AUTOMATIC SPEED CONTROL OF VEHICLES

A PROJECT REPORT

SUBMITTED BY:

MOHIT NIGAM

UNDER SUPERVISION OF

ASSISTANT PROF. MRS SHARMILA VERMA

In partial fulfillment for the award of the degree

Of

BACHELOR OF TECHNOLOGY

In

ELECTRONICS AND COMMUNICATION ENGINEERING

RAJ KUMAR GOEL INSTITUE OF TECHNOLOGY, GHAZIABAD

MAY 2015

CERTIFICATE

This is to certify that MOHIT KUMAR, ANURAG SINGH and MANISH SINGH of the final year B. Tech. (ECE) have carried out project work on **"AUTOMATIC SPEED CONTROL OF VEHICLES "** under the guidance of **Mrs. Sharmila verma** , Asst. Professor in ECE Department for the partial fulfillment of the award of the degree of Bachelor of Technology in Electronics & Communication Engineering in **RAJ KUMAR GOEL INSTITUTE OF TECHNLOGY , Ghaziabad** (Affiliated to U.P. Technical University, Lucknow) is a bonafide record of work done by them during the year 2011 – 2015.

SIGNATURE

HEAD OF DEPT.

PROF. DHEERENDRA KUMAR

SIGNATURE

SUPERVISIOR

MRS.SHARMILA VERMA

(ASSISTANT PROFFESOR)

ACKNOWLEDGEMENT

For the fulfillment of this task it was necessary to obtain proper guidance and right direction to work in to .Also the completion and submission depended on the people who successfully conducted their duties so that we can complete this task without facing unnecessary obstacles and difficulties. The completion of a task equally requires devotion and faith towards the project from the students and also their Mentor. So, we would like to thank our Guide **Mrs. Sharmila verma ,Asst. Professor(ECE),** for giving his time and support to us .

We are highly indebted to **Prof. Dheerendra Kumar, Head of Department (ECE)** for extending all necessary help during the work.

We would also like to thank **Prof. Ramendra Singh, Project Coordinator (ECE**) in particular for his precious and valuable time.

At last we would also like to appreciate the support and cooperation rendered to us by our close friends.

MOHIT NIGAM

ABSTRACT

Nowadays people are driving very fast, accidents are occurring frequently, we lost our valuable life by making small mistake while driving (school zone, hills area, and highways). So in order to avoid such kind of accidents and to alert the drivers and to control their vehicle speed in such kind of places the highway department have placed the signboards. But sometimes it may not be possible to view that kind of signboards and there is a chance for accident or driver don't slow the speed of their vehicles even after seeing the sign boards.

Accidents are occurring frequently in highly traffic areas .Drivers drive vigorously without caring the traffic. Intimation of driver about speed and accident prone zone is necessary. It can be done by using automatic technology with the help of embedded system and sensors. This project is focused on "automatic speed control of vehicles" by detecting the accident prone zone. The main objective is to design a Smart Display controller meant for Vehicle's speed control and monitors the zones, which can run on an embedded system.

TABLE OF CONTENT

CHAPTER 1

OBJECTIVE

To design a system which controls the speed of vehicles in Accident prone areas.

The system will inform the driver about the exceeding speed of vehicle and control it automatically if driver doesn't respond.

INTRODUCTION:

As the days of manned driving are getting extremely numbered, so are those of **traffic jams**, **bad**, **dangerous and rough drivers** and more importantly, **accidents**.

Automation of the driving control of vehicles is one of the most vital need of the hour. This technology can very well implement what was absent before, controlled lane driving. Considering the hazards of driving and their more pronounced effect on vehicles our **AUTOMATIC VEHICLE SPEED CONTROL SYSTEM** is exactly what is required.

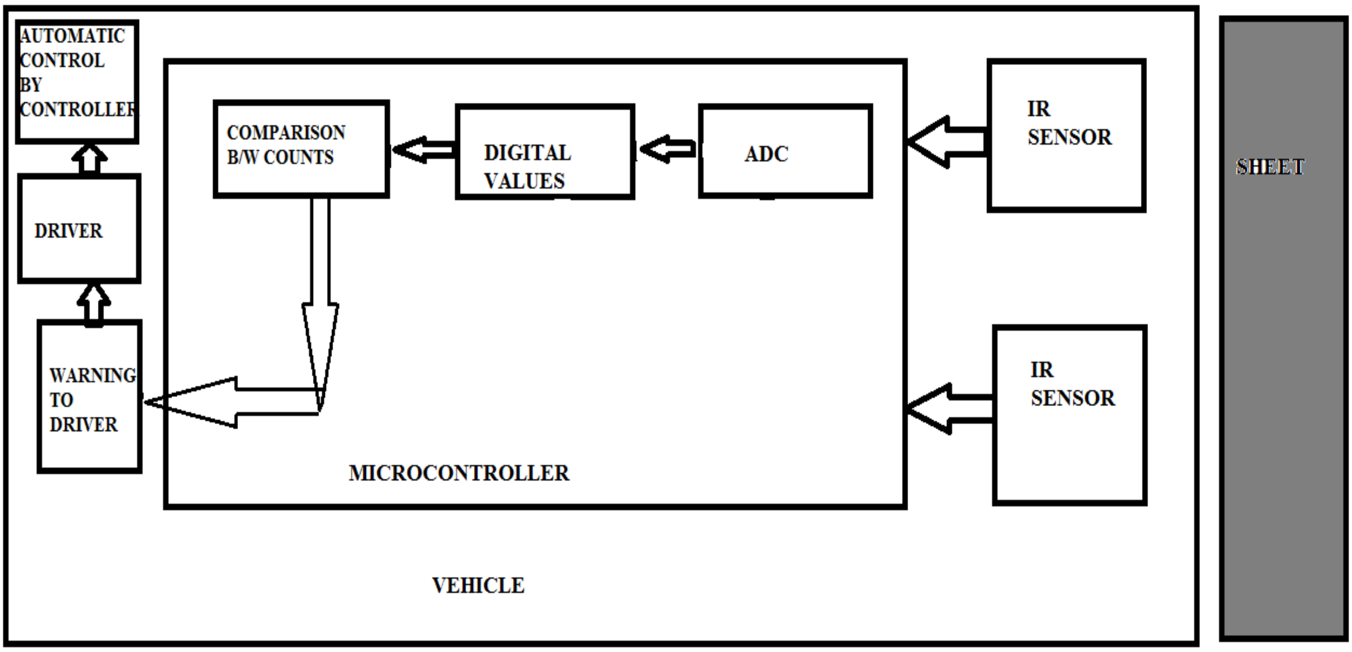
Safety is a necessary part of man's life. Due to the accident cases reported daily on the major roads in all parts of the developed and developing countries, more attention is needed for research in the designing an efficient car driving aiding system. It is expected that if such a device is designed and incorporated into our cars as a road safety device, it will reduce the incidence of accidents on our roads and various premises, with subsequent reduction in loss of life and property. However, a major area of concern of an engineer should be safety, as it concerns the use of his/her inventions and the accompanying dangers due to human limitations. When it comes to the use of a motor vehicle, accidents that have occurred over the years tell us that something needs to be done about them from an engineering point of view. According to the 2007 edition of the Small-M report on the road accident statistic in Malaysia, a total of 6,035 people were killed in 2000 and the fatality spring up to 6,287 in 2006 from accident cases reported in 250,429 and 341,252 cases of accident for 2000 and 2006 respectively. The obtained results show that, high rate of accident is reported each year.

Now it is suffice to say that the implementation of certain highway safety means such as speed restrictions, among others, has done a lot in reducing the rates of these accidents. The issue here is that policies of safe driving alone would not eradicate this, the engineer has a role to play, after all the main issue is an engineering product (the motor vehicle). Many motorists have had 2 to travel through areas with little light under much fatigue, yet compelled to undertake the journey out of necessity. It is not always irresponsible to do this. A lot of cases reported is as a result of drivers sleeping off while driving, and when he/she eventually woke up, a head-on collision might have taken place. Not many have had the fortune to quickly avert this. It is therefore imperative to consider the advantages of an early warning system where the driver is alerted of a possible collision with some considerable amount of time before it occurs.

Till yet, government implemented the technique of catching the culprit who involved in accident via CCTV footage. This system was efficient in catching the culprit but real loss of life has taken place, the loss that had happened can’t be recovered.

But the system we are designing overcomes all the ill-effects of above mentioned system as it prevent the loss to take place by avoiding accidents.

BLOCK DIAGRAM:



HARDWARE:

- IR sensor
- L293D
- Atmega 16 (microcontroller)
- Line Follower Robot
- DC Motors.
- AVR programmer

SOFTWARES:

- BASCOM AVR
- PROTEUS
- AVR loader
- USB ASP driver

CHAPTER 2

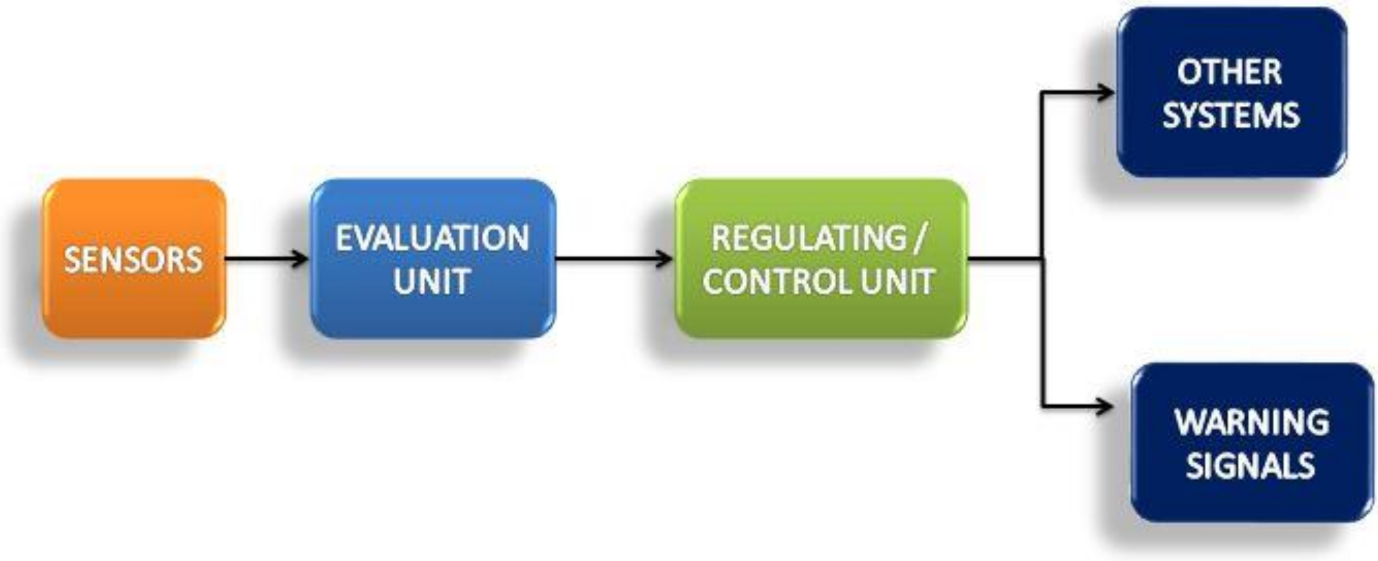
HOW PROJECT MODEL WORKS:

The automatic speed control of vehicles comprises of :

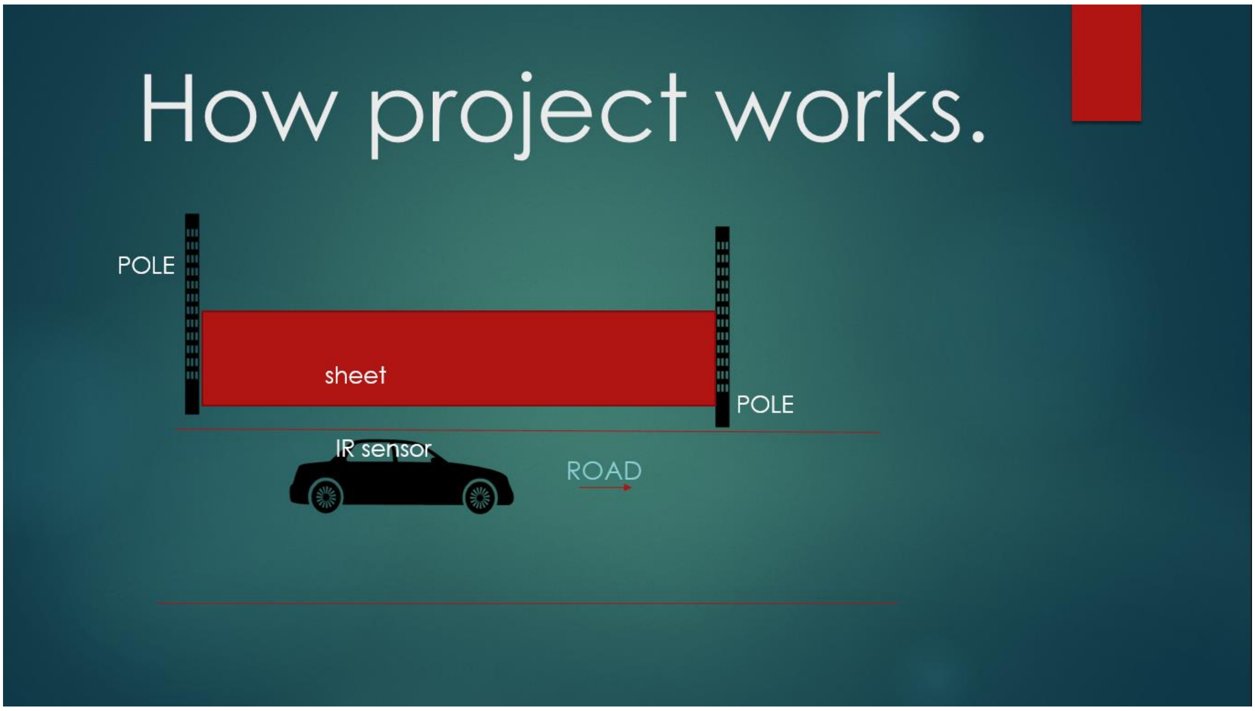
a. Atmega16 (AVR uc)
b. 2 DC motors
c. L293D motor driver IC
d. A sheet
e. IR sensor

WORKING:

A sheet is being placed on left side of road in traffic prone areas like schools, colonies, hospitals, four ways etc. This is an ordinary sheet which is being made up of any material like aluminum, plastic etc. beside being used in this project this sheet can be utilized for commercial purposes as any brand can commercialize their product through advertisement on it. The length of sheet is taken in such a way that the vehicle of any size is able to cross it easily.



The vehicle has IR sensor and controller installed on it. The IR sensor is installed on left side of the car. It sends Infrared signals which strikes the sheet and gets reflected back to the LDR in IR sensor . now the resistor of LDR increases and sends some values to microcontroller. The microcontroller automatically converts these signals into Digital signals and if controller receives a signal of adequate intensity only then it will start counting .



This process continues till the sensor on vehicle is in affinity of sheet. But as the vehicle crosses the sheet the intensity of light on LDR increases hence resistance of LDR decreases hence LDR will not be able to send signals of adequate strength to controller. So the controller stops counting.

The microcontroller has a default value of count pre-define on it with the help of programming. Now as soon as microcontroller stops counting it start its another function i.e comparing the practical count to default count.

When controller start comparing the practical count to default count, there exist two conditions:

<u>Condition 1</u>:- default count < practical count

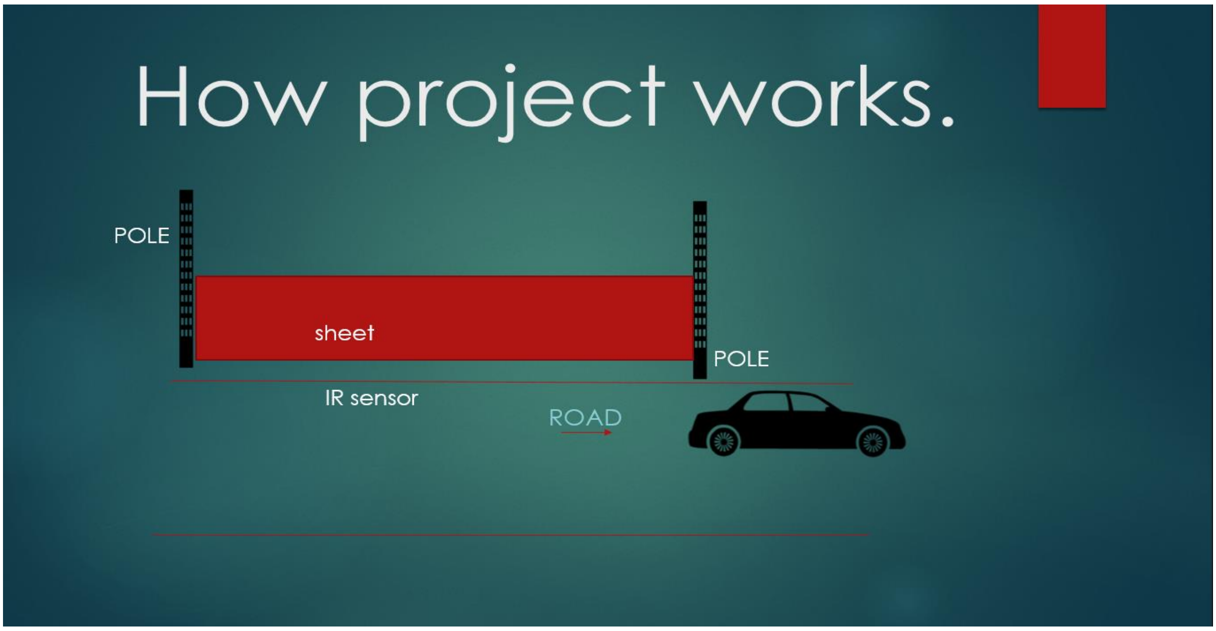
Then the speed of vehicle is more.

