HOME AUTOMATION SYSTEM USING IR SENSORS

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ABSTRACT

This paper proposes a system for automation of appliances which will be operated using sensors and micro controllers. We have used sensor network and one central control section. The network is connected with IR Sensors and relays. Sensors will be in communication with micro controller. Whenever a person enters into a Particular zone, his presence will be detected by IR Sensor and it will send this information to controller. Controller after receiving information from particular sensor, it sends signal to particular relay there then after the appliance will turn on/off due to presence /absence of person. The feasibility of the model is verified in the demo kit.

KEYWORDS: Micro Controller, LED, Sensors

INTRODUCTION

Employment to Population ratio has increased drastically with increasing living standards. Home Automation plays an important role in maintaining these living standards of employed population by providing a secure & convenient environment. Home automation is similar to smart home, digital home, e-home and intelligent household. They both mean a high living condition with many smart devices. It is the residential extension of building automation which is using automation technology, computer technology and telecommunication technology to give the user a developed living condition, entertainment and security. It helps people to reduce house working and household management by its automation. The Home Automation Systems not only benefit the employed population but it also helps the disabled and elderly population. The aim of our system is to build a perfect companion for someone to be at home. [2]

The concept of "automation" has existed for many years. It began with a student connecting two electric wires to the hands of an alarm clock in order to close a circuit of a battery andlight bulb. Later, companies developed automated systems of their own to control alarms, sensors, actuators and video cameras and, in so doing, created the first automated buildings. The term "intelligent home" followed. [3]

Home automation systems are developed in recent years that make use of emerging technologies for the development. Home automation has become a one of the upcoming field that introduces many technologies for making the automation easy and with good performance. Most of the systems make use of a web server and mobile communication for controlling the home appliances. [4]

The vision of the system is to provide an efficient internet based system to control everyday home appliances. The system offers users an easy & effective means of controlling their various home appliances from a remote location i.e. without physically being present at home. The system makes use of the internet to enable remote access to the various home appliances. Apart from merely turning the appliances ON & OFF, the scope of the system can be extended to regulate their output power & set their usage time. [1]

METHODOLOGY

The model works as a visitor counter and hence by the home automation using a microcontroller is a reliable circuit that takes over the task of controlling the room lights as well as counting number of persons/visitors in the room very accurately. When somebody enters the room the sensors at the one end are programmed in such a way that on consecutive operation of two LED complies micro-controller to count as a person to be entering the room. This information can be further used to manipulate the operation of electronic appliances automatically. When the display shows a zero then all the appliances will be signaled to turn off, this helps in the energy efficient housing system. Moreover, the number of persons inside the big halls, malls can be easily identified.

The microcontroller does the above job. It receives the signal from the sensors, and this signal is operated under the control of the software which is stored in the ROM. Microcontroller continuously monitors the infrared receivers. When any object pass through the IR Receiver's then the IR Rays falling on the receiver are obstructed, this obstruction is sensed by the Microcontroller.
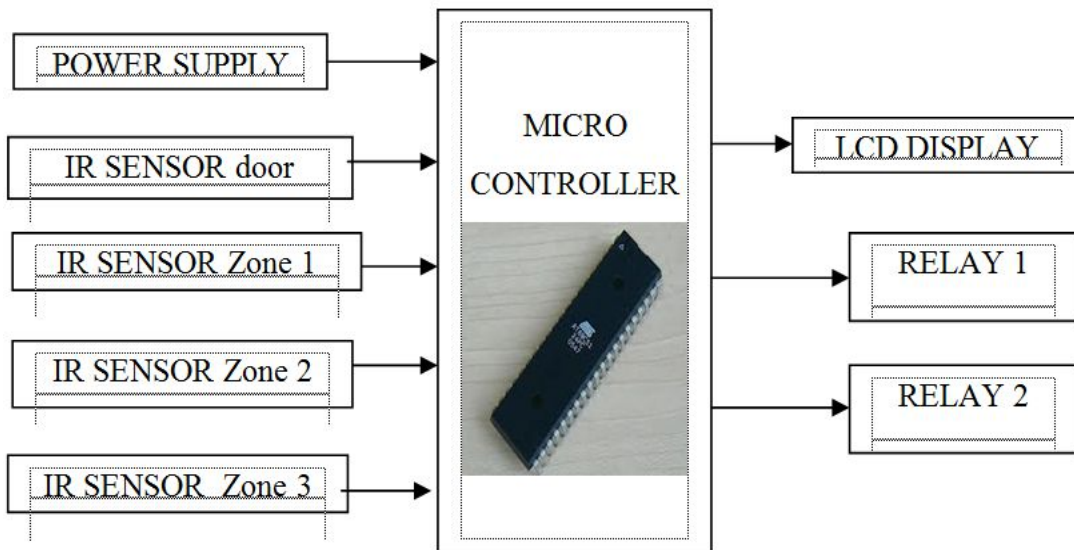
BLOCK DIAGRAM:

Figure 1: Block Diagram of Home Automation Using IR Sensor
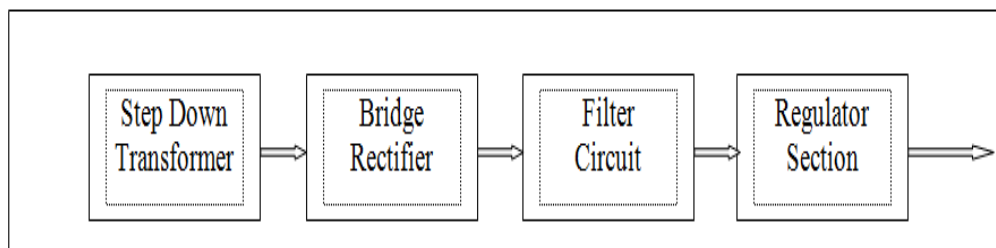
Components

- **Power Supply:**

Figure 2: Block Diagram of Power Supply
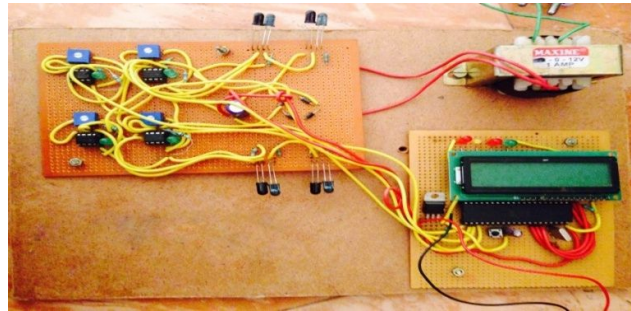
- **Home Automation Model:**

Figure 3: Pictorial Representation of the Home Automation Model

- **Microcontroller / Arduino Board:**

Features:

Figure 4: AT89S52 Microcontroller

Compatible with MCS®-51 Products, 8K Bytes of In-System Programmable (ISP) Flash Memory – Endurance: 10,000 Write/Erase Cycles,4.0V to 5.5V Operating Range, Fully Static Operation: 0 Hz to 33 MHz, Three-level Program Memory Lock,256 x 8-bit Internal RAM,32 Programmable I/O Lines, Three 16-bit Timer/Counters, Eight Interrupt Sources, Full Duplex UART Serial Channel, Low-power Idle and Power-down Modes, interrupt Recovery from Power-down Mode, Watchdog Timer, Dual Data Pointer, Power-off Flag, Fast Programming Time, Flexible ISP Programming (Byte and Page Mode),Green (Pb/Halide-free) Packaging Option

Description:

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes on-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications. The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two

software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset.
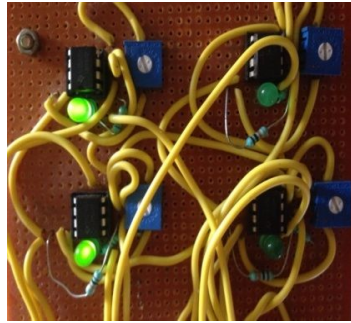
- **Relays**

Figure 5: Relays

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 low-power signal (with complete electrical isolation between control and controlled circuits), 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. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called "protective relays".
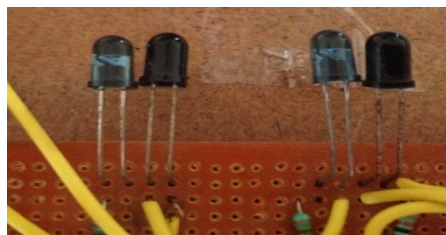

Figure 6: IR Sensors

- **Sensors**

Features

Long range, Low cost, PLL-synthesized architecture, Direct serial interface, Data rates up to 10,000bps, No external RF components required, Low power consumption, Low supply voltage (2.1 to 3.6VDC), Compact surface-mount package, Wide temperature range, Power-down function, No production tuning

Applications

Remote control, Keyless entry, Garage/gate openers, Lighting control, Medical monitoring/call systems, Remote industrial monitoring, Periodic data transfer.
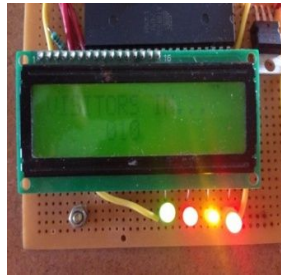
- **LCD Display (2x16):**

