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In this recent year of technology, along with smartphones, electronic gadgets are becoming widely popular in daily lives. The idea of the technology is to make the urban life easier and comfortable, therefore developing an upgraded home automation system is a popular demand nowadays. The article from hereafter will discuss the aspects of home automation system designed on the basis of Bluetooth access system. This system mainly develops its framework based on Android and Arduino .Since the use will be multipurpose ,the system has to be cost effective and easy to use .therefore, the design that will be described here we control the home appliances through an android application and Bluetooth wireless connectivity. The smartphone app will be used to monitor the gadgets whereas the Bluetooth system will provide control over them for easy access .So the control will be used only on a small circumference covering the Bluetooth range .basically the concept is developed for ease and comfort for everybody including handicapped people.

Keyword: —Home Automation, Bluetooth, Arduino, cost-effective, Smartphone, user friendly.

Introduction:

In the digital age of 21st century the concept of technology is to make life easier and fast .both in industrial and home front ,smart phone, technology are used to decrees effort and increase efficiency. While, in industries Robots and large machineries are easily used ,it can not be the same for domestic use due to cost and space issues . Therefore the idea for home automation system is depending on two major categories, locally controlled and remotely controlled.[1] According to first category ,the user can control their home appliances through Bluetooth ,ZigBee ,GSM. This kind of control only provides a limited access. Wahereas in second category the control is widely accessible through an internet connection and android application. Fig. 1. An example of simple wireless home automation.

This paper will mainly focus on first category. with the advancement of technology ,the concept of wireless connectivity is becoming more popular worldwide.

People are more inclined to get used to with wireless life style to be free from hazard of cables connectivity. Keeping that in mind, our paper will focus on low budget highly efficient automation system that will be easily usable by people of all walks. The core function of this system is to switch on and off and occasionally regulate multiple home appliances through one single software application or in -home Bluetooth technology. Therefore, the simple components of Arduino framework will be sufficient for the whole operation where we will be using Arduino, Arduino UNO, HC 05 Bluetooth Module. Being a cost efficient project the functions has to be simpler and easily accessible by all.

The goals that need to be completed to achieve this aim are:

- To introspect the reasons of using home automation for comfort security and ok rivacy .
- To research and find out how to make technology more available to everyone within a minimal budget.
- To find out as to how to utilize this low budget technology to turn a generic home into a smart home for more comfort and less effort.

To find out the reason behind the much discussed cable hazards, we stumble upon a question that helped us to go through a research which is how to address this wired suffering and what to do to take the burden of cables off the shoulders of the users using lowest possible expenditure.

Due to the pandemic situation and time constraint we had to work with limited data within a small scale of research area but we hope to expand our arena in future with possibly a larger resource and man power.

II. RELATED WORKS

For this section of the paper, Several remote controlled home automation systems have been studied. R. Piyare and M. Tazil research work provided full functionality to remotely control home appliances via wireless communication between the Arduino BT-display and cell phone using Bluetooth technology. Arduino BT board was connected with home appliance and it was controlled through a Symbian OS cell phone application. Similarly, another study presented home automation system using Bluetooth and android application. [2] but, this was designed only for 4 lights and it was not strong enough to control more than 4 Home appliances.

In another research work, GEE Bee based home automation system introduced for handicapped and elderly people.[3] GEE Bee transceivers was used for wireless communication between the master control panel board and the remote control device.

A home monitoring and automation system was also studied, it was implemented by using Arduino Uno and Digilent chipKIT. [4] Although this system mentioned as low cost system but it is much expensive than Bluetooth base home automation system. A low cost and wireless controlled automation system was designed by researchers. Bluetooth technology was used to provide remote controlled wireless access to user.

