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Arduino Based Home Automation

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Abstract

The main objective is to develop a home automation system using an Arduino board. As technology is advancing so houses are also getting smarter. Modern houses are gradually shifting from conventional switches to centralized control system, involving remote controlled switches. Presently, conventional wall switches located in different parts of the house makes it difficult for the user to go near them to operate. Even more it becomes more difficult for the elderly or physically handicapped people to do so. As technology arises, we are going into smarter world and daily new technologies are invented Smart home automation can be done through so many ways like webservers and websites but now we are trying it using telegram application which is available in windows and android mobile phones.Remote controlled home automation system provides a most modern solution with smart phones.

Keywords: Arduino uno,MQ-6 Sensor,PIR Sensor, Relay.

I. Introduction

Nowadays, we have remote controls for our television sets and other electronic systems, which have made our lives real easy. This system is super-cost effective and can give the user, the ability to control any electronic device without even spending for a remote control. This project helps the user to control all the electronic devices using his/her smartphone. Time is a very valuable thing. Everybody wants to save time as much as they can. New technologies are being introduced to save our time. To save people's time we are introducing Home Automation system. Smart home automation refers to the use of technology to control and automate various home appliances and systems, such as lighting, heating, cooling, security, and entertainment, among others. It provides homeowners with greater control and convenience, as well as increased energy efficiency and improved security. Smart home automation typically involves the use of various devices and technologies, including smart sensors, smart thermostats, smart lighting, smart locks, and smart cameras. For example, homeowners can set their lights to turn on automatically when they enter a room, or program their thermostat to adjust to their preferred temperature at specific times of the day. They can also receive alerts and notifications if there is any unusual activity or if any of their devices require maintenance. Smart home automation can also help homeowners save money on energy bills. Moreover, smart home automation can improve home security. Smart cameras and sensors can detect and alert homeowners of any unusual activity or movement, and smart locks can allow homeowners to control who enters their home and when. This can provide a greater sense of security and peace of mind. In the present day, home automation is becoming essential for the purpose of improving our life condition. Convenience and ease of using home appliances is what home automation is offering. Home automation offers a futuristic way of life in which an individual gets to control his entire house

using a smart phone, from turning on a TV to locking/unlocking doors; it also offers an efficient use of energy.

II.Existing System

The Existing system based on with the GSM Module & Bluetooth Module only. The recent developments in technology which permit the Use of Bluetooth and Wi-Fi have enabled different devices to have capabilities of connecting with each other. Using a WIFI shield to act as a Micro web server for the Arduino eliminates the need for wired connections between the Arduino board and computer which reduces cost and enables it to work as a standalone device. The Wi-Fi shield needs connection to the internet from a wireless router or wireless hotspot and this would act as the gateway for the Arduino to communicate with the internet. With this in mind, an internet based home automation system for remote control of home appliances is designed.

III.PROPOSEDSYSTEM

Our proposed system is an arduino based home automation done with Arduino connected to a wifi and controlled via android app or a social media network. This system deals with the safety in home and smart home technologies which will be cost efficient. Block Diagram of the proposed system is shown in Fig (i).

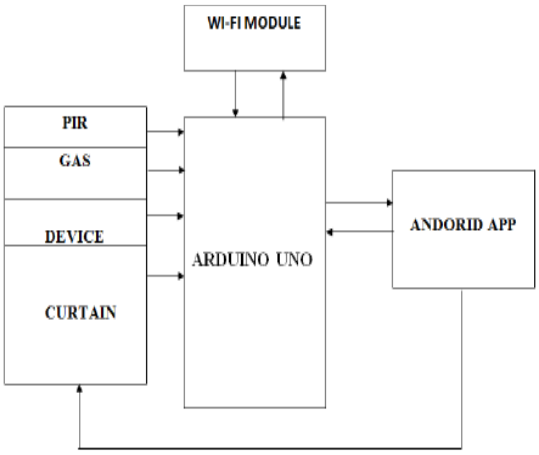

Fig 1 Proposed Block Diagram

Arduino can sense the surroundings by receivinginputsignalfrom avariety of sensorsandcan affectitsenvironmentviaactuators.Ananalogtemperaturesensorisachipthat tells you what the ambient temperature is. TheDHT11isabasic,ultralow-costdigitaltemperature and humidity sensor. It uses a capacitive humidity sensor anda thermistor to measure the surrounding air, and spits out adigital signal on the data pin (no analog input pins needed). It is fairly simple to use, but requires careful timing to grab data.T he only real down side of thissensorisyoucanonlygetnewdatafromitonceevery2 seconds, so when using our library, sensor readings can be up to2 second sold.