<u>Condition 2</u>:- default count > practical count

Then the speed of vehicle is normal.

In condition 1, since the speed of vehicle is more than anticipated, speed of vehicle need to be lowered down.

In order to control the speed of vehicle, the controller signify either by continuous beep or any other mean to driver, if driver doesn't respond then controller take over the control from driver and it automatically neutralizes the speed of vehicle with the help of PWM in atmega16 AVR controller. After some duration of time controller automatically resets.



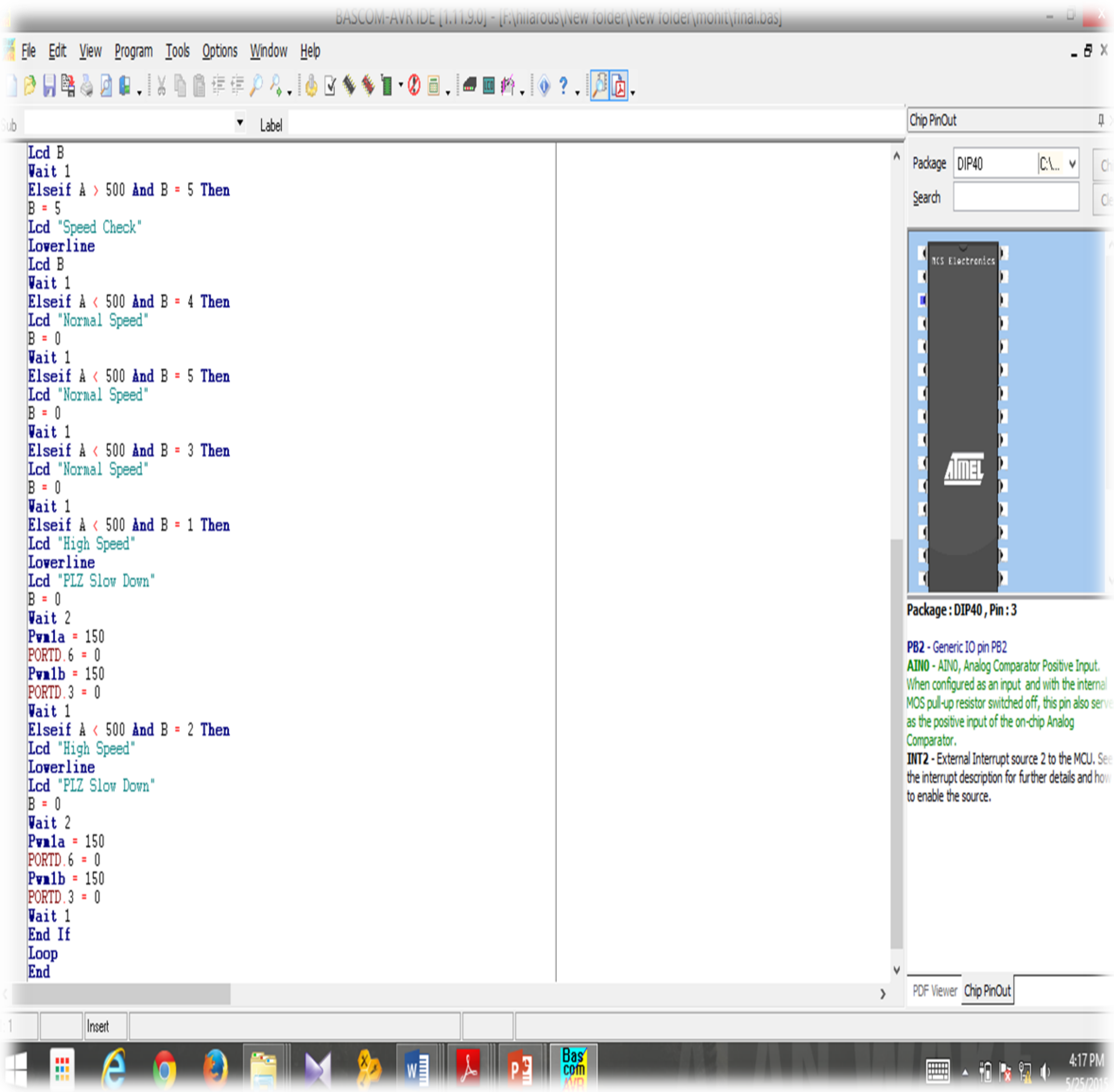
In condition 2, since the speed of vehicle is normal so there is no need to control the speed by controller.

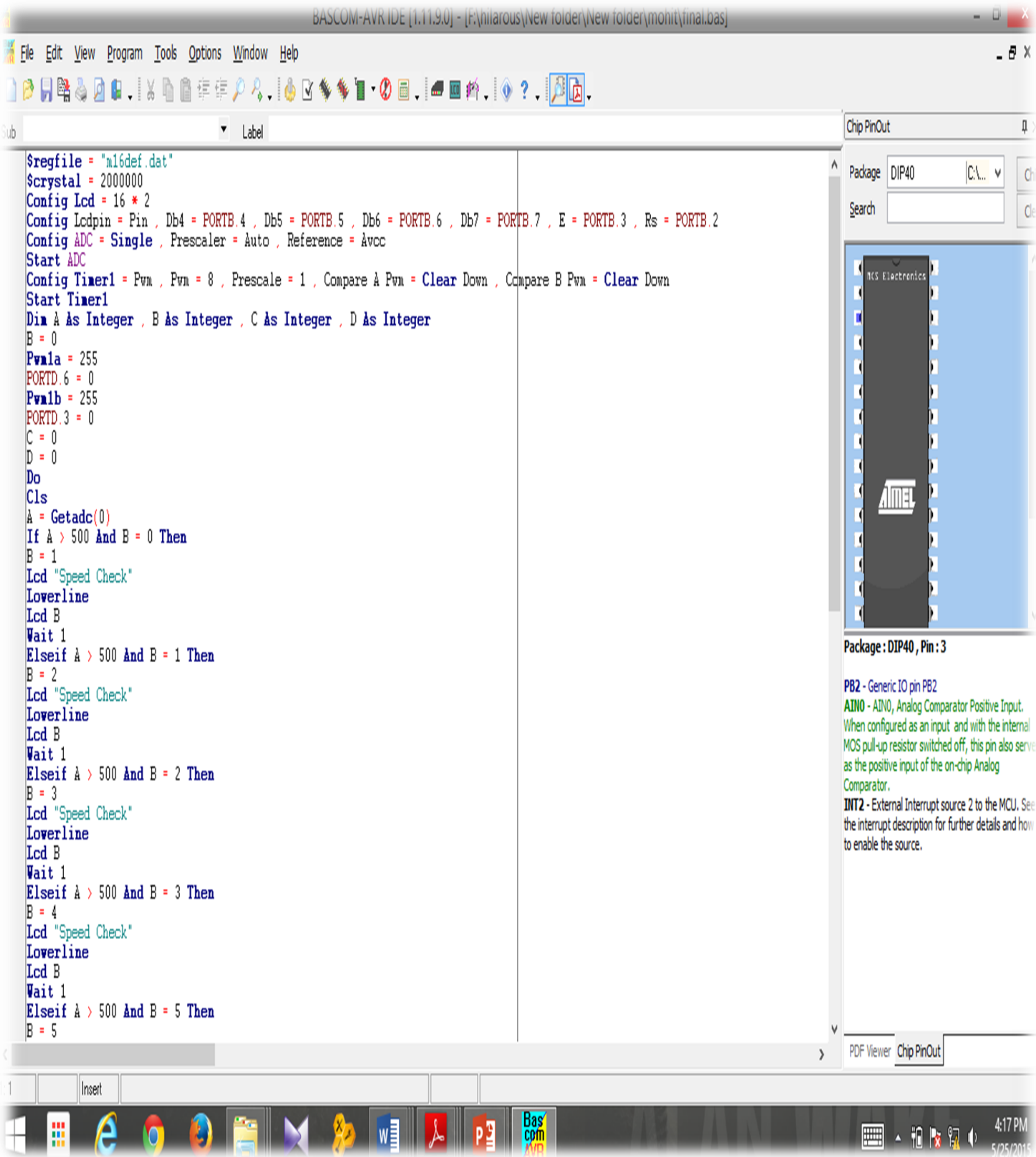
We need to install two or more than two sheets if the accident prone area are in quick succession in order to prevent the further loss by accidents.

In this model we can add Ultra sonic sensors in front of car in order to prevent collision of vehicles and control its speed due to brakers or any other obstacles.

How model looks like:

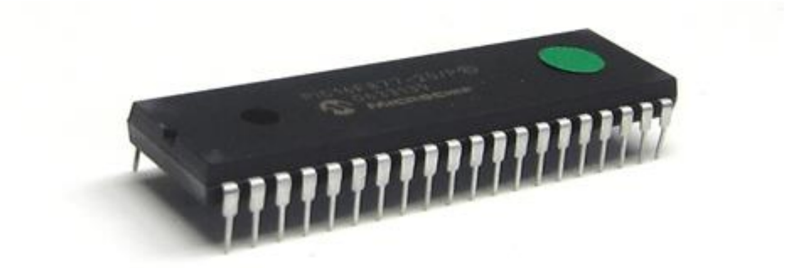
PROGRAMMING IN BASCOM AVR:




BASCOM-AVR IDE [1.11.9.0] - [F:\hilarous\New folder\New folder\mohit\final.bas]
File Edit View Program Tools Options Window Help
Label
Chip PinOut
$regfile = "m16def.dat"
$crystal = 2000000
Config Lcd = 16 * 2
Config Lcdpin = Pin , Db4 = PORTB.4 , Db5 = PORTB.5 , Db6 = PORTB.6 , Db7 = PORTB.7 , E = PORTB.3 , Rs = PORTB.2
Config ADC = Single , Prescaler = Auto , Reference = Avcc
Start ADC
Config Timer1 = Pwm , Pwm = 8 , Prescale = 1 , Compare A Pwm = Clear Down , Compare B Pwm = Clear Down
Start Timer1
Dim A As Integer , B As Integer , C As Integer , D As Integer
B = 0
Pwm1a = 255
PORTD.6 = 0
Pwm1b = 255
PORTD.3 = 0
C = 0
D = 0
Do
Cls
A = Getadc(0)
If A > 500 And B = 0 Then
B = 1
Lcd "Speed Check"
Lowerline
Lcd B
Wait 1
Elseif A > 500 And B = 1 Then
B = 2
Lcd "Speed Check"
Lowerline
Lcd B
Wait 1
Elseif A > 500 And B = 2 Then
B = 3
Lcd "Speed Check"
Lowerline
Lcd B
Wait 1
Elseif A > 500 And B = 3 Then
B = 4
Lcd "Speed Check"
Lowerline
Lcd B
Wait 1
Elseif A > 500 And B = 5 Then
B = 5
Package DIP40
Search
MCS Electronics
Package : DIP40 , Pin : 3
PB2 - Generic IO pin PB2
AIN0 - AIN0, Analog Comparator Positive Input.
When configured as an input and with the internal
MOS pull-up resistor switched off, this pin also serve
as the positive input of the on-chip Analog
Comparator.
INT2 - External Interrupt source 2 to the MCU. See
the interrupt description for further details and how
to enable the source.
PDF Viewer
Chip PinOut
Insert
4:17 PM
5/25/2015

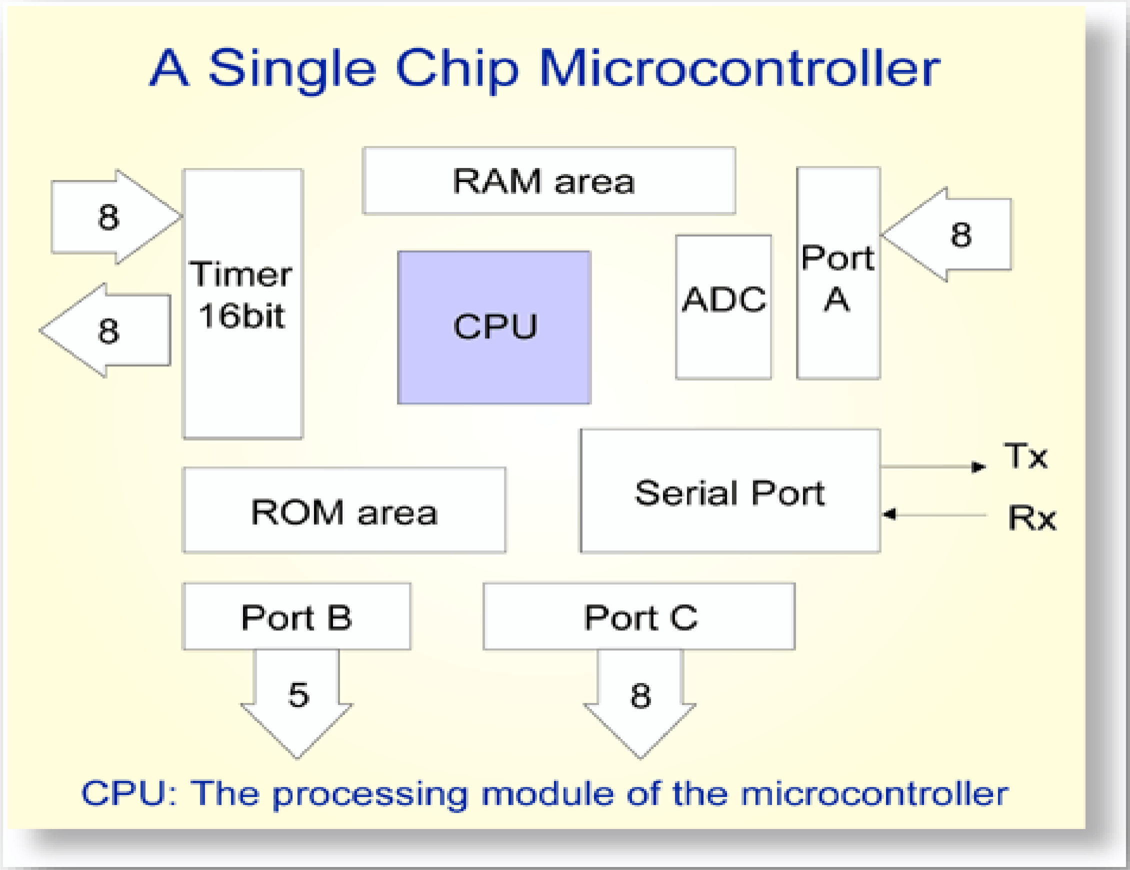
CHAPTER 3

INTRODUCTION TO MICROCONTROLLER:



A microcontroller(sometimes abbreviated µC or MCU) is a self-contained system with peripherals, memory and a processor that can be used as an embedded system. Most programmable microcontrollers that are used today are embedded in other consumer products or machinery including phones, peripherals, automobiles and household appliances for computer systems. Due to that, another name for a microcontroller is "embedded controller." Some embedded systems are more sophisticated, while others have minimal requirements for memory and programming length and a low software complexity. Input and output devices include solenoids, LCD displays, relays, switches and sensors for data like humidity, temperature or light level, amongst others

It is a decision making device used widely in embedded systems and all intelligent devices.



Microcontrollers are hidden inside a surprising number of products these days. If your microwave oven has an LED or LCD screen and a keypad, it contains a microcontroller. All modern automobiles contain at least one microcontroller, and can have as many as six or seven: The engine is controlled by a microcontroller, as are the anti-lock brakes, the cruise control and so on. Any device that has a remote control almost certainly contains a microcontroller: TVs, VCRs and high-end stereo systems all fall into this category. Nice SLR and digital cameras, cell phones, camcorders, answering machines, laser printers, telephones (the ones with caller ID, 20-number memory, etc.), pagers, and feature-laden refrigerators, dishwashers, washers and dryers (the ones with displays and keypads)... You get the idea. Basically, any product or device that interacts with its user has a microcontroller buried inside.

HOW MICROCONTROLLER WORKS:

Microcontroller is used to control the operation of various machines and devices according to the program or given instructions in the memory or ROM of the Microcontroller. The program that is needed for proper working of Microcontroller is called Firmware and is written in ROM (Read Only Memory). ROM is a non-volatile memory that is its contents are permanent. Some latest ROMs can be Re-Programmed, but mostly it doesn't requires.

Types of Microcontrollers

There are several different kinds of programmable microcontrollers. We stock many of the most common types categorized by several parameters including Bits, Flash size, RAM size, number of input/output lines, packaging type, supply voltage and speed. Our parametric filters will allow you to refine your search results according to the required specifications.