Features:

Figure 7: LCD Display(2X16)

High contrast LCD supertwist display, EA DIP162-DNLED: yellow/green with LED backlight, EA DIP162-DN3LW AND DIP162J-DN3LW with white LED b/l, low power, INCL. HD 44780 or compatible controller, Interface for 4- and 8-bit data bus, Power supply +5v or ±2.7v or ±3.3v,Operating temperature 0~+50°c,LED backlight Y/G max. 150mA@+25°C,LED backlight white max. 45mA@+25°C, some more modules with same mechanic and same pin out: DOTMATRIX 1x8, 4x20 -GRAPHIC 122x32, No screws required: solder on in PCB only, Detachable via 9-pin socket EA B200-9 (2 pcs. required).

Figure 8: Step Down Transformer

- **Step Down Transformer**

The working principle of Transformer is very simple. It depends upon Faraday's law of electromagnetic induction. Actually, mutual induction between two or more winding is responsible for transformation action in an Electrical Transformer. According to faradays law of electromagnetic induction, "Rate of change of flux linkage with respect to time is directly proportional to the induced EMF in a conductor or coil**".**

Transformers are rated in Volt-amperes (VA), or in larger units of Kilo Volt Amperes (kVA). 12-0-12 means that the voltage or the potential difference between each of the end terminals of the secondary winding and the mid-point of the secondary winding of the Transformer is 12V. And, between the two ends of the secondary winding, we will get 12 + 12 = 24V. 1A means the current delivery capability of the secondary winding of the Transformer. Normally it is said in VA. It would be 25 x 1 = 25VA. The ratings are based on the requirements of the loads that are to be connected to the

Transformer.

- **Bread Board**

A breadboard is a construction base for prototyping of electronics. Originally it was literally a bread board, a polished piece of wood used for slicing bread. In the 1970s the solder less breadboard (AKA plug board, a terminal array board) became available and nowadays the term "breadboard" is commonly used to refer to these. "Breadboard" is also a synonym for "prototype".
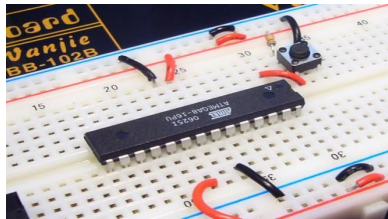

Figure 9: Bread Board

Because the solder less breadboard does not require soldering, it is reusable. This makes it easy to use for creating temporary prototypes and experimenting with circuit design. For this reason, solder less breadboards are also extremely popular with students and in technological education. Older breadboard types did not have this property. A strip board and similar prototyping printed circuit boards, which are used to build semi-permanent soldered prototypes or one-offs, cannot easily be reused. A variety of electronic systems may be prototyped by using breadboards, from small analog and digital circuits to complete central processing units (CPUs).

- **Wires:**

A wire is a single, usually cylindrical, flexible strand or rod of metal. Wires are used to bear mechanical loads or electricity and telecommunications signals. Wire is commonly formed by drawing the metal through a hole in a die or draw plate. Wire gauges come in various standard sizes, as expressed in terms of a gauge number. The term wire is also used more loosely to refer to a bundle of such strands, as in 'multistranded wire', which is more correctly termed a wire rope in mechanics, or a cable in electricity.

Figure 10: Connecting Wires

Wire comes in solid core, stranded, or braided forms. Although usually circular in cross-section, wire can be made in square, hexagonal, flattened rectangular or other cross-sections, either for decorative purposes, or for technical purposes such as high-efficiency voice coilsin loudspeakers. Edge-wound coil springs, such as the Slinky toy, are made of special flattened wire.

CONCLUSIONS AND FUTURE SCOPE:

The system for the "Home Automation Network" has a vast scope & almost limitless applications in today's technology driven market. The system can be made efficient by modularizing each and every component of the system hence ensuring that it can be integrated with a varied range of devices. The basic vision of the system is to provide a

convenient & secure system to the user, which would aid the high degree of mobility & control we aim to achieve nowadays. ''

The future work for Intelligent Home System can be porting the system to the cloud so that any device eventually could be used to control and monitor the Intelligent Home System remotely over cloud.

As for recommendation, there are few suggestions that can be considered for further research to improve this paper: The monitoring part not only limited to the ON/ OFF the home appliances only. Motion sensor may add for automatic lighting and turning ON the fans in the area where user were there. Schedule may add to enable user to set the ON/ OFF timer for home appliances.

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