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Home Automation using PIR and Voice Recognition Sensors

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Abstract: *The aim of the project is to use PIR & VOICE sensors for home automation. This project shows the design and implementation concepts for home automation systems based basically on sensors (i.e; PIR & VOICE). In this project, we have studied about all technologies which are used for implementation of home automation. In this dissertation, PIR & VOICE sensors are the crucial part. Here, we have used PIR (Passive infrared) sensor to detect the presence of person within certain range, it is designed to cover a wide area this sensor rather than emitting light such as from LED's, detects the amount of change in infrared rays that occurs, when a person whose temperature is different from surrounding, moves. This dissertation is made so that electricity will be saved to some extent by using Arduino microcontroller. Thus in quickly the main desire of our free ride is to save electricity, time and maintain in functioning of classroom system smoothly.*

Keywords: *PIR Sensor, Voice Sensor, Arduino, Automation, Relay.*

I. INTRODUCTION

Home automated are developed to make life more relaxed for people as well as easier. Equipment and other electric powered gadgets, such as program, home appliances and lighting are all instantly control and people do not have a hand in it. It helps the market operate more effectively. Home automated techniques can be cost effective because there are a wide range of price levels & it does not just have to be aspect of a high community lifestyle. A home automated program allows the houses heat range be managed as well as instantly managed in each rooms. Now, with home automated, lifestyle can be made better and special because it is possible to do things many may have believed was just a desire. This can be a way to preserve our time and be beneficial. The aim of the project is to use PIR & VOICE sensors for home automation. This project shows the design and implementation concepts for home automation systems based basically on sensors (i.e; PIR & VOICE). Thus, the main desire of our free ride is to save electricity, time and maintain in functioning of home appliances smoothly [1].

II. MODEL / COMPONENTS DESCRIPTION

A. PIR Sensor

PIR stands for Passive Infrared detector or sensor. It receives change in thermal energy to determine change in motion of an object or person. It is an electronic sensor that measures infrared light radiating from objects in its viewing field. It generates energy based on observed heat surrounding it. Basically, it is a human sensing device, mostly used in PIR-based motion detectors [3]. Here, the term passive refers to the fact that these devices work entirely by detecting infrared radiation emitted by or reflected from objects. When human or anybody comes nearby, it receives more thermal energy as compared to normal condition.

They don't detect or measure heat.. We can split the PIR sensor internally into two halves, one half acts as a positive one and the other will be considered as a negative one. Thus, one half generates one signal by detecting the motion of a hot body and other half generates another signal. The output signal is generated by finding the differences in between these signals. Normally, this sensor consists of Fresnel lens which are bifurcated to detect the infrared radiation produced by the motion of hot body over a wide range or specific area [2].

If once the sensor gets warmed up, then the output remains low until it detects motion. If once it detects the motion, then the output goes high for a couple of seconds and then returns to a normal state or low [3].

This sensor requires settling time, which is characteristically in the range of 10 to 60 seconds. Generally, the PIR sensor power is up to 5V, but, the large size PIR modules operate a relay instead of direct output. It is very simple and easy to interface the sensor with a microcontroller. The output of the PIR is (usually digital output) either low or high. The PIR sensor circuit consists of three pins, power supply pin, output signal pin, and ground pin..

B. Voice Sensor

Voice Activity Detection (VAD) also known as speech activity detection or speech detection, is a technique used in speech processing in which the presence or absence of human speech is detected, which was first investigated for use on Time Assignment Speech Interpolation (TASI) systems. The main uses of VAD are in speech coding and speech recognition.



Fig.2 Voice recognition sensor

C. 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. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit [5]. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

D. Arduino uno

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. The ATmega328 has 32 KB (with 0.5 KB used for the bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library). The Uno has 6 analog inputs, labeled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values).