Programmable microcontrollers contain general purpose input/output pins. The number of these pins varies depending on the microcontroller. They can be configured to an input or an output state by software. When configured to an input state, these pins can be used to read external signals or sensors. When they are configured to the output state, they can drive external devices like LED displays and motors.

Applications for Microcontrollers:

Programmable microcontrollers are designed to be used for embedded applications, unlike microprocessors that can be found in PCs. Microcontrollers are used in automatically controlled devices including power tools, toys, implantable medical devices, office machines, engine control systems, appliances, remote controls and other types of embedded systems.

Choosing the Right Microcontroller:

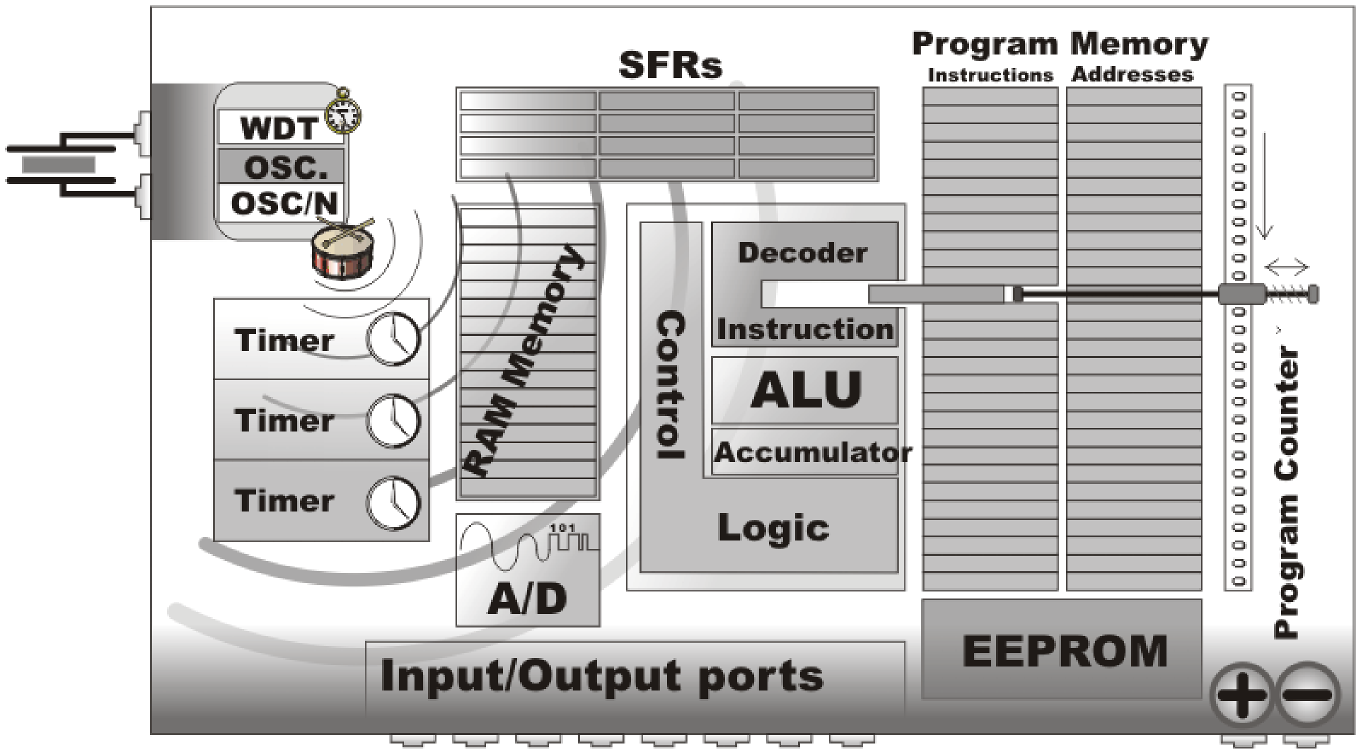
With the FutureElectronics.com parametric search, when looking for the right microcontrollers, you can filter the results by the number of Bits required. We carry the following size microcontrollers:

32 bit Microcontrollers in Production Ready Packaging or R&D Quantities:

If the quantity of 32 bit microcontrollers is less than a full reel, we also offer many of our 32 bit microcontroller products in tray, tube or individual quantities that will avoid unneeded surplus.

- 8 bit Microcontrollers
- 16 bit Digital Signal Controllers (DSC)
- 16 bit General Purpose Microcontrollers
- 32 bit Micorcontrollers

Once you choose the microcontroller size, you can narrow them down by various attributes: by RAM size, Flash size, number of input lines, speed and supply voltage to name a few. You will be able to find the right LCD, low power, USB, wireless or pic microcontrollers using these filters.



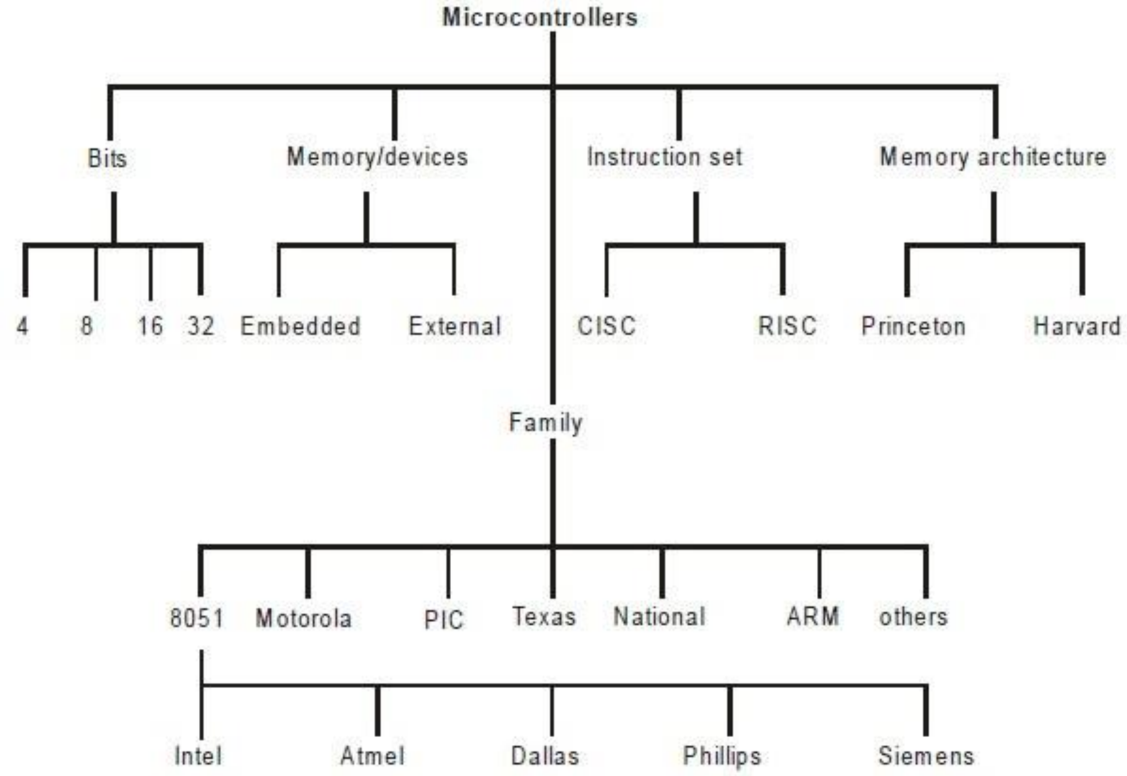
Various types of controllers:

8051

PIC

Atmega 8/16/32 AVR

ARM etc.

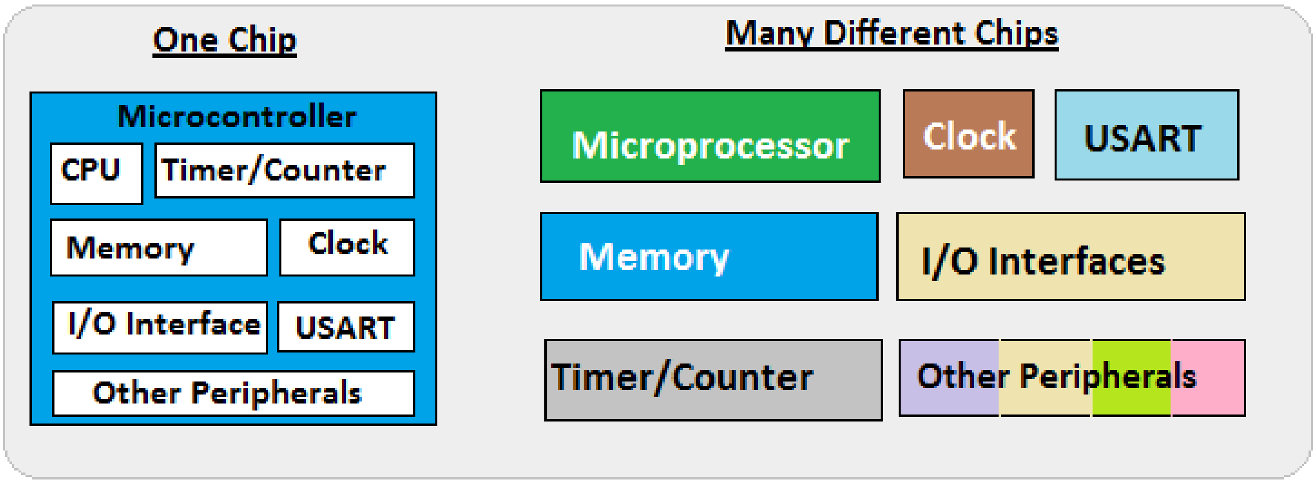


Types of microcontrollers

Difference between Microprocessor and Microcontroller:

The term **microprocessor and microcontroller** have always been confused with each other. Both of them have been designed for real time application. They share many common features and at the same time they have significant differences. Both the IC's i.e., the microprocessor and microcontroller cannot be distinguished by looking at them. They are available in different version starting from 6 pin to as high as 80 to 100 pins or even higher depending on the features.

Difference between microprocessor and microcontroller



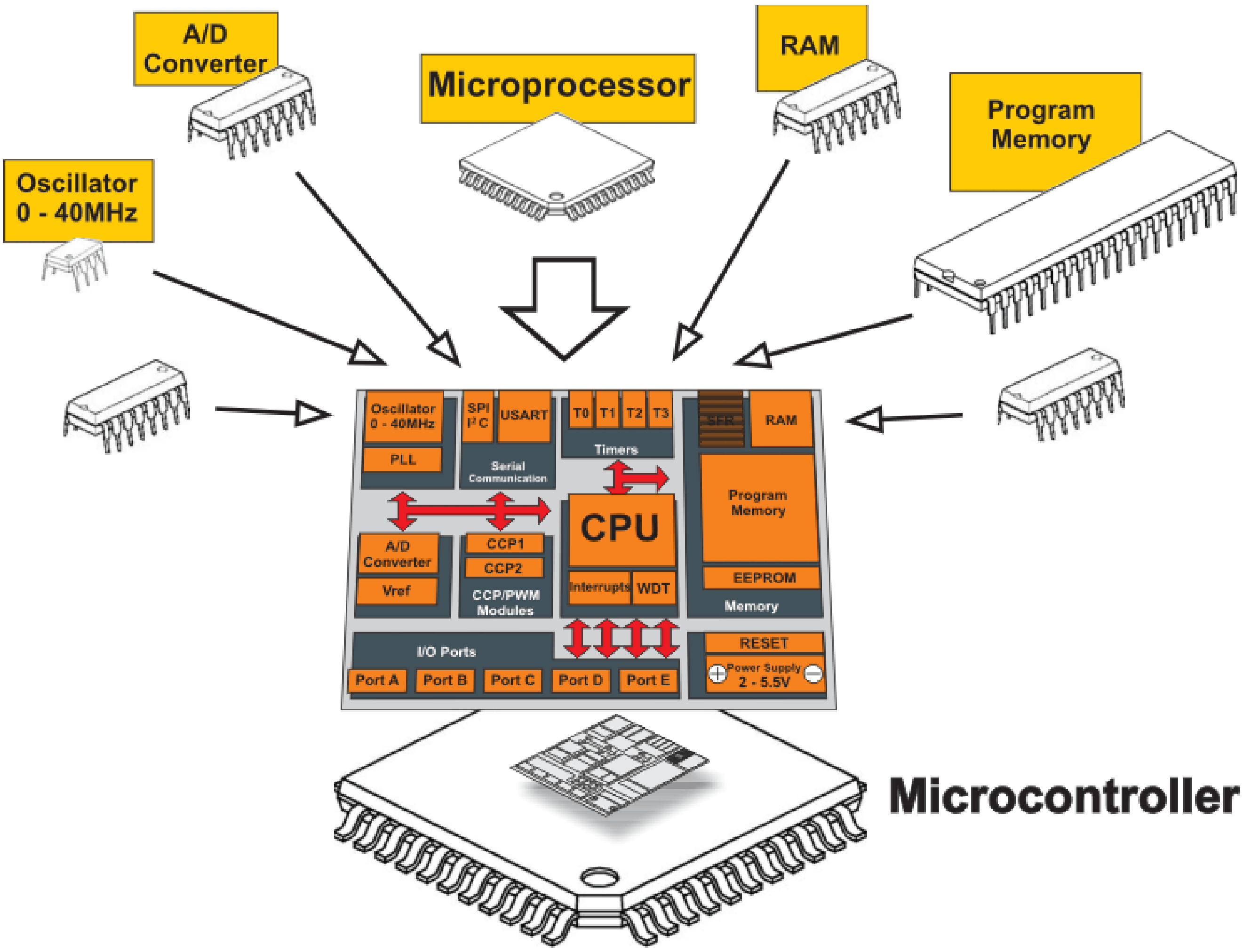
Microprocessor is an IC which has only the CPU inside them i.e. only the processing powers such as Intel's Pentium 1,2,3,4, core 2 duo, i3, i5 etc. These microprocessors don't have RAM, ROM, and other peripheral on the chip. A system designer has to add them externally to make them functional. Application of microprocessor includes Desktop PC's, Laptops, notepads etc.

But this is not the case with Microcontrollers. Microcontroller has a CPU, in addition with a fixed amount of RAM, ROM and other peripherals all embedded on a single chip. At times it is also termed as a mini computer or a computer on a single chip. Today different manufacturers produce microcontrollers with a wide range of features available in different versions. Some manufacturers are ATMEL, Microchip, TI, Freescale, Philips, Motorola etc.

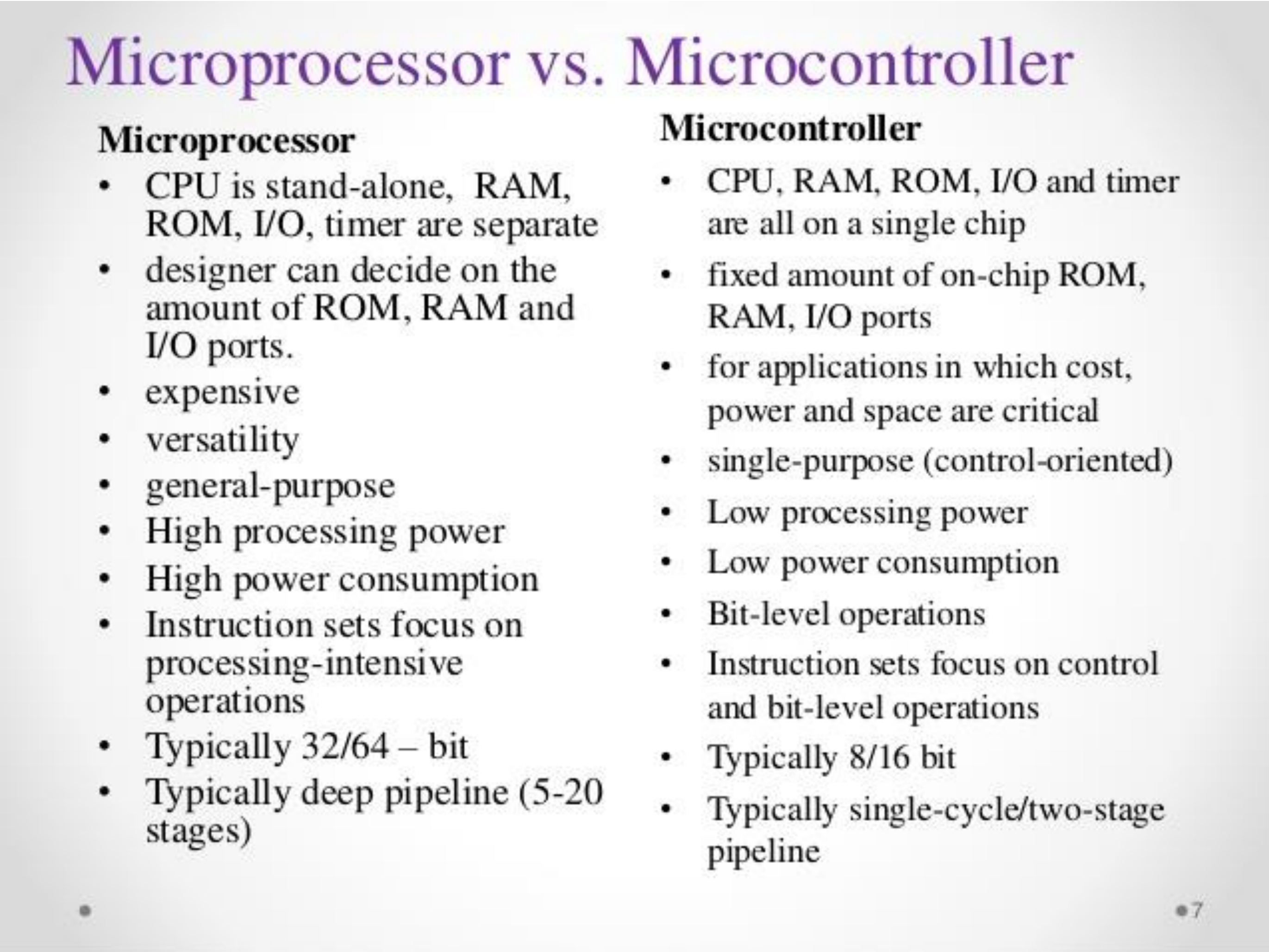
Microcontrollers are designed to perform specific tasks. Specific means applications where the relationship of input and output is defined. Depending on the input, some processing needs to be done and output is delivered. For example, keyboards, mouse, washing machine, digicam, pendrive, remote, microwave, cars, bikes, telephone, mobiles, watches, etc. Since the applications are very specific, they need small resources like RAM, ROM, I/O ports etc and hence can be embedded on a single chip. This in turn reduces the size and the cost.

