

Smart Automation System

Dr. U.M Gokhale

ETC Department

GHRIET, Nagpur

Anku Singh

ETC Department

GHRIET, Nagpur

Rituja nakade

ETC Department

GHRIET, Nagpur

Babli Sasaharkar

ETC Department

GHRIET, Nagpur

Deepa Singh

ETC Department

GHRIET, Nagpur

Ulahaskumar.gokhale@raisoni.net ak09133@gmail.com

Abstract-The future of electronics is going to be smart automation. Automation is a growing technology. Modern homes are becoming Smart Homes. These homes are progressively shifting from conventional switches to a centralized control system. At present, conventional wall switches located in different parts of the house make it difficult for the user to go near them to operate. The main concept of smart automation is to make automatic controlling of appliances which saves electricity. System is integrated uses AVR based microcontroller which is the brain of computer.

Keywords — Microcontroller, Smart Home Automation.

I. INTRODUCTION

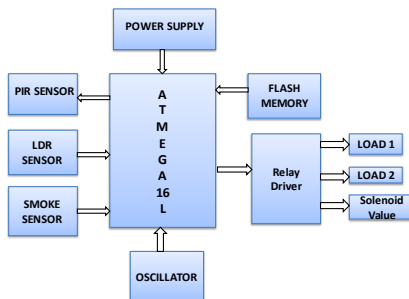
Homes of the 21st century will become more self-controlled and automated due to the comfort it provides, especially when employed in a private home. A home automation system is a means that allow users to control electric appliances of different kind. Many existing well-established home automation systems are based on wired communication. This does not pose a problem until the system is well planned in advance and installed during the physical construction of the building. It aims for reducing the wastage of electricity, comfortable home appliance control. With advancement of Automation technology, life will get more simpler and easier in all aspects. In today's world Automatic systems are being preferred over manual system.

Home automation is meant to provide the capability to control as well as monitor various household activities. These may include lighting, heating and air conditioning, security locks on the doors, multimedia and various appliances. A home automation system can have varying degree of intelligence and complexity. Automation of home is adopted not only to provide ease, convenience and comfort to user but also to minimize the energy waste and provide home security. An ideal home automation system must have the capability to sense its environment, process and act with minimal supervision. It is reliable, secure, user-friendly and cost effective. The home automation technology is witnessing remarkable growth and popularity over the past decades. In modern homes, various routine tasks have been automated for

the benefit of the user. A simple example would be micro wave ovens and automatic washing machines, which were introduced to reduce the manual labor. The home automation systems are not only limited to lighting, HVAC and security systems, but have also evolved into fire detection systems, entertainment systems and energy management systems. Currently, there exist various home automation technologies. The DTMF (Dual Tone Multiple Frequency) technology uses DTMF tone which is generated by pressing a mobile phone keypad to control devices. The main disadvantage of this approach is that the user will have to remember which key to press for each appliance he wants to control. The tasks of a modern security system include identifying an intruder trying to gain access to the home, alerting the owner of the home about the intrusion or the attempt of intrusion, preventing the intruder from accessing the home, and collecting evidences regarding the intrusion so that the perpetrators can be brought to justice. The advancement of technology is contributing to the changing concept of security in modern homes. It has changed from simple lock and key security to implementing sophisticated security systems by using cameras, microphones, contact sensors, proximity sensors, alarms, silent alarms etc. By connecting modern homes to the Internet users can access and control their homes remotely at any point of time and from anywhere in the world. An increase in processing power of newly designed processors and the considerable reduction in power consumption, cost, and size of new electronics devices is enabling people to know and control every aspect of their home, for example which door or window is open, which device or light is switched on, and which rooms are occupied. Inhabitants can keep an eye on their homes using live video and audio feeds from different parts of their homes. They can also be able to get information regarding different environmental factors inside and outside their homes, like humidity, temperature, and light intensity. In a Wireless Sensor Actor Network, The sensor gathers the information about the physical world or environment around them. The Actors performs the appropriate actions on the environment which is directed by the users or any other party. Improvements in Wireless Sensor Actor Networks is certainly a highly contributing factor in the popularity of smart homes. Combining Ubiquitous Computing, Wireless Sensor Actor Networks and the popularity of Internet has made designers,

engineers, and researchers to come up with different efficient methods to allow home inhabitants to access and control each and every part aspect of their home, including the environment.

II. PROPOSED WORK



Fig(1). Block diagram of Smart automation system using AVR ATMEGA -16 microcontroller.

This system consists of LDR, SMOKE and PIR sensors as input devices. While the Relay driver and flash memory are connected on the output side. The PIR sensor detects the presence of a Person, if no person is detected then solenoid value is off. LDR is used to detect the intensity of light. If the light intensity is low then it automatically switch on the light. SMOKE sensor detects the presence of smoke, if the smoke is detected it will performed following condition.

- A. then buzzer will produce beep sound which help to make necessary action.
- B. The Smart automation is an intelligent system which is ready to work 24/7.

Light Sensor:

A LDR (light dependent resistor) is a light sensor to measure the ambient light levels and input them to the MCU. An LDR is a sensor which is light controlled variable resistor. It exhibits photoconductivity. The resistance value of a LDR increases with decrease in incident light intensity levels and vice-versa. This light detector is ideal for lighting automation.

Smoke Sensor:

A smoke detector is a device that detects the presence of smoke, mainly as an indicator of fire. Commercial security devices issues a signal to fire alarm control panel as a part of a fire alarm system, while household smoke detectors which is also known as smoke alarms, generally issues a locally audible or visual alarm from the detector itself.

