# ROBOTICS AND EMBEDDED SYSTEM

Nidhi Chauhan, Md. Shahrukh Khan
*Dronacharya College Of Engineering*

***Abstract*- In this paper we have tried to put our focus on embedded systems and robotics and we have discussed about various components in detail like sensors, motor and their interfacing with microcontroller ATMEGA 16.**

## I. INTRODUCTION

An embedded system is a computer system with a dedicated function within a larger mechanical or electrical system, often with real-time computing constraints. Embedded system is a scaled down computer system which is designed to perform a specific task or operation. Embedded system reduces human effort to a great extent. A single chip contains both hardware and software. such systems are limited in computational resources like memory, CPU processing speed, I/O facilities but are still capable of performing the task given to them efficiently. These systems interact with physical elements in our environment viz. controlling and driving a motor, sensing temperature etc

## II. EMBEDDED SYSTEMS IN DAILY LIFE

- Digital clock, traffic light, DVD player.

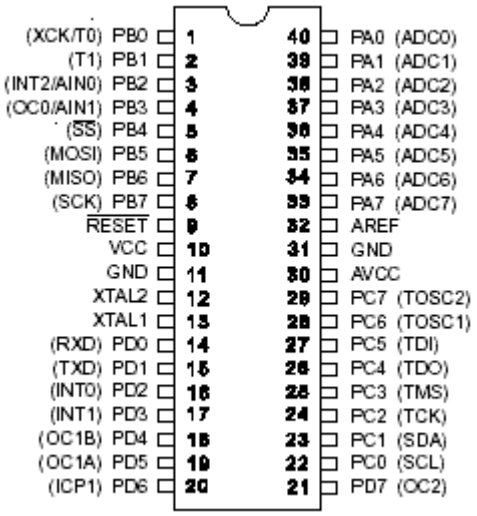
## III. MICROCONTROLLER

A Microcontroller is a programmable digital processor with necessary peripherals. Both microcontrollers and microprocessors are complex sequential digital circuits meant to carry out job according to the program.

**ATMEGA 16 MICROCONTROLLER**

Features of Atmega 16 are:

- 16 KB of flash memory.
- 1 KB of SRAM
- 512 Bytes of EEPROM
- Available in 40-Pin DIP
- 8-Channel 10-pin AD
- Two 8 bit Timers/counters
- One 16 bit Timer/counter
- 4 PWM Channels
- Serial USART
- Digital to Analog comparator

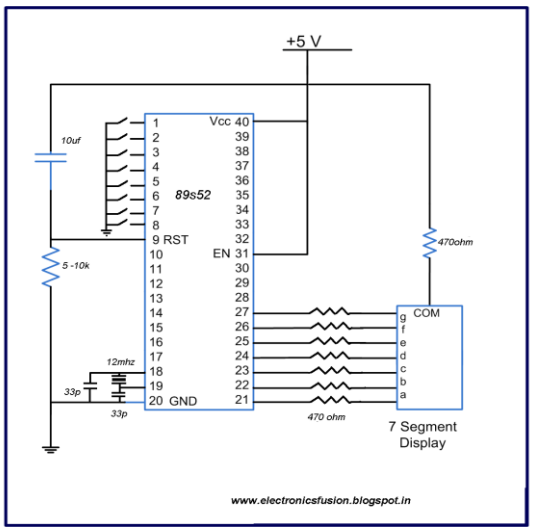



The software which support this hardware and can communicate with microcontroller using this circuit is AVR studio.

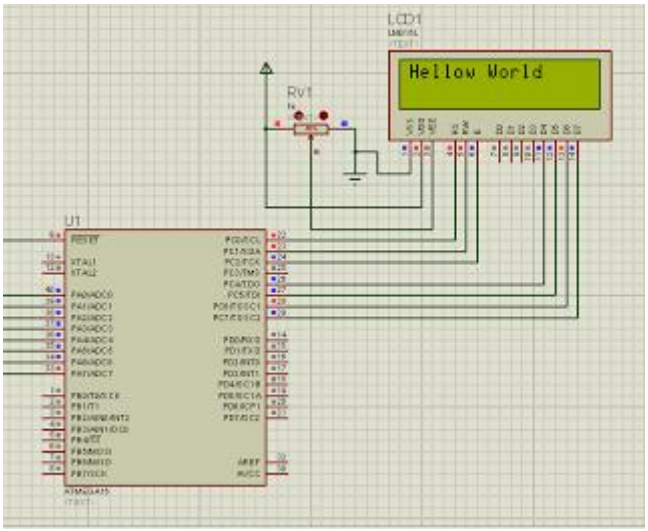
**ANALOG TO DIGITAL CONVERTERS:** Microcontroller understands only digital language. To convert the analog output from the sensors to digital we need ADC. In AVR family of microcontroller we have inbuilt ADC on PORTA. Each pin in PORTA has an ADC circuit connected behind it. Thus we have 8 channels of ADC. The resolution of ADC output is 10 bit i.e, the output from the ADC is any number between 0 to 1023.