Microprocessor find applications where tasks are unspecific like developing software, games, websites, photo editing, creating documents etc. In such cases the relationship between input and output is not defined. They need high amount of resources like RAM, ROM, I/O ports etc.

The clock speed of the Microprocessor is quite high as compared to the microcontroller. Whereas the microcontrollers operate from a few MHz to 30 to 50 MHz, today's microprocessor operate above 1GHz as they perform complex tasks. Read more about [what is microcontroller.](#)



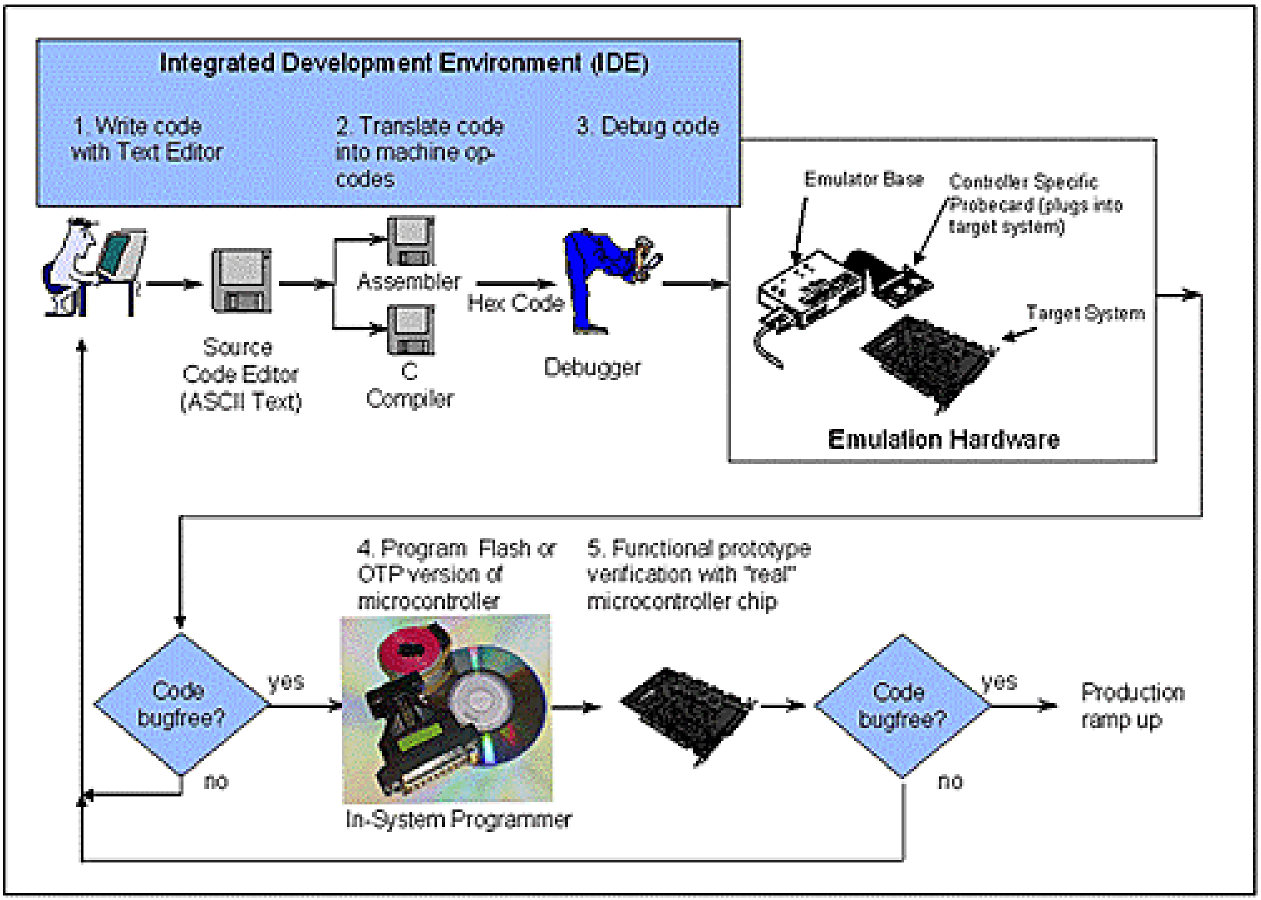
Comparing microcontroller and microprocessor in terms of cost is not justified. Undoubtedly a microcontroller is far cheaper than a microprocessor. However microcontroller cannot be used in place of microprocessor and using a microprocessor is not advised in place of a microcontroller as it makes the application quite costly. Microprocessor cannot be used stand alone. They need other peripherals like RAM, ROM, buffer, I/O ports etc and hence a system designed around a microprocessor is quite costly.



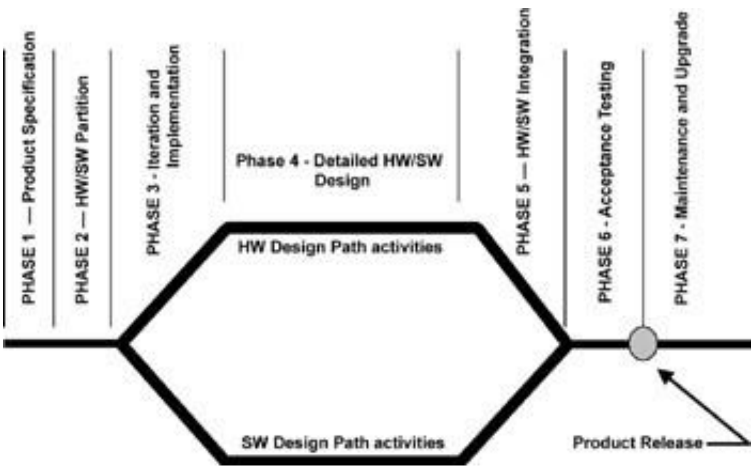
The Embedded Design Life Cycle

Developing software and hardware for microcontroller based systems involves the use of a range of tools that can include editors, assemblers, compilers, debuggers, simulators, emulators and Flash/OTP programmers. To the newcomer to microcontroller development it is often not clear how all of these different components play together in the development cycle and what differences there are for example between starter kits, emulators and simulators.

To complicate matters more, there are quite a number of different approaches and technologies for emulation available that make it difficult for even seasoned embedded engineers to pick the right tools. With this article, I'll try to give a short explanation of the different tools involved in the microcontroller development cycle, with a particular focus on the different emulator types and their advantages.



The Microcontroller Development Cycle



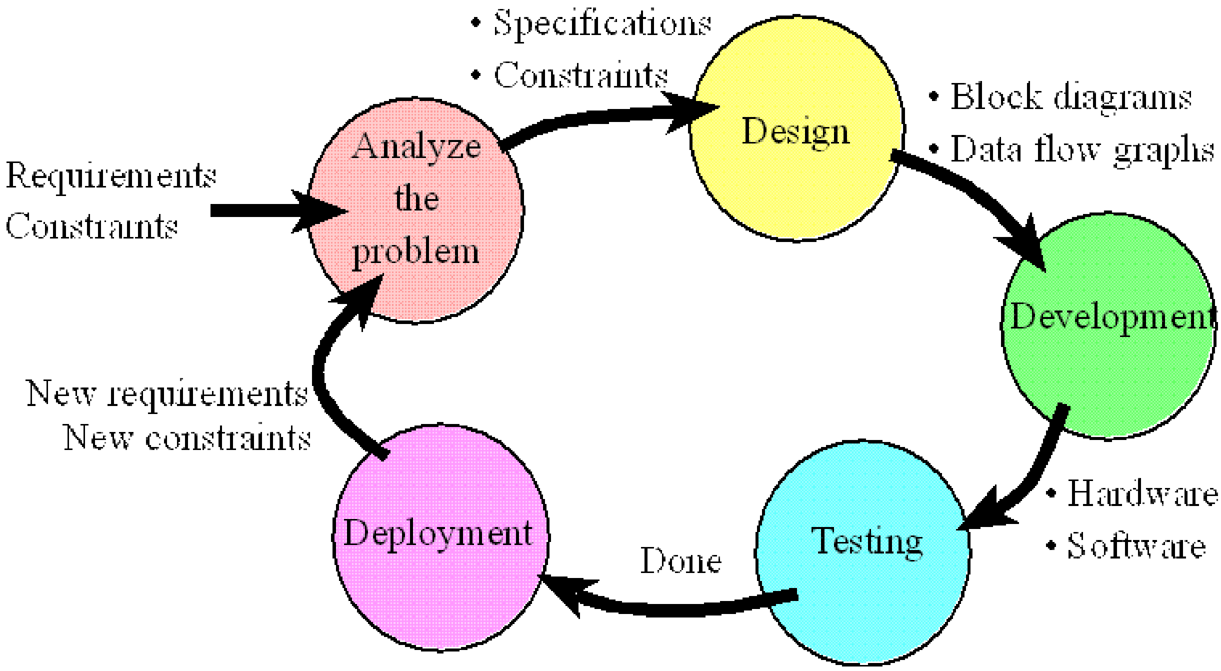
Time flows from the left and proceeds through seven phases:

- Product specification
- Partitioning of the design into its software and hardware components
- Iteration and refinement of the partitioning
- Independent hardware and software design tasks
- Integration of the hardware and software components
- Product testing and release
- On-going maintenance and upgrading

The embedded design process is not as simple as Figure 1.1 depicts. A considerable amount of iteration and optimization occurs within phases and between phases. Defects found in later stages often cause you to go back to square 1. For example, when product testing reveals performance deficiencies that render the design non-competitive, you might have to rewrite algorithms, redesign custom hardware such as Application Specific Integrated Circuits (ASICs) for better performance speed up the processor, choose a new processor, and so on.

Product Life Cycle

In this section, we will introduce the product development process in general. The basic approach is introduced here, and the details of these concepts will be presented throughout the remaining chapters of the book. As we learn software/hardware development tools and techniques, we can place them into the framework presented in this section. As illustrated in Figure 7.1, the development of a product follows an analysis-design-implementation-testing-deployment cycle. For complex systems with long life-spans, we transverse multiple times around the life cycle. For simple systems, a one-time pass may suffice.



During the analysis phase, we discover the requirements and constraints for our proposed system. We can hire consultants and interview potential customers in order to gather this critical information. A requirement is a specific parameter that the system must satisfy. We begin by rewriting the system requirements, which are usually written in general form, into a list of detailed specifications. In general, specifications are detailed parameters describing how the system should work. For example, a requirement may state that the system should fit into a pocket, whereas a specification would give the exact size and weight of the device. For example, suppose we wish to build a motor controller. During the analysis phase, we would determine obvious specifications such as range, stability, accuracy, and response time. There may be less obvious requirements to satisfy, such as weight, size, battery life, product life, ease of operation, display readability, and reliability. Often, improving the performance on one parameter can be achieved only by decreasing the performance of another. This art of compromise defines the tradeoffs an engineer must make when designing a product. A constraint is a limitation, within which the system must operate. The system may be constrained to such factors as cost, safety, compatibility with other products, use of specific electronic and mechanical parts as other devices, interfaces with other instruments and test equipment, and development schedule. The following measures are often considered during the analysis phase of a project:

- Safety: The risk to humans or the environment
- Accuracy: The difference between the expected truth and the actual parameter

- Precision: The number of distinguishable measurements
- Resolution: The smallest change that can be reliably detected
- Response time: The time between a triggering event and the resulting action
- Bandwidth: The amount of information processed per time
- Maintainability: The flexibility with which the device can be modified
- Testability: The ease with which proper operation of the device can be verified
- Compatibility: The conformance of the device to existing standards
- Mean time between failure: The reliability of the device, the life of a product
- Size and weight: The physical space required by the system
- Power: The amount of energy it takes to operate the system
- Nonrecurring engineering cost (NRE cost): The one-time cost to design and test

- Unit cost: The cost required to manufacture one additional product

- Time-to-prototype: The time required to design, build, and test an example system

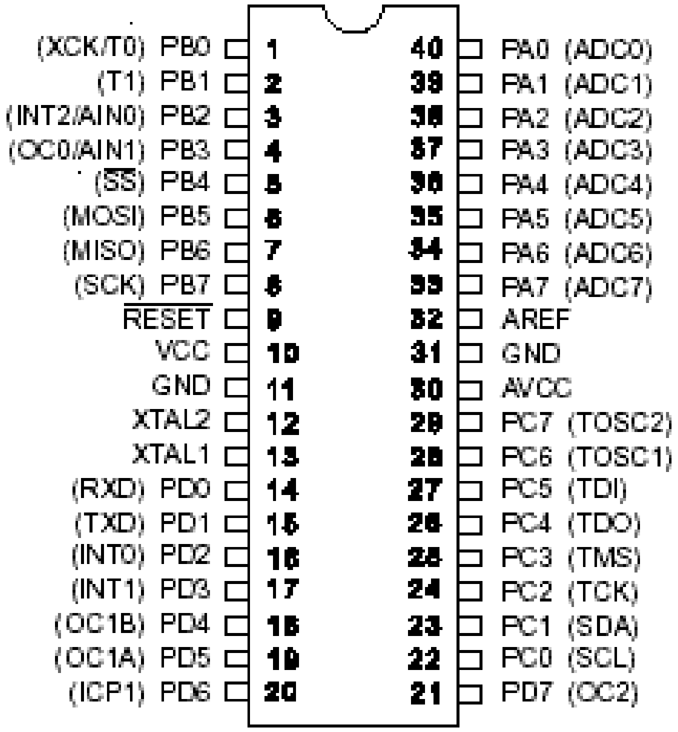
- Time-to-market: The time required to deliver the product to the customer

- Human factors: The degree to which our customers like/appreciate the product

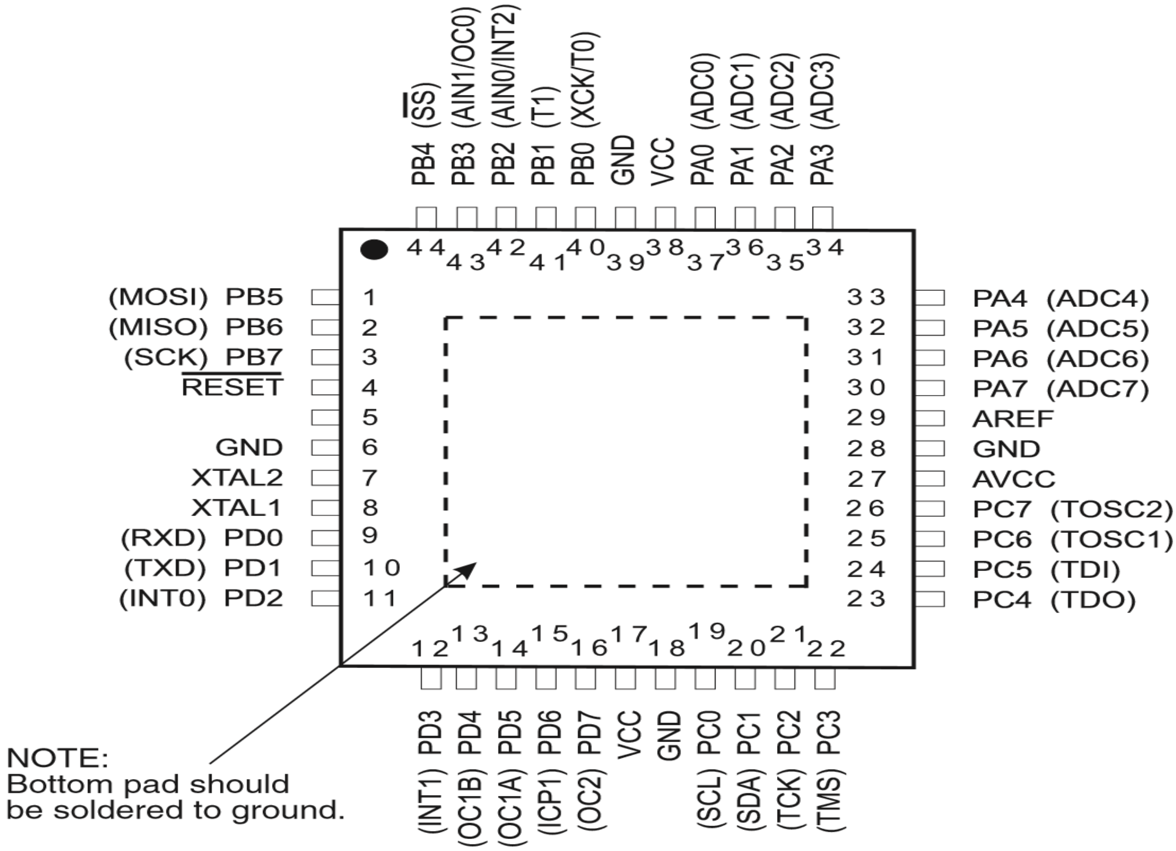
AVR (ATMEGA 16)

The ATmega16 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega16 achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed.