I. METHODOLODY AND MATERIALS

A. Conceptual Framework.

This individual part of this paper lays out the conceptual details of the framework and methodology regarding the entire work done on the project. The entire framework of the way the project is implemented as well as the structural components and their integration upon which the success of the project is dependent on is explained here. The prototype of this project is done completely by using the

the programming phase is initiated and it is done by using Arduino UNO IDE. Afterward, the code is burnt into the Arduino board (in this case the hex file is loaded) and

after numerous tests and debugging we end up with the final product and then the overall project is evaluated.

B. Core Components of Home Automation System.

1) Arduino UNO: The Arduino UNO, as shown below, is an open-source microcontroller board based on the Microchip ATmega328P microcontroller. It is the mother of this project and its main purpose here is to read input and turn it to output, receive and transmit serial data using the TXD and RXD pins and also using the PWM output as well as draw power from those pins. The reason being for using this particular microcontroller is because it is low cost, simple to code for, cross-platform among others.

2) NPN Relay Switch Circuit: The relay circuit shown here is connected through an NPN transistor (2N2222) and then connected to the appliances. Here the transistor acts as a switch and whenever a certain amount of voltage is passed through the base of the transistor only then will the relay circuit activate and hence jump start the appliance as well. All of this depends on which instruction is passed through the Arduino board from the android application through the Bluetooth module.

3) Bluetooth: HC-05 module: HC-05 Bluetooth Moduleis an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. This module is used in order to transfer the instructions from the android application to the Arduino board to control the appliances by various commands already instilled in the code. It is very cost-effective.

4.) Flame Sensor: This sensor is work as the flame alarms Tthis sensor detects length otherwise wavelength within the range of 760 nm to 11nm within the light range.

5) Buzzer Module: Buzzer module is an active buzzer alarm module for Arduino UNo is an audio signaling device.

6) Ultrasonic Sensor: An ultrasonic is an instrument that measures the distance to an object using ultrasonic sound waves.

7) LDR Sensor: An LDR is a component that has a variable resistance that changes with the light intensity that falls upon it.

8) DHT 11: The DHT11 uses just **one signal wire to transmit data** to the Arduino.

II. SYSTEM ARCHITECTURE AND IMPLEMENTATION

The implementation of this ARDUINO system is done through a few elaborated steps which include the This the Arduino UNO AT- mega328P based microcontroller and HC-05 Bluetooth module. Firstly, we have to build up the frame to put all the sensor and the instruments. The android phone and the Bluetooth module are paired by setting up the physical port of the module to be on the same network as the android phone. Then an application with the easy interface is used for the display, in display the house owner name and temperature, humidity will be shown. For the next step, the Arduino controller is programmed to interact with the application in question and commands are sent from the application by text and through the Bluetooth channel. There are used several sensor with the Arduino UNO into different port. And when sensor is activated then it will heat the Arduino UNO it will work fine. These few steps ensure home automation via Bluetooth and android application

Pros and cons of using home automation system:

While the ease of access and comfort are two main purpose of the automation system; there are also a few other added benefits of this operation.

- Security,
- Energy- saving,
- Budget maintenance,
- Convenience are among the many benefits of this system.

At the same time, there are a few aspects where one has to compromise for the sake of these benefits. Among them-

- Intelligence surveillance,
- Invasion of privacy,
- Digital footprint are a few worth mentioning.

I.DISCUSSION AND FUTURE WORKS

From the above methodology and implementation analysis, Bluetooth based home automation system allows sending commands to control home appliances through text. As compared to other technologies used for a smart home system. The smart home device based on Bluetooth is only allowed to use within a short range which is more or less 100 metres. Despite of such space limitation, the Bluetooth technology runs smoothly within its range. The few devices in home appliances are now connected and operated by this framework. The test run is operated with a future hope to expand the connectivity beyond the few appliances those are connected right now. Since, the whole concept is based on the use of a smartphone and a simple software application; the whole outcome has to be a cost-effective and easily accessible operation for everyone. Therefore, no other connectivity will be more efficient and easy to use than Bluetooth connection.

Further development of this project can be developed into IOT by using Ethernet Arduino and wifi module. In that case, it will be possible to control it from anywhere around the world.

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