DEVELOPMENT OF MILITARY RADAR USING IR SENSOR

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ABSTRACT

This is a very interesting project with many practical applications in security and alarm systems for military, homes, shops and cars. It consists of a set of IR receiver and transmitter. When something moves in the area covered by the circuit the circuit's fine balance is disturbed and the alarm is triggered. The circuit is very sensitive and can be adjusted to reset itself automatically or to stay triggered till it is reset manually after an alarm.

Keywords: LCD Interfacing, Microcontroller, IR Sensor, MotorDriver, Stepper Motor Buzzer,

I .INTRODUCTION

An airport or an army base used to have huge structures that could send out signals to find out if any aircraft were approaching. Transducers are used in this type of radar. A rangefinder emits a brief pulse of high that produces reflection when it hits an object. This reflection returns to the emitter and depending upon the intensity of the reflection received object presence or absence is detected. The finder is composed of two different parts. The transmitter that emits an IR then waits for the reflection to return and detects it. A stepper motor rotates the transducer to get a 360 degree field of view. There are several ways to measure echo without contact. One way is to use IR light transmission intensity measurement. The stepper motor is used to rotate the radar so it can scan 360 degrees around the room. An ordinary DC motor would not do for such a project

II.CIRCUIT DIAGRAMS

A. LCD INTERFACING

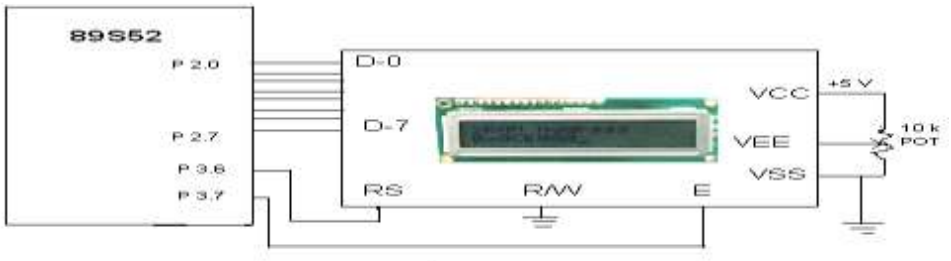


Fig. 1Circuit Diagram of LCD Interfacing

B. 8051 MICROCONTROLLER

A microcontroller is a single chip that contains the processor (the CPU), non-volatile memory for the program

(ROM or flash), volatile memory for input and output (RAM), a clock and an I/O control unit. Also called a "computer on a chip," billions of microcontroller units (MCUs) are embedded each year in a myriad of products from toys to appliances to automobiles.

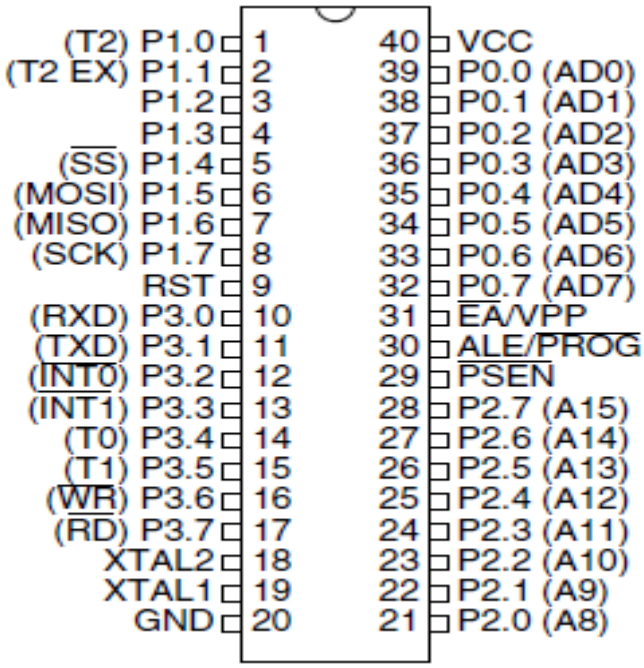


Fig.2Pin Diagram of Microcontroller

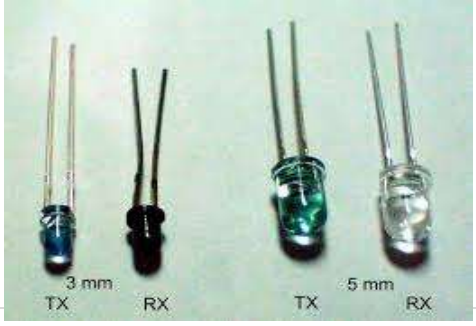
This unit is the brain of the system. This is responsible for the full control of the system. The microcontroller used here is a common 8 bit Atmel microcontroller AT89s8253.It is a low-power, high-performance CMOS 8-bit microcontroller with12K bytes of In-System Programmable (ISP) Flash program memory and 2K bytes of EEPROM data memory. It has 32 programmable input output lines.

Features:

- 12K Bytes of In-System Programmable (ISP) Flash Program Memory
- SPI Serial Interface for Program Downloading
- Endurance: 10,000 Write/Erase Cycles
- 2K Bytes EEPROM Data Memory.

C.IR SENSOR

This sensor is capable of detecting the object on the proper sensitivity calibration one of the drawbacks of this sensor is that it detects the IR of the sun also. So applications with this sensor have to be used ignoring sunlight. To remove this drawback we can use TSOP1738, MOC3041 but they receive the IR intensity at particular frequency only. So the transmitter should transmit at that particular frequency.