The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers.



(XCK/T0) PB0 1
(T1) PB1 2
(INT2/AIN0) PB2 3
(OC0/AIN1) PB3 4
(SS) PB4 5
(MOSI) PB5 6
(MISO) PB6 7
(SCK) PB7 8
RESET 9
VCC 10
GND 11
XTAL2 12
XTAL1 13
(RXD) PD0 14
(TXD) PD1 15
(INT0) PD2 16
(INT1) PD3 17
(OC1B) PD4 18
(OC1A) PD5 19
(ICP1) PD6 20
40 PA0 (ADC0)
39 PA1 (ADC1)
38 PA2 (ADC2)
37 PA3 (ADC3)
36 PA4 (ADC4)
35 PA5 (ADC5)
34 PA6 (ADC6)
33 PA7 (ADC7)
32 AREF
31 GND
30 AVCC
29 PC7 (TOSC2)
28 PC6 (TOSC1)
27 PC5 (TDI)
26 PC4 (TDO)
25 PC3 (TMS)
24 PC2 (TCK)
23 PC1 (SDA)
22 PC0 (SCL)
21 PD7 (OC2)

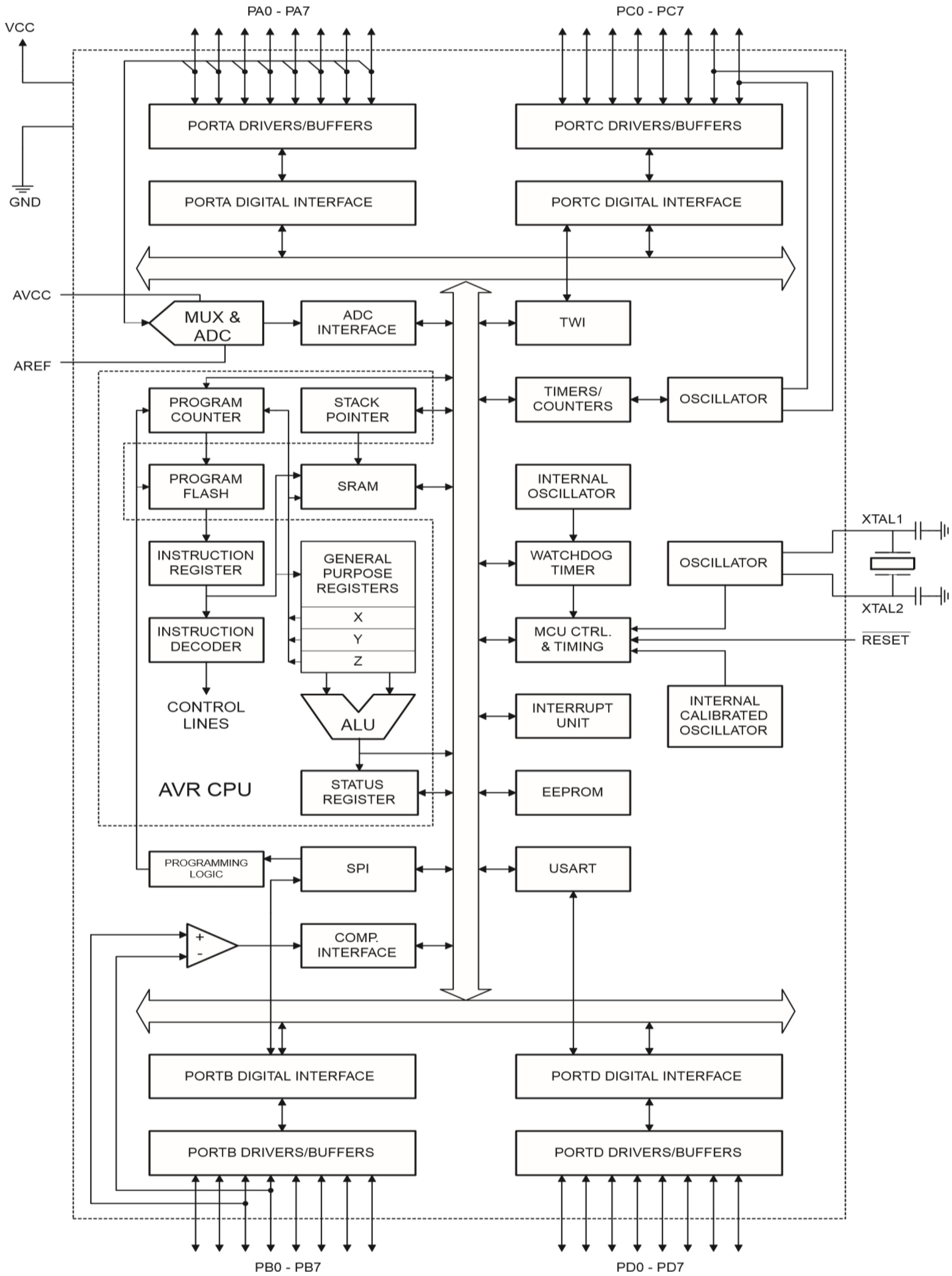


PB4 (SS)
PB3 (AIN1/OC0)
PB2 (AIN0/INT2)
PB1 (T1)
PB0 (XCK/T0)
GND
VCC
PA0 (ADC0)
PA1 (ADC1)
PA2 (ADC2)
PA3 (ADC3)
44 43 42 41 40 39 38 37 36 35 34
(MOSI) PB5 1
(MISO) PB6 2
(SCK) PB7 3
RESET 4
5
GND 6
XTAL2 7
XTAL1 8
(RXD) PD0 9
(TXD) PD1 10
(INT0) PD2 11
33 PA4 (ADC4)
32 PA5 (ADC5)
31 PA6 (ADC6)
30 PA7 (ADC7)
29 AREF
28 GND
27 AVCC
26 PC7 (TOSC2)
25 PC6 (TOSC1)
24 PC5 (TDI)
23 PC4 (TDO)
12 13 14 15 16 17 18 19 20 21 22
PD3 (INT1)
PD4 (OC1B)
PD5 (OC1A)
PD6 (ICP1)
PD7 (OC2)
VCC
GND
PC0 (SCL)
PC1 (SDA)
PC2 (TCK)
PC3 (TMS)
NOTE:
Bottom pad should
be soldered to ground.

The ATmega16 provides the following features: 16 Kbytes of In-System Programmable Flash Program memory with Read-While-Write capabilities, 512 bytes EEPROM, 1 Kbyte SRAM, 32 general purpose I/O lines, 32 general purpose working registers, a JTAG interface for Boundaryscan, On-chip Debugging support and programming, three flexible Timer/Counters with compare modes, Internal and External Interrupts, a serial programmable USART, a byte oriented Two-wire Serial Interface, an 8-channel, 10-bit ADC with optional differential input stage with programmable gain (TQFP package only), a programmable Watchdog Timer with Internal Oscillator, an SPI serial port, and six software selectable power saving modes. The Idle mode stops the CPU while allowing the USART, Two-wire interface, A/D Converter, SRAM, Timer/Counters, SPI port, and interrupt system to continue functioning. The Power-down mode saves the register contents but freezes the Oscillator, disabling all other chip functions until the next External Interrupt or Hardware Reset. In Power-save mode, the Asynchronous Timer continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping. The ADC Noise Reduction mode stops the CPU and all I/O modules except Asynchronous Timer and ADC, to minimize switching noise during ADC conversions. In Standby mode, the crystal/resonator Oscillator is running while the rest of the device is sleeping. This allows very fast start-up combined with low-power consumption. In Extended Standby mode, both the main Oscillator and the Asynchronous Timer continue to run.

The device is manufactured using Atmel's high density nonvolatile memory technology. The Onchip ISP Flash allows the program memory to be reprogrammed in-system through an SPI serial interface, by a conventional nonvolatile memory programmer, or by an On-chip Boot program running on the AVR core. The boot program can use any interface to download the application program in the Application Flash memory. Software in the Boot Flash section will continue to run while the Application Flash section is updated, providing true Read-While-Write operation. By combining an 8-bit RISC CPU with In-System Self-Programmable Flash on a monolithic chip, the Atmel ATmega16 is a powerful microcontroller that provides a highly-flexible and cost-effective solution to many embedded control applications.

The ATmega16 AVR is supported with a full suite of program and system development tools including: C compilers, macro assemblers, program debugger/simulators, in-circuit emulators, and evaluation kits.


PA0 - PA7
PC0 - PC7
VCC
GND
PORTA DRIVERS/BUFFERS
PORTC DRIVERS/BUFFERS
PORTA DIGITAL INTERFACE
PORTC DIGITAL INTERFACE
AVCC
MUX & ADC
ADC INTERFACE
TWI
AREF
PROGRAM COUNTER
STACK POINTER
TIMERS/ COUNTERS
OSCILLATOR
PROGRAM FLASH
SRAM
INTERNAL OSCILLATOR
XTAL1
INSTRUCTION REGISTER
GENERAL PURPOSE REGISTERS
WATCHDOG TIMER
OSCILLATOR
X
Y
Z
XTAL2
INSTRUCTION DECODER
MCU CTRL. & TIMING
RESET
CONTROL LINES
ALU
INTERRUPT UNIT
INTERNAL CALIBRATED OSCILLATOR
AVR CPU
STATUS REGISTER
EEPROM
PROGRAMMING LOGIC
SPI
USART
+
-
COMP. INTERFACE
PORTB DIGITAL INTERFACE
PORTD DIGITAL INTERFACE
PORTB DRIVERS/BUFFERS
PORTD DRIVERS/BUFFERS
PB0 - PB7
PD0 - PD7

Pin Descriptions:

VCC Digital supply voltage.

GND Ground.

Port A (PA7..PA0) Port A serves as the analog inputs to the A/D Converter.
Port A also serves as an 8-bit bi-directional I/O port, if the A/D Converter is not used. Port pins can provide internal pull-up resistors (selected for each bit). The Port A output buffers have symmetrical drive characteristics with both high sink and source capability. When pins PA0 to PA7 are used as inputs and are externally pulled low, they will source current if the internal pull-up resistors are activated. The Port A pins are tri-stated when a reset condition becomes active, even if the clock is not running.

Port B (PB7..PB0) Port B is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port B output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port B pins that are externally pulled low will source current if the pull-up resistors are activated. The Port B pins are tri-stated when a reset condition becomes active, even if the clock is not running.

Port C (PC7..PC0) Port C is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port C output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port C pins that are externally pulled low will source current if the pull-up resistors are activated. The Port C pins are tri-stated when a reset condition becomes active, even if the clock is not running. If the JTAG interface is enabled, the pull-up resistors on pins PC5(TDI), PC3(TMS) and PC2(TCK) will be activated even if a reset occurs.

Port D (PD7..PD0) Port D is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port D output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port D pins that are externally pulled low will source current if the pull-up resistors are activated. The Port D pins are tri-stated when a reset condition becomes active, even if the clock is not running.

$\overline{\textbf{RESET}}$ Reset Input. A low level on this pin for longer than the minimum pulse length will generate a reset, even if the clock is not running.

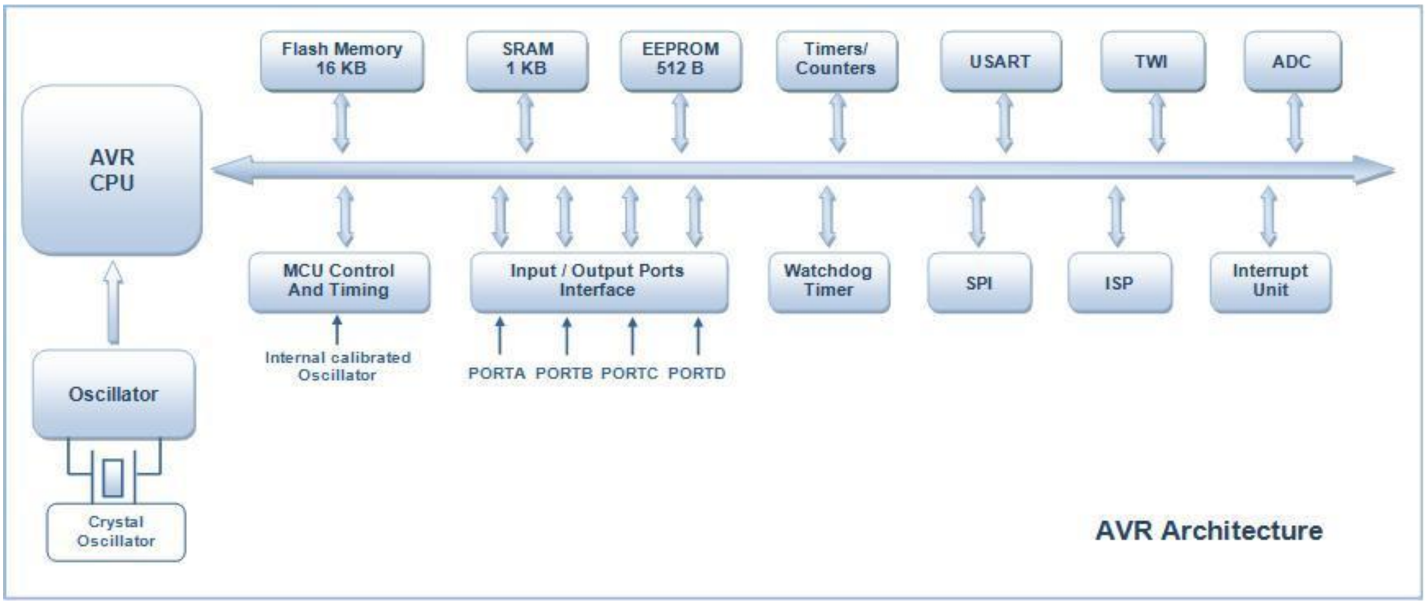
XTAL1 Input to the inverting Oscillator amplifier and input to the internal clock operating circuit.

XTAL2 Output from the inverting Oscillator amplifier.

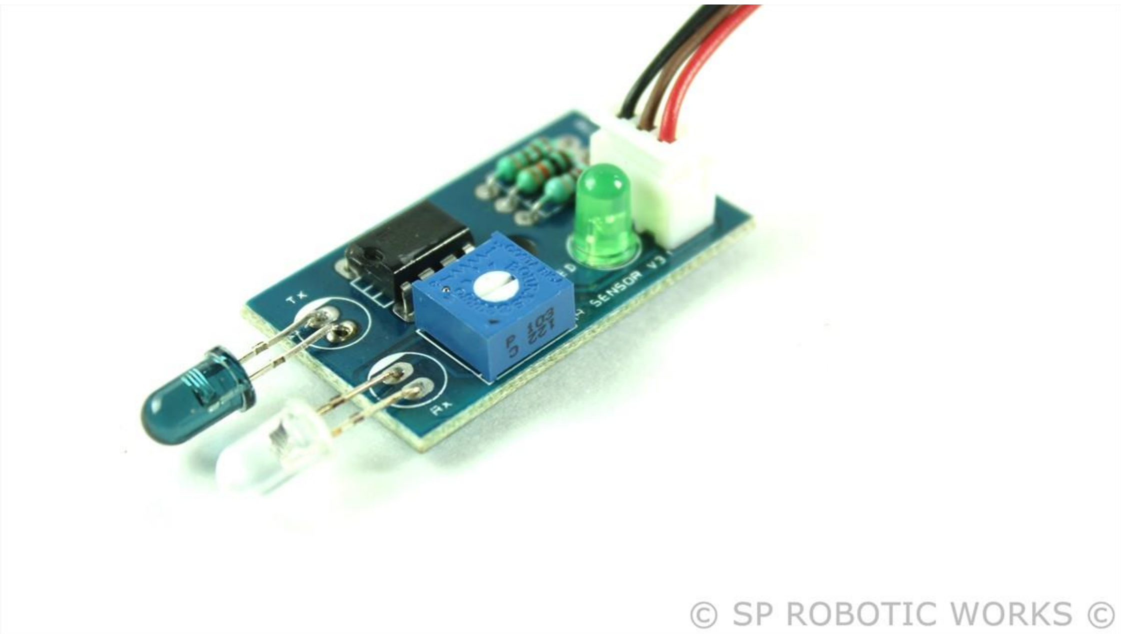
AVCC AVCC is the supply voltage pin for Port A and the A/D Converter. It should be externally connected to V_{CC}, even if the ADC is not used. If the ADC is used, it should be connected to V_{CC} through a low-pass filter.