The Passive Infra-Red (PIR) sensors allow one to sense motion, almost always and are used to detect whether a human has moved in orout of the sensors range. The PIR sensor is a pyroelectric device that detects motion by measuring changes in the infrared level emitted by surrounding objects. This motion can be detected by checking for a high signal on a signal I/O pin.

3.1 ARDUINOUNO

Arduino microcontrollers are pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash memory. The default bootloader of the Arduino UNO is the optiboot bootloader. Boards are loaded with program code via a serial connection to another computer. Some serial Arduino boards contain a level shifter circuit to convert between RS232 logic levels and

transistor–transistor logic(TTL) level signals. Current Arduino boards are programmed via Universal

Serial Bus (USB), implemented using USB-to-serial adapter chips such as the FTDI FT232.

Fig 2 A r d u i n o UNO

3.2 RELAY:

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal.

3.3 WI-FI ESP8266:

The ESP8266 is a Wireless Fidelity microchip with TCP/IP stack and Arduino capability which is a low cost, high range and reliable device. This module allows microcontrollers to connect to a Wi-Fi network and makes TCP/IP connections using Hayes-style commands. The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocols, it gives Arduino a direct access to the Wi-Fi network. The ESP8266 can either host an application or offload Wi-Fi networking functions from another processor. ESP8266 module has a pre-programmed AT command with a set firmware which can connect ESP8266 to Arduino Uno. Wi-Fi is usually referred to as IEEE 802.11x standards i.e. to provide instant connectivity.

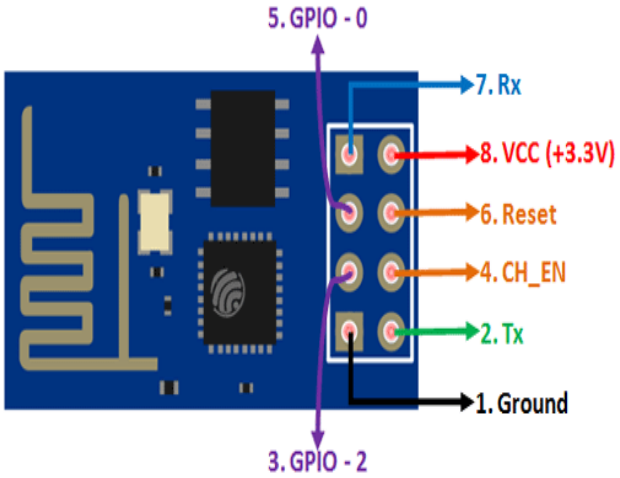

Fig 3 Wi-Fi ESP8266

3.4 SENSORS

In the broadest definition, a sensor is an object whose purpose is to detect events or changes in its environment, and then provide a corresponding output. A sensor is a type of transducer; sensors may provide various types of output, but typically use electrical or optical signals. For example, a thermocouple generates a known voltage (the output) in response to its temperature (the environment).

A mercury-in-glass thermometer, similarly, converts measured temperature into expansion and contraction of a liquid, which can be read on a calibrated glass tube. The types of sensors used in this system are lm35 i.e temperature sensor and LDR i.e light detection sensor. Both of these sensors will be connected to arduinouno board and will be configured accordingly. These sensors will sense the light and temperature in the room and will allow user to manually switch ON and OFF the lights. Lm35 sensor will help the user to know the room temperature and the LDR sensor will help the user to have control over the light remotely.