Smoke detectors are kept in plastic enclosures, typically shaped like a disk of about 150 millimeters (6 in) in diameter and 25 millimetres (1 in) thick, but shapes and sizes varies. Smoke is detected either optically (photoelectric) or by physical process (ionization), detectors may use any or both of the methods. Sensitive alarms can be used to detect, and thus determines any smoking in areas where smoking is banned. Smoke detectors in large commercial, industrial, and residential buildings are generally powered by a central fire alarm system which is powered by the power of the building with a battery backup. Domestic smoke detectors ranges from individual battery-powered units, to several interlinked mains-powered units with battery backups. If any unit detects smoke all triggers even in the absence of electricity

Micro-Controller:



A microcontroller is used to act as the brain of the home automation system. A microcontroller is a highly integrated chip on which all the peripherals like CPU, counters, timers, ROM, RAM, registers, I/O pins, clock circuit, etc. are built. Therefore, the microcontroller is a combination of microprocessors and peripherals. Microcontrollers are small and very powerful and are used in different embedded applications for performing specific tasks. In the smart home automation system, one ATmega8A microcontroller is used. It belongs to Atmel's family of microcontrollers. Atmel AVR microcontrollers provide flexibility in terms of designs and no other microcontroller provides better power efficiency than the AVR family. The mega AVR device family provides a good amount of memory with inbuilt peripherals and is suitable for general purpose applications. Some of the features of the 8-bit AVR microcontroller ATmega 16 are: 8K Bytes in System Self-programmable Flash memory, 512 Bytes EEPROM, 1K Byte internal SRAM, 23 programmable I/O lines, Advanced RISC Architecture.



Smoke Detector

This smoke and flammable gas sensor detects the concentration of combustible gas in the air and outputs its measure as an analog voltage. This sensor can measure concentrations of flammable gas of 300 to 10,000. Ppm. The sensor can operate at temperatures varying from -20 to 50°C and consumes less than 150 mA at 5 V.

Connecting five volts across the heating pins keeps the sensor hot enough to function correctly. Connecting five volts at either of the A or B pins causes the sensor to emit an analog voltage on the other pins. A resistive load between the output pins and ground sets the sensitivity of the detector. The resistive load should be calibrated for your particular application using the equations in the datasheet, but a good starting value for the resistor is 20 kΩ.

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Relay

A relay is a simple electromechanical switch which is made up of an electromagnet and a set of contacts. Relays are generally found hidden in most of devices. In fact, some of the first generation computers ever built used relays to implement Boolean gates.

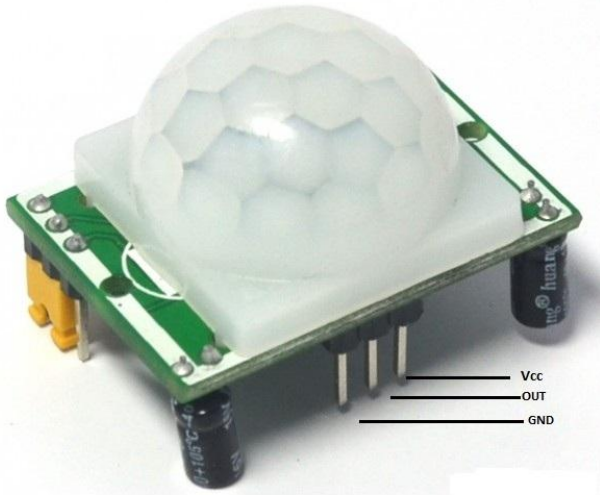
Relays are amazingly simple devices consisting of four parts in every relay. They are Electromagnet, Armature that can be attracted by the electromagnet, spring, Set of electrical contacts.

In general, the main point of a relay is to use a small amount of power in the electromagnet from a very small dashboard switch or a low power electronic circuit to move the armature that is able to switch a much larger amount of power. For example, you may want the electromagnet to energize using 5 volts 50 milliamps (250 milliwatts), while the armature can support 120V AC at 2 amps (240 watts).

Relays are quite common in home appliances where there is an electronic control turning on something for example, a motor or a light. They are also common in cars, where the 12V supply voltage means that just about everything needs a large amount of current. In later model cars, manufacturers started combining relay panels into the fuse box to make the maintenance easier. For example, the six gray boxes in this photo of a Ford Windstar fuse box are all relays.

PIR Sensor

PIR Sensor - (Motion Sensor or Motion Detector)



A passive infrared sensor (PIR sensor) is an electronic sensor which measures infrared (IR) light radiating from objects in the field of view. They are most often used in PIR-based motion detectors. All objects with a temperature above absolute zero emits heat energy in the form of radiation. Usually this radiation is not visible to the human eye because it radiates at wavelengths in infrared region, but it can be detected by electronic devices designed for such a purpose.

III. Discussions

Limitations of system and Future Scope

The proposed system uses only three sensors for detection of light, smoke and persons, other sensors can be added for sensing temperature, humidity etc. The use of wireless technologies such as Bluetooth can be done to avoid the wiring cost. With the use of wireless technologies devices such as smartphones and tablets may be used for monitoring and controlling remotely.

IV. Conclusion

The proposed system works on the Automation technology, which is a modern technique now days. Smart homes are

progressively shifting from conventional switches to a centralized control system. The main concept of smart automation is to make automatic controlling of appliances. The system is energy efficient which helps in contributing to the society by saving electricity.

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