AREF AREF is the analog reference pin for the A/D Converter.

Data Retention Reliability Qualification results show that the projected data retention failure rate is much less than 1 PPM over 20 years at 85°C or 100 years at 25°C.


Flash Memory
16 KB
SRAM
1 KB
EEPROM
512 B
Timers/
Counters
USART
TWI
ADC
AVR
CPU
MCU Control
And Timing
Input / Output Ports
Interface
Watchdog
Timer
SPI
ISP
Interrupt
Unit
Internal calibrated
Oscillator
PORTA PORTB PORTC PORTD
Oscillator
Crystal
Oscillator
AVR Architecture

IR sensor:



Introduction

Infrared technology addresses a wide variety of wireless applications. The main areas are sensing and remote controls. In the electromagnetic spectrum, the infrared portion is divided into three regions: near infrared region, mid infrared region and far infrared region.

The wavelengths of these regions and their applications are shown below.

- Near infrared region — 700 nm to 1400 nm — IR sensors, fiber optic
- Mid infrared region — 1400 nm to 3000 nm — Heat sensing
- Far infrared region — 3000 nm to 1 mm — Thermal imaging

The frequency range of infrared is higher than microwave and lesser than visible light.

For optical sensing and optical communication, photo optics technologies are used in the near infrared region as the light is less complex than RF when implemented as a source of signal. Optical wireless communication is done with IR data transmission for short range applications.

An infrared sensor emits and/or detects infrared radiation to sense its surroundings.

The working of any Infrared sensor is governed by three laws: Planck's Radiation law, Stephen – Boltzmann law and Wien's Displacement law.

Planck's law states that "every object emits radiation at a temperature not equal to 0^0K". Stephen – Boltzmann law states that "at all wavelengths, the total energy emitted by a black body is proportional to the fourth power of the absolute temperature". According to Wien's Displacement law, "the radiation curve of a black body for different temperatures will reach its peak at a wavelength inversely proportional to the temperature".

The basic concept of an Infrared Sensor which is used as Obstacle detector is to transmit an infrared signal, this infrared signal bounces from the surface of an object and the signal is received at the infrared receiver.

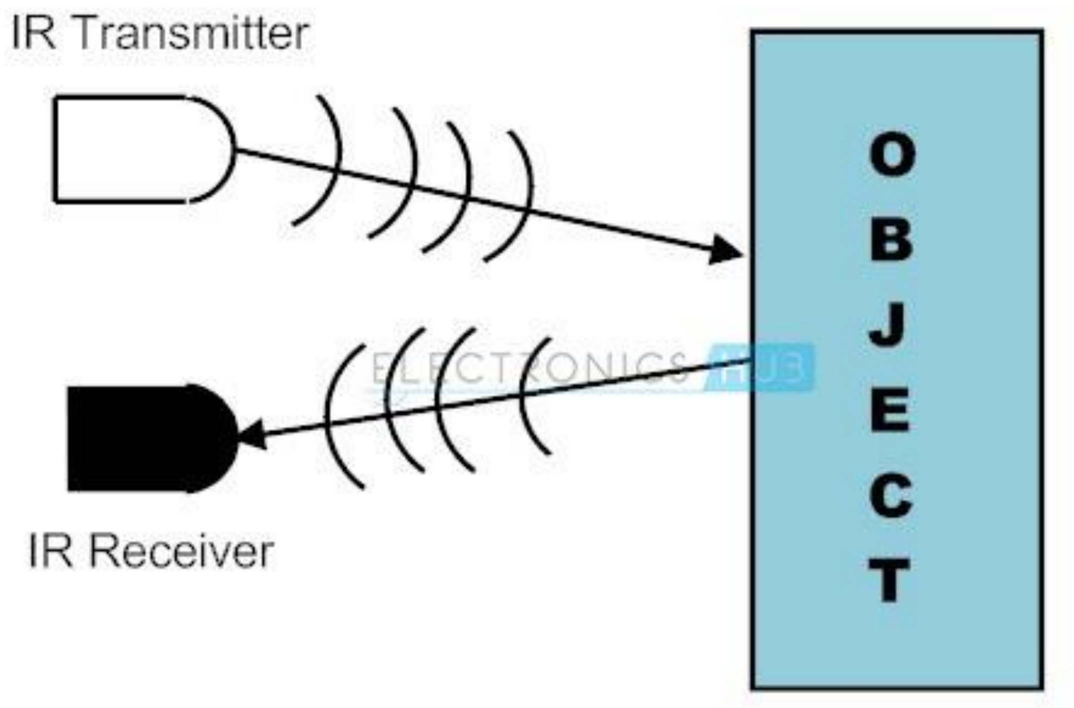
There are five basic elements used in a typical infrared detection system: an infrared source, a transmission medium, optical component, infrared detectors or receivers and signal processing. Infrared lasers and Infrared LED's of specific wavelength can be used as infrared sources. The three main types of media used for infrared transmission are vacuum, atmosphere and optical fibers. Optical components are used to focus the infrared radiation or to limit the spectral response. Optical lenses made of Quartz, Germanium and Silicon are used to focus the infrared radiation. Infrared receivers can be photodiodes, phototransistors etc. some important specifications of infrared receivers are photosensitivity, detectivity and noise equivalent power. Signal processing is done by amplifiers as the output of infrared detector is very small.

Types of IR Sensors

Infrared sensors can be passive or active. Passive infrared sensors are basically Infrared detectors. Passive infrared sensors do not use any infrared source and detects energy emitted by obstacles in the field of view. They are of two types: quantum and thermal. Thermal infrared sensors use infrared energy as the source of heat and are independent of wavelength. Thermocouples, pyroelectric detectors and bolometers are the common types of thermal infrared detectors.

Quantum type infrared detectors offer higher detection performance and are faster than thermal type infrared detectors. The photosensitivity of quantum type detectors is wavelength dependent. Quantum type detectors are further classified into two types: intrinsic and extrinsic types. Intrinsic type quantum detectors are photoconductive cells and photovoltaic cells.

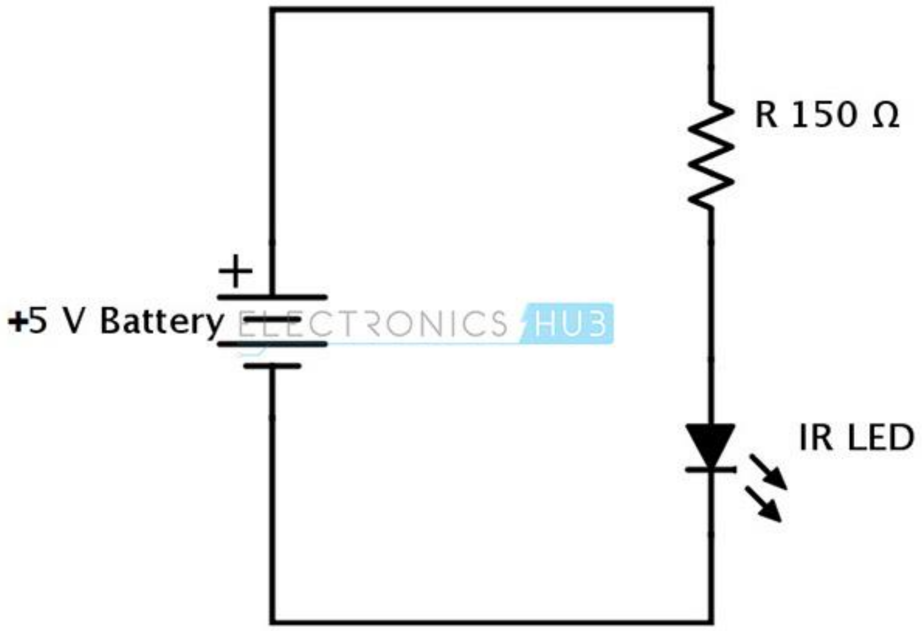
Active infrared sensors consist of two elements: infrared source and infrared detector. Infrared sources include an LED or infrared laser diode. Infrared detectors include photodiodes or phototransistors. The energy emitted by the infrared source is reflected by an object and falls on the infrared detector.



IR Transmitter

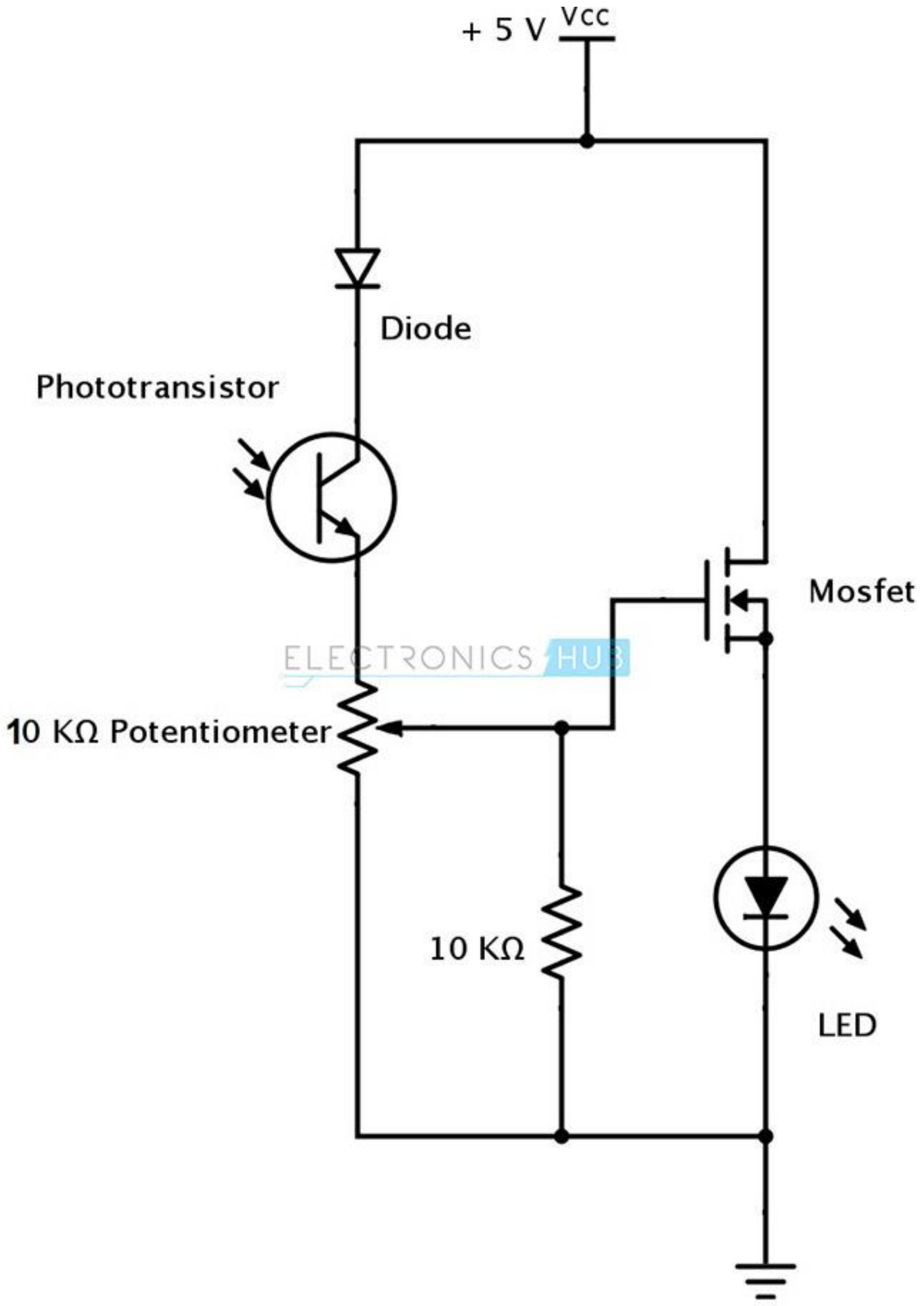
Infrared Transmitter is a light emitting diode (LED) which emits infrared radiations. Hence, they are called IR LED's. Even though an IR LED looks like a normal LED, the radiation emitted by it is invisible to the human eye.

The picture of a typical Infrared LED is shown below.



IR Receiver

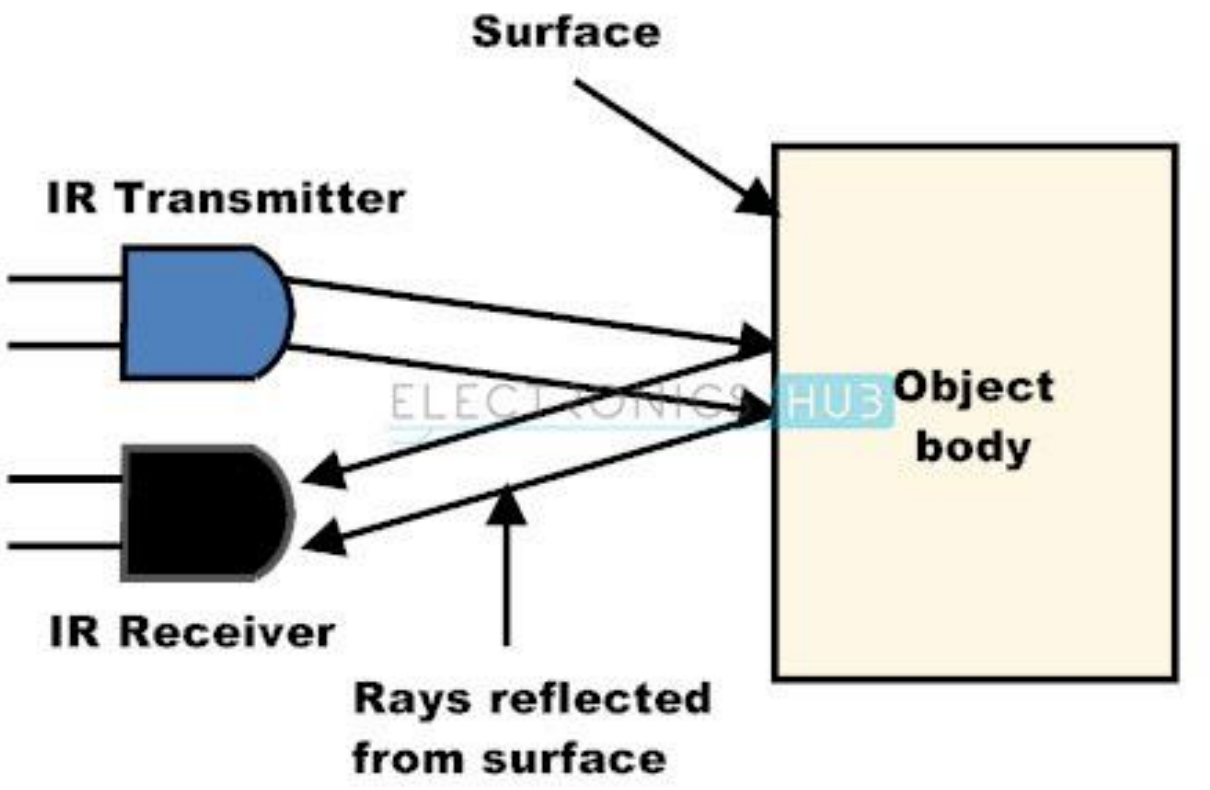
Infrared receivers are also called as infrared sensors as they detect the radiation from an IR transmitter. IR receivers come in the form of photodiodes and phototransistors. Infrared Photodiodes are different from normal photo diodes as they detect only infrared radiation. The picture of a typical IR receiver or a photodiode is shown below.



It consists of an IR phototransistor, a diode, a MOSFET, a potentiometer and an LED. When the phototransistor receives any infrared radiation, current flows through it and MOSFET turns on. This in turn lights up the LED which acts as a load. The potentiometer is used to control the sensitivity of the phototransistor.