D.Motor Driver

Used to drive the DC motors as directed by the microcontroller. This is the OUTPUT block. Here we used L293D to drive the motors .whatever signals it receives from the microcontroller on the basis of that it will drive the motors.An H-bridge is an electronic circuit which enables a voltage to be applied across a load in either direction. These circuits are often used in robotics and other applications to allow DC motors to run forwards and backwards. H-bridges are available as integrated circuits, or can be built from discrete components.

E. Stepper Motor

A stepper motor (or step motor) is a brushless DC electric motor that divides a full rotation into a number of equal steps. The motor's position can then be commanded to move and hold at one of these steps without any feedback sensor (an open-loop controller), as long as the motor is carefully sized to the application.

F. Power Supply Block

The power supply consists of a step down transformer 230/12V, which steps down the voltage to 12V AC. This is converted to DC using a Bridge rectifier. The ripples are removed using a capacitive filter and it is then regulated to +5V using a voltage regulator 7805 which is required for the operation of the microcontroller and other components.

III. CONSTRUCTION & WORKING

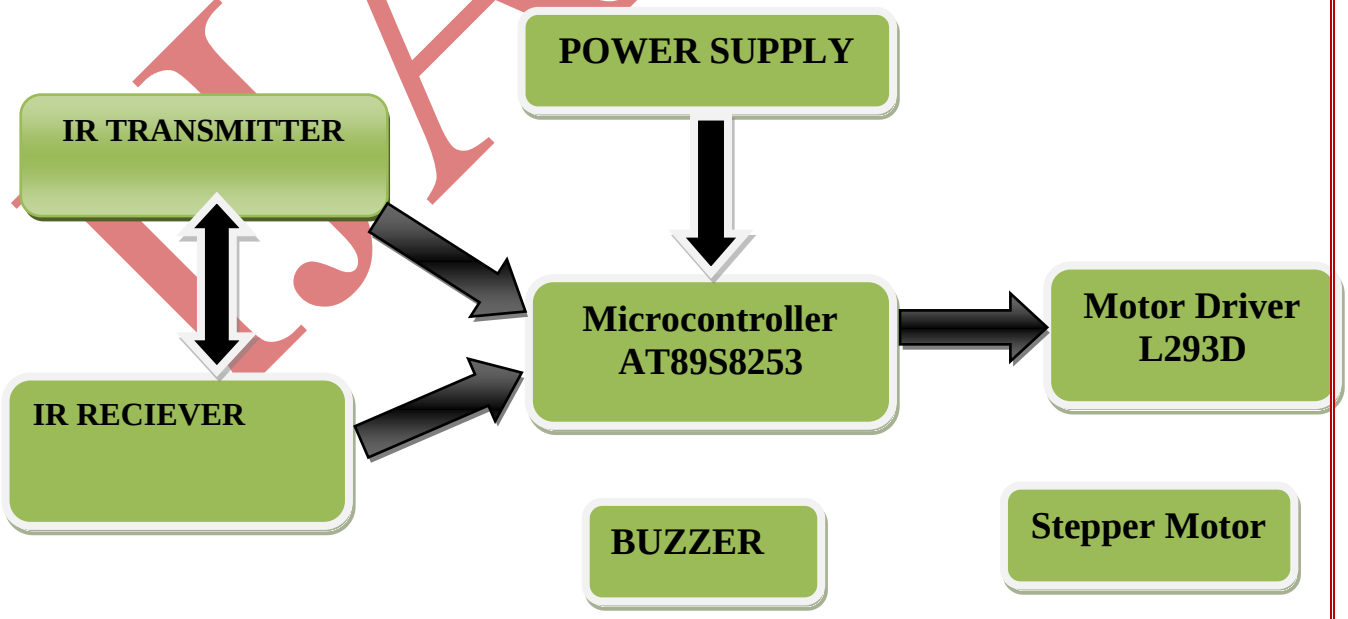


Fig. 4Circuit Diagram of project

In this project we used an IR sensor which senses for the unwanted object and as soon as it got something it sends the signals to the microcontroller in response on which further execution take place. The alarm is activated as soon as object is detected. There is LCD to display and stepper motor to rotate.

Input Section:

- IR based sensing unit: The sensor is capable of detecting object
- ADC via OPAMP: This unit will be used to convert then analog variation of sensor voltage into digital 1/0 comparing with a threshold. The IC used is LM358 .This unit is needed since processing unit is digital in nature.

Processing Section:

Microcontroller: Programmed by the user to monitor the input and generate proper output for the output unit. In general this is the brain of the system.

Output Section:Motor Driver: IC L293D will be used which can drive the motor to provide proper voltage and current. It will control the stepper motor

- Stepper Motor: Unipolar 6 wire stepper motor will run to rotate the sensing unit
- 16x2 LCD: Used as display device for required data.
- Buzzer system: This will generate the alarm in case of object detection

IV. APPLICATIONS

- Military detection system
- Monitoring and surveillance system
- Intruder detection unit

V. FUTURE SCOPE

It can be enhance the military as well as civil application. It is also very widely used in radar technology. This is a very interesting with many practical applications in security and alarm systems for military, homes, shops and cars**.**

VI.CONCLUSION

Transducers are used in this type of radar. A rangefinder emits a brief pulse of high that produces reflection when it hits an object. This reflection returns to the emitter and depending upon the intensity of the reflection received object presence or absence is detected. The finder is composed of two different parts. The transmitter that emits an IR then waits for the reflection to return and detects it. A stepper motor rotates the transducer to get a 360 degree field of view.

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