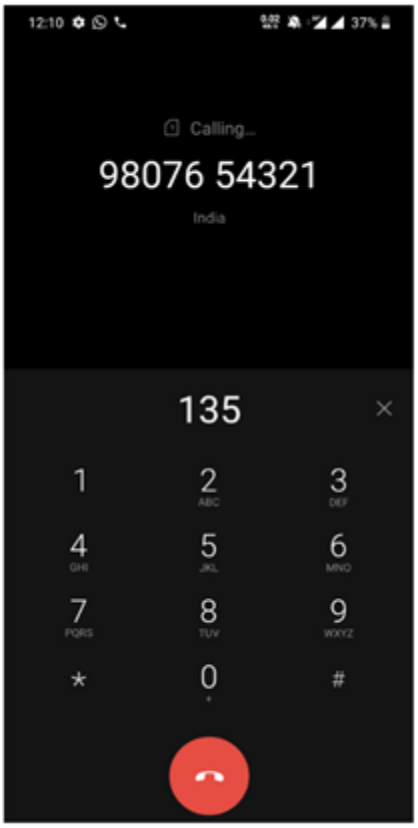

Fig 7: Dial Pad

Now we will open the dial pad on our phone and press the button 1,3,5 to switch on the first, second and third bulb respectively. To switch off these bulb we will use 2, 4, 6 buttons for first, second and third bulb respectively.

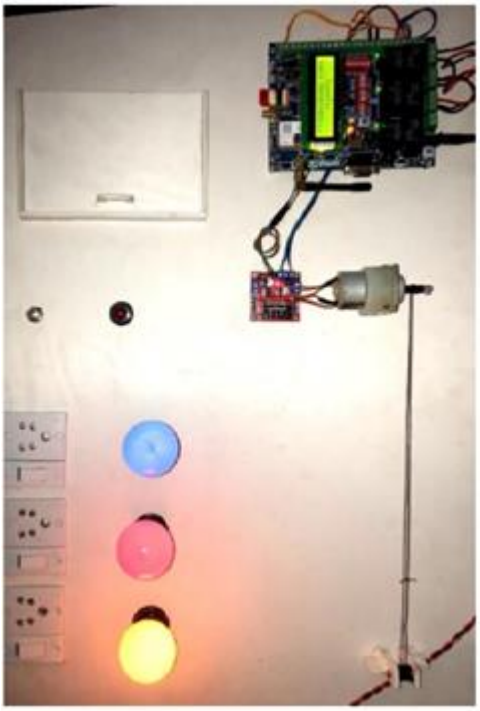

Fig 8: Operations on Appliances

Our final result will come out as shown in the fig 8.

IV. CONCLUSION

In this work, the proposed system facilitates the users to control the appliances such as lights, fans, projector and air conditioner just by giving commands through either a smart phone or Node-RED Dashboard. Thus, all devices can be controlled universally and remotely , and the status of the devices can be visualized. This feature will help the user to analyze the status of these devices anytime and anywhere. It reduces human intervention in monitoring the devices. This system can be further extended for automatic ON and OFF appliances depending upon the number of users in the Lab using Omron thermal sensors. This system can be further implemented in hospitals for physically challenged people for controlling the appliances.

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