Principle of Working

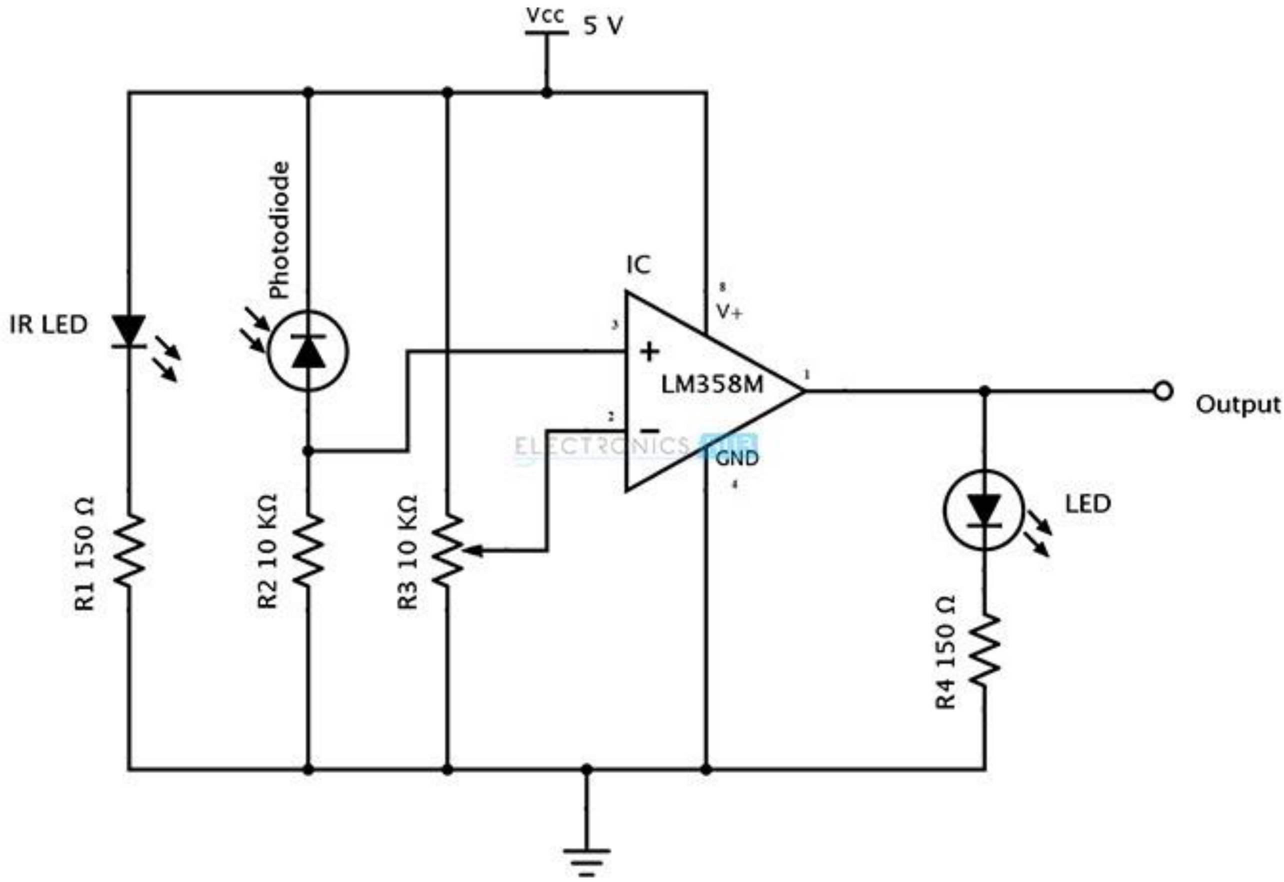
The principle of an IR sensor working as an Object Detection Sensor can be explained using the following figure. An IR sensor consists of an IR LED and an IR Photodiode; together they are called as Photo – Coupler or Opto – Coupler.



When the IR transmitter emits radiation, it reaches the object and some of the radiation reflects back to the IR receiver. Based on the intensity of the reception by the IR receiver, the output of the sensor is defined

Obstacle Sensing Circuit or IR Sensor Circuit

A typical IR sensing circuit is shown below



It consists of an IR LED, a photodiode, a potentiometer, an IC Operational amplifier and an LED.

IR LED emits infrared light. The Photodiode detects the infrared light. An IC Op – Amp is used as a voltage comparator. The potentiometer is used to calibrate the output of the sensor according to the requirement.

When the light emitted by the IR LED is incident on the photodiode after hitting an object, the resistance of the photodiode falls down from a huge value. One of the input of the op – amp is at threshold value set by the potentiometer. The other input to the op-amp is from the photodiode's series resistor. When the incident radiation is more on the photodiode, the voltage drop across the series resistor will be high. In the IC, both the threshold voltage and the voltage across the series resistor are compared. If the voltage across the resistor series to photodiode is greater than that of the threshold voltage, the output of the IC Op – Amp is high. As the output of the IC is connected to an LED, it lightens up. The threshold voltage can be adjusted by adjusting the potentiometer depending on the environmental conditions.

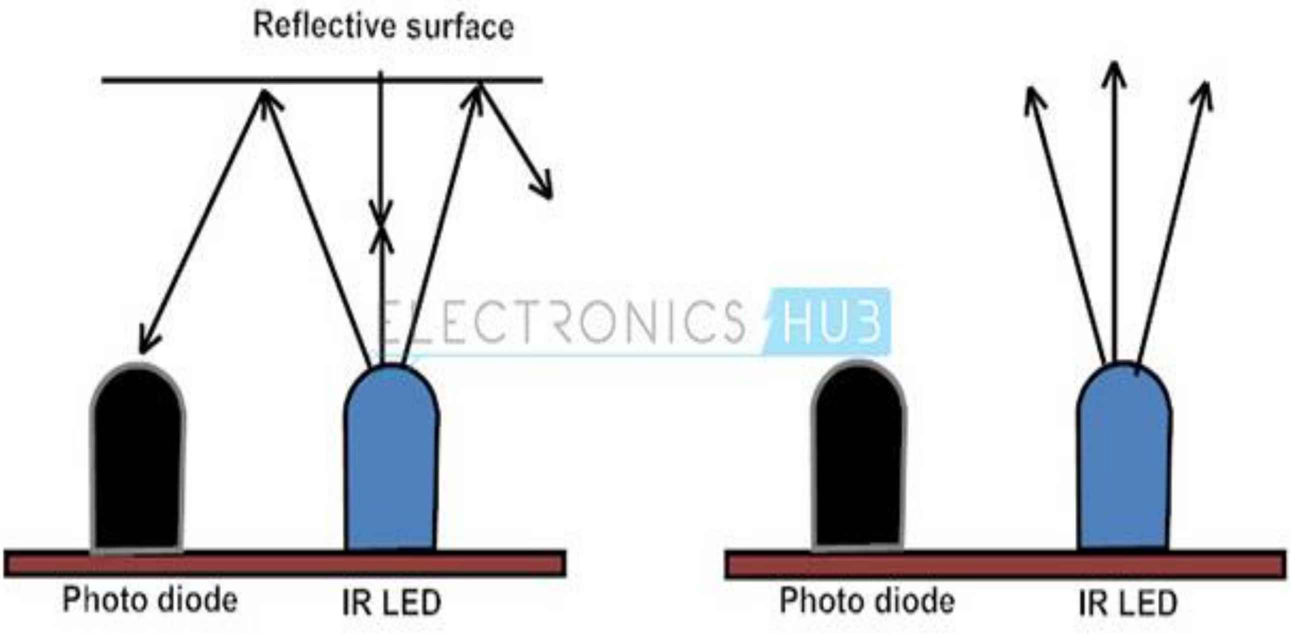
The positioning of the IR LED and the IR Receiver is an important factor. When the IR LED is held directly in front of the IR receiver, this setup is called Direct Incidence. In this case, almost the entire radiation from the IR LED will fall on the IR receiver. Hence there is a line of sight communication between the infrared transmitter and the receiver. If an object falls in this line, it obstructs the radiation from reaching the receiver either by reflecting the radiation or absorbing the radiation.

Distinguishing Between Black and White Colors

It is universal that black color absorbs the entire radiation incident on it and white color reflects the entire radiation incident on it. Based on this principle, the second positioning of the sensor couple can be made. The IR LED and the photodiode are placed side by side. When the IR transmitter emits infrared radiation, since there is no direct line of contact between the transmitter and receiver, the emitted radiation must reflect back to the photodiode after hitting any object. The surface of the object can be divided into two types: reflective surface and non-reflective surface. If the surface of the object is reflective in nature i.e. it is white or other light color, most of the radiation incident on it will get reflected back and reaches the photodiode. Depending on the intensity of the radiation reflected back, current flows in the photodiode.

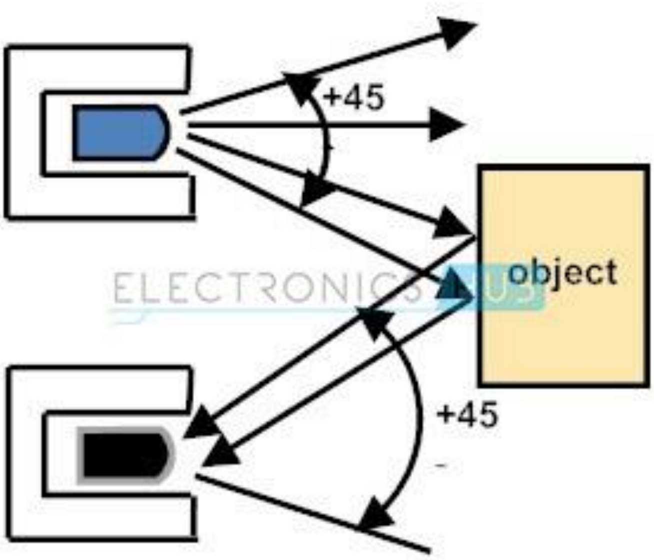
If the surface of the object is non-reflective in nature i.e. it is black or other dark color, it absorbs almost all the radiation incident on it. As there is no reflected radiation, there is no radiation incident on the photodiode and the resistance of the photodiode remains higher allowing no current to flow. This situation is similar to there being no object at all.

The pictorial representation of the above scenarios is shown below.



The positioning and enclosing of the IR transmitter and Receiver is very important. Both the transmitter and the receiver must be placed at a certain angle, so that the detection of an object happens properly. This angle is the directivity of the sensor which is +/- 45 degrees.

The directivity is shown below.



DC MOTORS:

Introduction

Almost every mechanical movement that we see today is accomplished by an electric motor. An electric motor takes electrical energy and produces mechanical energy. Electric motors come in various ratings and sizes. Some applications of large electric motors include elevators, rolling mills and electric trains. Some applications of small electric motors are robots, automobiles and power tools. Electric motors are categorized into two types: DC (Direct Current) motors and AC (Alternating Current) motors. The function of both AC and DC motors is same i.e. to convert electrical energy to mechanical energy.

The basic difference between these two is the power supply which is an AC source for AC motors and a DC source like a battery for DC motors. Both AC and DC electric motors consist of a stator which is a stationary part and a rotor which is a rotating part or armature of the motor. The principle of working of an electric motor is based on the interaction of magnetic field produced by the stator and the electric current flowing in the rotor in order to produce rotational speed and torque.

There are different kinds of DC motors and they all work on the same principle. A DC motor is an electromechanical actuator used for producing continuous movement with controllable speed of rotation. DC motors are ideal for use in applications where speed control and servo type control or positioning is required.

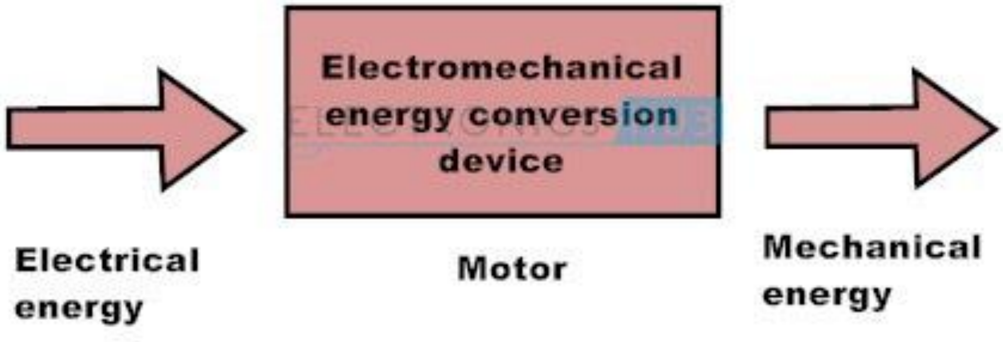
A simple DC motor is shown below.

As mentioned earlier, any motor consists of two parts viz. stator and rotor. Based on the configuration and construction, there are three types of DC motors: brushed motor, brushless motor and servo motor.

Working Principle of DC Motor

An electromechanical energy conversion device will take electrical energy at the input and produces a mechanical energy at the output side. There are three electrical machines that are extensively used for this task: a DC motor, an induction or asynchronous motor and a synchronous motor. Induction motor and synchronous motors are AC motors. In all the motors, the electrical energy is converted into mechanical when the magnetic flux linking a coil is changed.

An electric motor takes electrical energy as input and converts into mechanical energy.



When the electrical energy is applied to a conductor which is placed perpendicular to the direction of the magnetic field, the result of the interaction between the electric current flowing through the conductor and the magnetic field is a force. This force pushes the conductor in the direction perpendicular to both current and the magnetic field, hence, the force is mechanical in nature.

The value of the force can be calculated if the density of the magnetic field B, length of the conductor L and the current flowing in the conductor I are known.

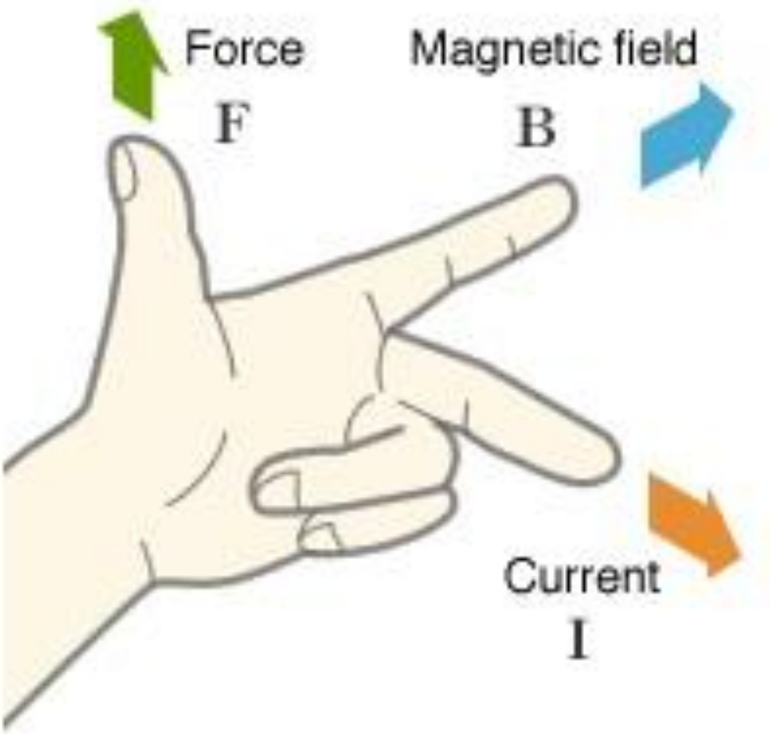
The force exerted on the conductor is given by

$F = B \times I \times L$ Newtons

The direction of the motion of the conductor can be determined with the help of Fleming's Left Hand Rule.

Fleming's Left Hand Rule is applicable to all electric motors.

The figure representing Fleming's Left Hand Rule is shown below.



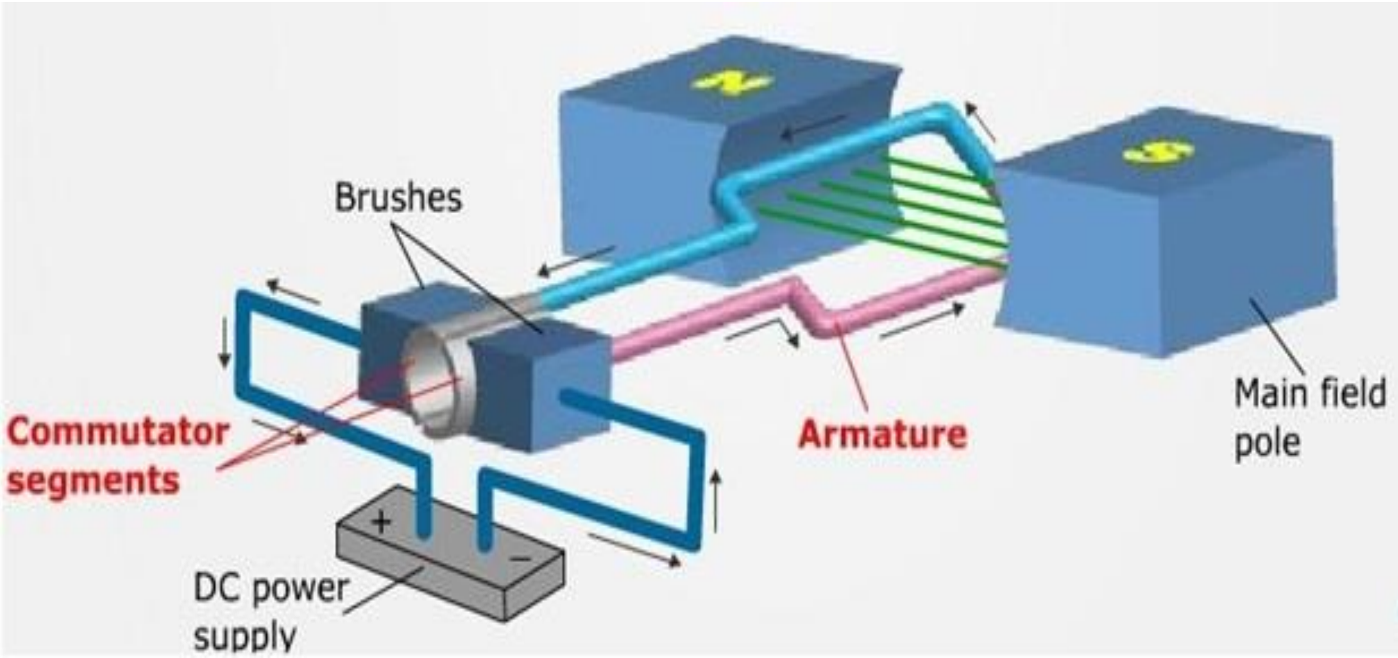
When a conductor which is carrying current is placed in a magnetic field, a force acts on the conductor that is perpendicular to both the directions of magnetic field and the current.