3.4.1 MQ-6SENSOR

This is a simple-to-use liquefied petroleum gas (LPG) sensor, suitable for sensing LPG concentrations in the air. The MQ-6 can detect gas concentrations anywhere from 200 to 10000ppm. This sensor has a high sensitivity and fast response time.

Fig 4MQ6Sensor

3.4.2 PIR SENSOR

Fig 5 PIR Sensor

PIR sensor detect animal/human movement in a requirement range. PIR is made of a pyroelectric sensor, which is able to detect different levels of infrared radiation. The detector itself does not emit any energy but passively receives it. The passive infrared sensor does not radiate energy to space. It receives the infrared radiation from the human body to make an alarm. Any object with temperature is constantly radiating infrared rays to the outside world. The surface temperature of the human body is between 36° C - 27 ° C and most of its radiant energy concentrated in the wavelength range of 8 um-12 um

3.4.3 DTH 11 Sensor

The DHT11 detects water vapor by measuring the electrical resistance between two electrodes. The humidity sensing component is a moisture holding substrate with electrodes applied to the surface. When water vapor is absorbed by the substrate, ions are released by the substrate which increases the conductivity between the electrodes. The change in resistance between the two electrodes is proportional to the relative humidity. Higher relative humidity decreases the resistance between the electrodes, while lower relative humidity increases the resistance between the electrodes.

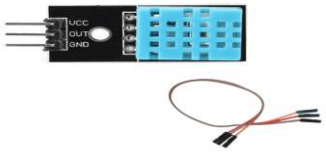

Fig6 DTH 11Sensor

IV HARDWAREIMPLEMENTATION

A model house is built for the home automation system. Fan will turn on when the room temperature exceeds the threshold value.MQ-6gas sensor used todetect any gas leakage, if anyleakage is detected the alarm turn on. Relay is used to switch the electrical appliances like light, fan etc. The Intel Galileo is placed in store room or garage. The Intel Galileo is connected with Wi-Fi card with the antennas for the connectivity with internet.

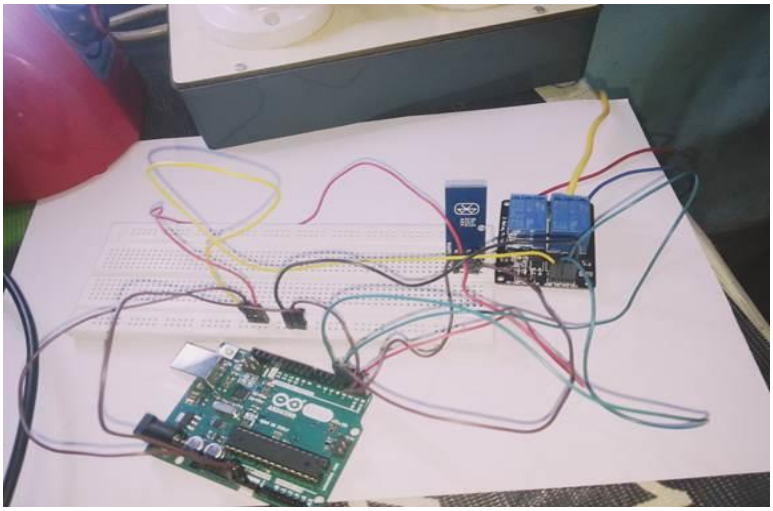

Fig 7Hardware Implementation

V CONCLUSION

A Smart Home system integrates electrical devices in a house with each other. The techniques which are going to use in home automation include those in building automation as well as the control of domestic activities, such as TV, fan, electric tubes, refrigerator and washing machine. After studying and understanding literature survey and other existing works, we proposed a Novel technique that will gives us better understanding of the Environmental conditions in home. Our system not only just monitors environmental conditions but it acts according to inhabitant requirement. In this paper we are planning to eliminate most of the human interaction by providing intelligent system. Development of such Smart Home achieve by using Internet of Things technologies. By using these system we can actually manage to make low cost, flexible smart homes to adjust its environmental conditions and resolve its errors with energy saving.

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