III. NOVEL BLOCK DIAGRAM & ITS DESCRIPTION

A. Earlier Block Diagram

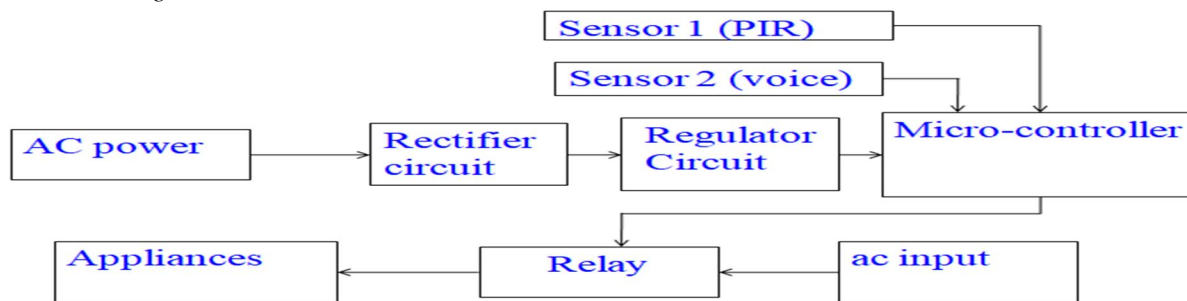


Fig.3: Block diagram of home automation using PIR & voice sensors

The block diagram of home automation using PIR & voice sensor is shown in fig.8. It consists of a rectifier circuit which is a device that converts an ac power into dc one. It is then passed through a regulator circuit which is an electronic circuit that provides a stable (constant) dc voltage independent of the load current, temperature and ac line voltage variations. The output of the regulator circuit

is then passed through the Micro-controller which is a device that contains one or more CPUs along with the memory & programmable input–output peripherals. Here, relay which is an electrically operated switch that control one electrical circuit by opening & closing contacts in another circuit, has been used. The sensors (i.e; the PIR and the voice) are connected with the micro-controller which is used to detect events or changes in its environment & send the information to the relay, along with an ac input, which is then connected with the appliances through which output has to be received.

B. Our modified Block Diagram

The block diagram of home automation using PIR & voice sensor is shown in fig.9. It consists of a Micro-controller ckt.(which is a device that contains one or more CPUs along with the memory & programmable input–output peri-pherals), including the rectifier and the regulator circuit Within it. Here, a relay has been used for controlling of the circuit . The sensors (i.e; the PIR and the voice) are connected with the micro-controller which is used to detect events or changes in its environment & send the information to the relay, along with an ac input, which is then connected with the appliances through which output has to be received.

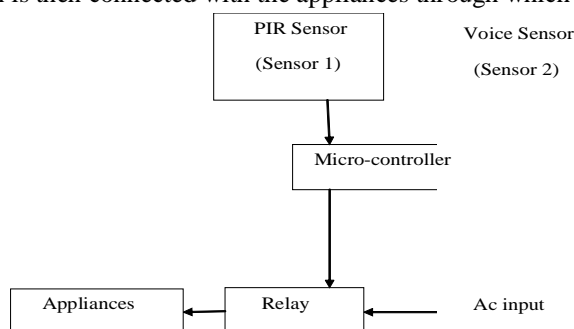


Fig.4 Modified block diagram of a home automation using PIR & Voice sensors

IV. FINAL PROJECT HARDWARE

Fig.5 shown in below is our project hardware which consist arduino uno, four channel relay board, PIR motion sensor & voice recognition sensor. We have used following library (1) #include <SoftwareSerial.h> & (2)#include "VoiceRecognitionV3.h" to complete our project.

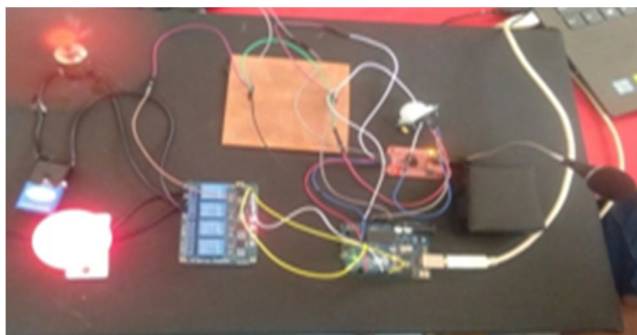


Fig.5: Automation of a fan and a bulb using PIR & Voice recognition sensor

V. RESULT, CONCLUSION & FUTURE SCOPE

Our proposed design is very useful in everywhere like offices, homes, schools, colleges, companies, shopping malls, and many other places. This system requires very low power consumption and has various advantages. As we know that, a PIR sensor can operate within a range of (7-10) meters, it can have various applications such as it can be used as motion tracking system, can be useful even at night times.

VI. ACKNOWLEDGEMENT

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