**TIMERS IN ATMEGA 16:** In Atmega 16 we have 3 timers: TIMER0, TIMER1, TIMER2. Out of these TIMER0 and TIMER2 are of 8 bit timer, while TIMER1 is a 16 bit timer. All the TIMERS have three unique registers and two common registers. The TIMER1 has a special register called ICR(Input capture Register). It has two channels A and B. TIMER2 has a special register known as ASSR which is used to generate PWM using asynchronous clock.

**SEVEN SEGMENT DISPLAY INTERFACING:** A seven segment display can be used to display the decimal numbers 0-9 and some alpha characters. A seven segment display is simply a figure eight grouping of LEDs. SSDs are available in two configurations- Common Cathode and common anode



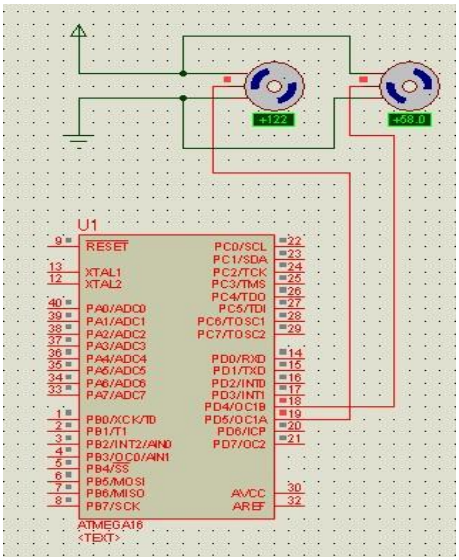

**SEVEN SEGMENT DISPLAY INTERFACING**




**LCD INTERFACING**

**LCD INTERFACING:** LCDs are all around us so liquid crystal displays are very useful in these days. It is a kind of display that is made up of a special matter state formed using liquid and crystal both, it's a forth state of matter. The most popular one is 16*2 LCD module. It has 16 coloumns and 2 coloumns.

**DC MOTOR INTERFACING:** The simplest DC rotating machine consists of a single loop of wire rotating about a fixed axis. The magnetic field is supplied by the North and south poles of magnet. We can reverse the motor direction by simply reversing the power supply connection of motor. It means motor is bipolar device. We are working with microcontroller and the maximum output current that it can provide is 20Ma. But our motor works on 1 Amp current so to remove this problem we will have to connect the motor driver IC L293D between the microcontroller and motor.

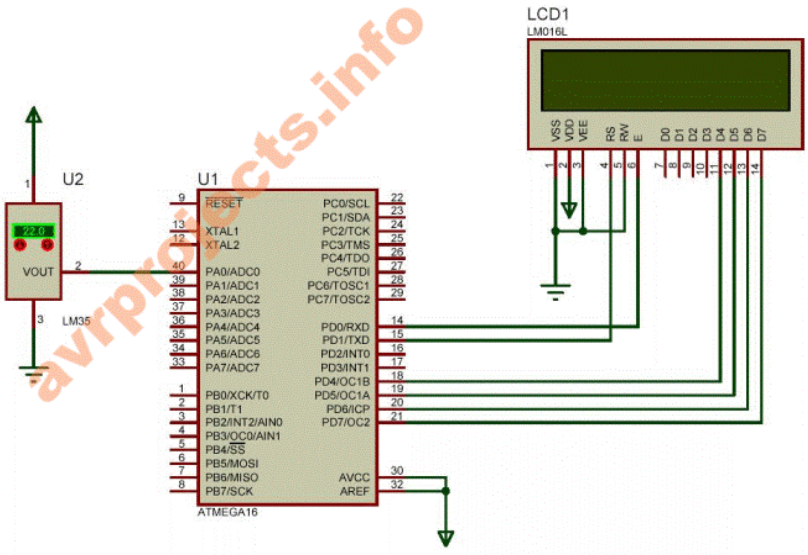



**MOTOR INTERFACING**

**IR SENSOR INTERFACING:** There are two part of the sensors: emitter and receiver. Emitter converts the electrical current in the Infra-Red radiation. Receiver receives the IR radiation when the radiation reflect back after the collision from the obstacle and then this IR radiation is converted into electrical current. It operates in two modes- Analog mode and Digital mode.

**LM 35 INTERFACING:**

LM 35 is a precision IC temperature sensor with its output proportional to the temperature. With LM35 temperature can be measured more accurately than with a thermistors. The operating range is -55degree Celsius to 150 degree Celsius.






## IV. CONCLUSION

In this paper we have discussed about embedded system and microcontroller. We have also discussed interfacing of various components with ATMEGA 16 microcontroller.

## REFERENCE

Wikipedia, Google, Project Report by Deepak kumar NIT Raipur .