According to Fleming’s Left Hand Rule, the left hand thumb represents the direction of the force, the index finger represents the direction of the magnetic field and the middle finger represents the direction of the current.

A DC motor consists of two sets of coils called armature winding and field winding. Field winding is used to produce the magnetic field. A set of permanent magnets can also be used for this purpose. If field windings are used, it is an electromagnet. The field winding is the fixed part of the motor or a stator. The armature winding is rotor part of the motor. The rotor is placed inside of stator. The rotor or the armature is connected to the external circuit through a mechanical commutator.

Generally, Ferro magnetic materials are used to make both stator and rotor which are separated by air gap. The coil windings inside the stator are made of series or parallel connections of number of coils. The Copper windings are generally employed for both armature and field windings.

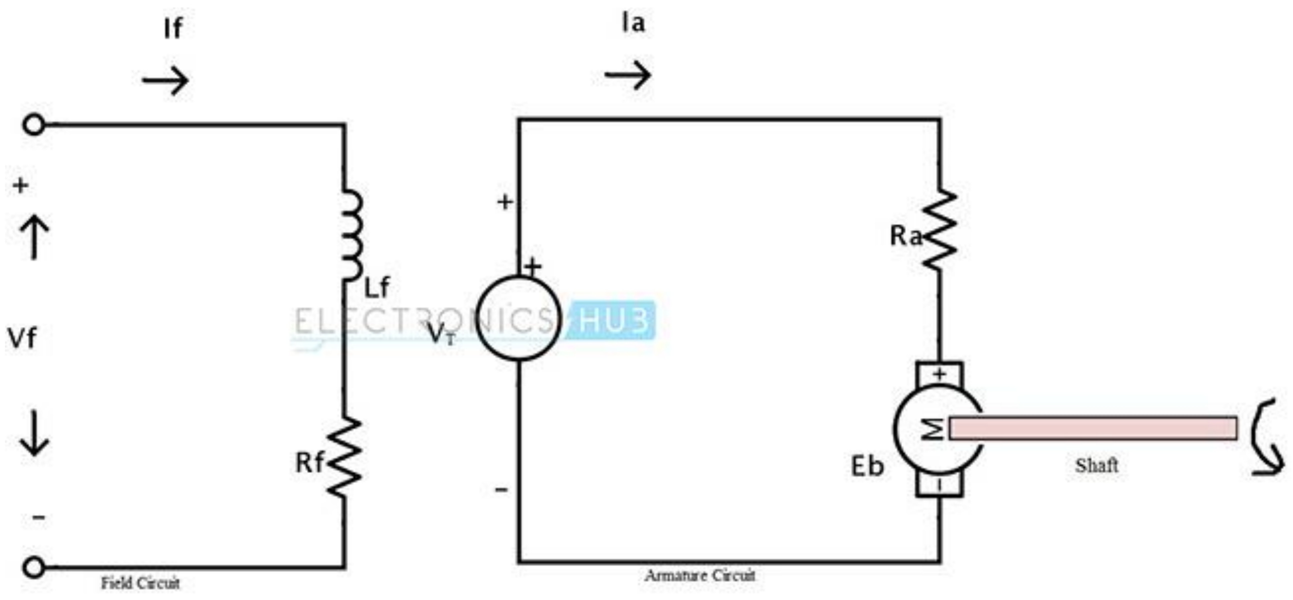
The principle of operation of a DC motor is explained below.



Consider a coil placed in a magnetic field with a flux density of B Tesla. When the coil is supplied with direct current by connecting it to a DC supply, a current I flows through the length of the coil. The electric current in the coil interacts with the magnetic field and the result is exertion of a force on the coil according to the Lorenz force equation. The force is proportional to the strength of the magnetic field and the current in the conductor.

The same principle is used in DC motor and it consists of several coils that are wound on the armature and all the coils experience the same force. The result of this force is the rotation of the armature. The rotation of the conductor in the magnetic field will result in torque. The magnetic flux linking with the conductor is different at different positions of the coil in the magnetic field and these causes to induce an emf in the coil according to the Faradays laws of electromagnetic induction. This emf is referred to as back emf. The direction of this emf is opposite to the supply voltage which is responsible for current to flow in the conductor. Hence the total amount of current flowing in the armature is proportional to the difference between the supply voltage and the back emf.

The electrical equivalent of a DC motor is shown below.



A DC motor electrical equivalent circuit is divided into two circuits: field circuit and armature circuit. Field circuit is responsible for the magnetic field and is supplied with a separate DC voltage V_f. The resistance and inductance of the field winding are represented by R_f and L_f. As a result of the voltage, a current I_f is produced in the winding and it establishes the necessary magnetic field.

In the armature, a voltage V_T is applied across the terminals of the motor and a current I_a flows in the armature circuit. The resistance of the armature winding is Ra and the total voltage induced in the armature is E_b.

Applying Kirchhoff's Voltage Law in both the circuits,

$V_f = I_f * R_f$

$V_T = I_a * R_a + E_b$

The torque developed in the motor is

$T = K * I_a * \Phi$

Where k is constant depending on coil geometry and Φ is magnetic flux.

The electrical power of the motor is $E_b * I_a$.

The developed power which is the power converted to mechanical form is given below:

$P = T * \omega_n$ where ω is the angular speed.

This is the total power that is delivered to the induced armature voltage and

$E_b * I_a = T * \omega_n$

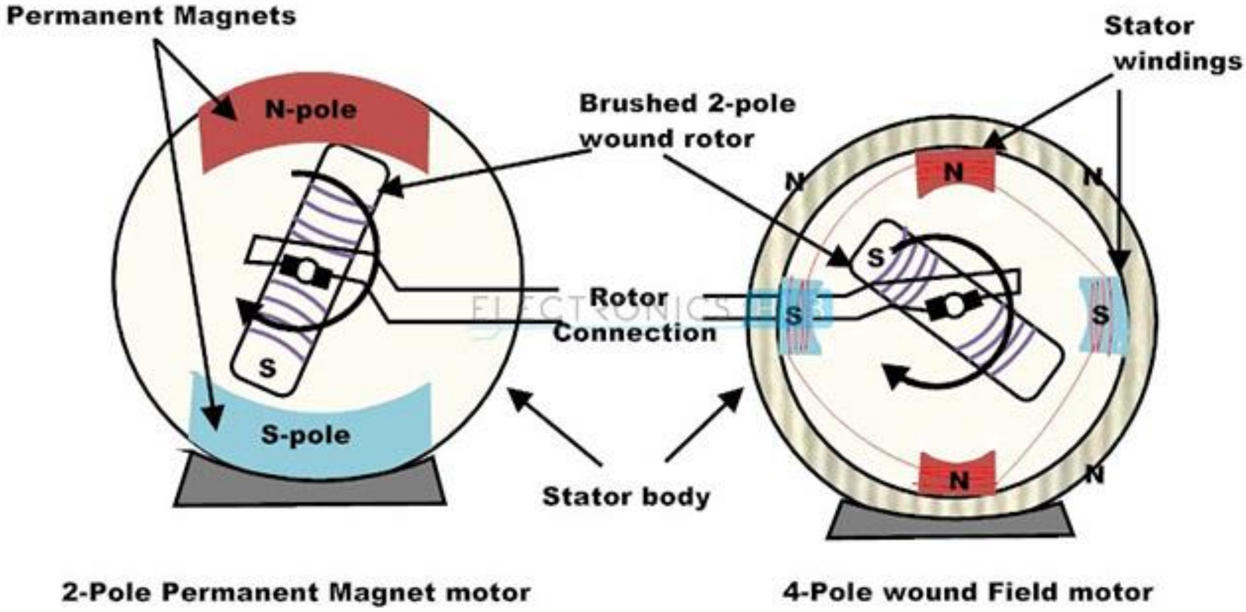
Types of DC Motors

DC motors are mainly classified into two types in the way of rotor is powered. They are Brushed DC motors and Brushless DC motors. As its name indicates, the brushes are present in brushed DC motor to supply the current to the rotating armature via the commutator whereas in a brushless DC motor no need of brushes as it uses a permanent magnet rotor.

Brushed DC Motor

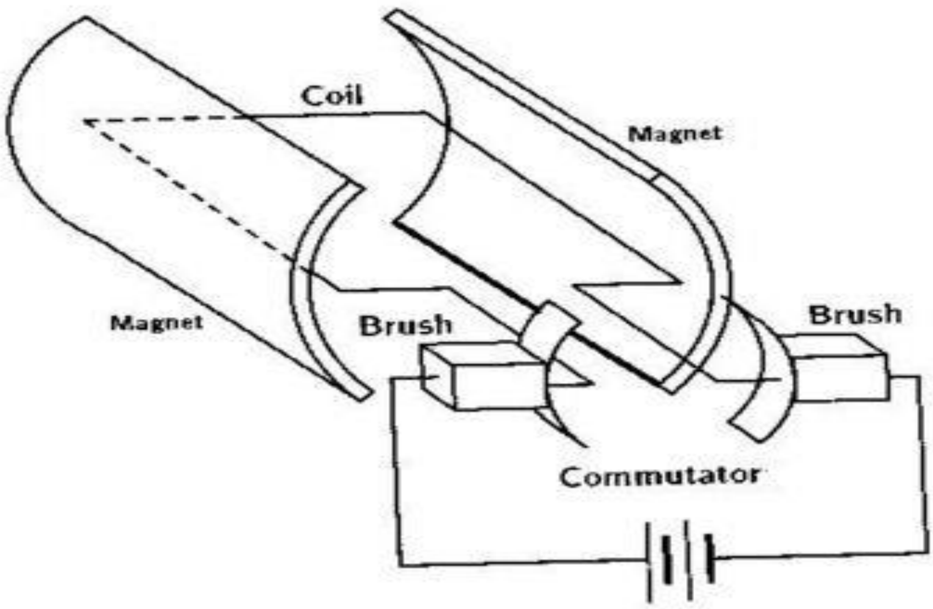
In this type of motors, magnetic field is produced by passing current through a commutator and brush which are inside the rotor. Hence, they are called Brushed Motors. The brushes are made up of carbon. These can be separately excited or self-excited motors.

The stator part of the motor consists of coils connected in a circular fashion in such a way that the required alternative north and south poles are formed. This coil setup can be in series or in parallel to the rotor coil winding forming series wound DC motors and shunt wound DC motors. The armature or the rotor part of the DC motor consists of Commutator which essentially a current carrying conductor connected at one end to copper segments which are electrically isolated. External power can be connected to commutator via the brushes as the armature rotates.



Permanent Magnet DC Motors: In case of permanent magnet DC motors, a powerful magnet is used to produce the magnetic field. Hence a permanent magnet DC motor consists of only armature winding.

A permanent magnet brushed DC motor is shown below.



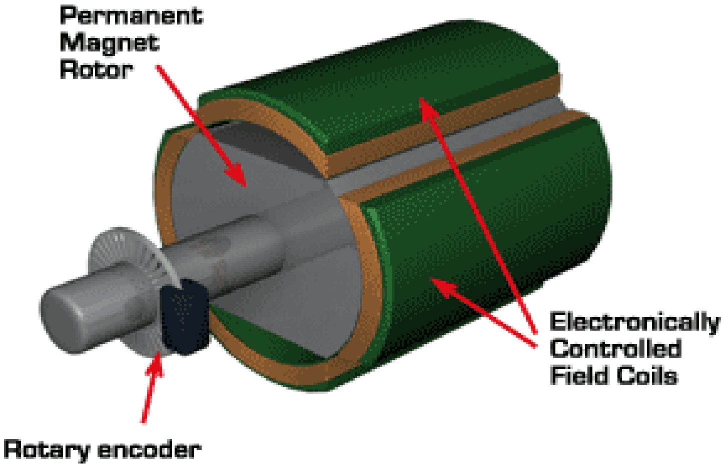
Permanent magnet brushed DC motors are smaller and cheaper than stator wound type DC motors. Generally rare earth magnets like Samarium Cobalt or Neodymium Iron Boron are used as magnets in permanent magnet DC motors as they are very powerful magnets and have high magnetic fields.

The speed/torque characteristics of a permanent magnet DC motor are more linear than stator wound DC motors.

The disadvantage of a brushed DC motor is the occurrence of sparks between commutator and brushes under heavy load conditions. This generates large amount of heat and reduces the lifetime of the motor.

Brushless DC Motor

Brushless DC motors typically consist of a permanent magnet rotor and a coil wound stator. This design by using permanent magnets in rotor eliminates the need for brushes in the rotor part. Hence, in contrast to brushed DC motors, these type do not contain any brushes and therefore no wear and tear of brushes as little amount of heat is generated.

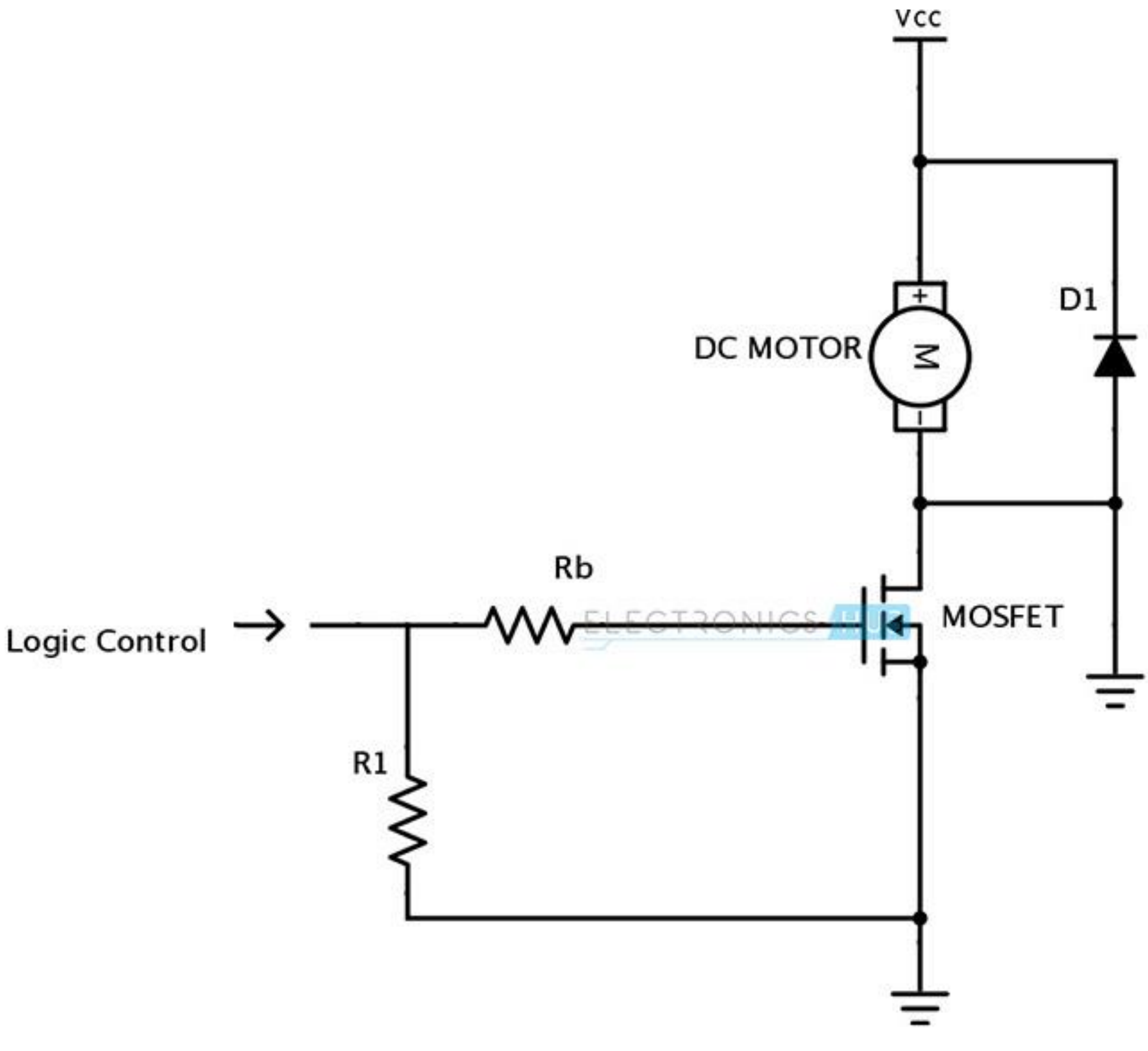


As there are no brushes in the motor, there should be some other means to detect the angular position of the rotor. Hall Effect sensors are used to produce the feedback signals that are required to control any semiconductor switching devices. Brushless DC motors are more expensive than brushed DC motors and are more efficient than their brushed cousins.

Driving a DC Motor

A DC motor can be switched ON or OFF with the help of transistors, switches or relays. The simplest form of motor control is linear control which uses a bipolar junction transistor acting as a switch. The purpose of drive circuits is to control the current in the windings. The speed of the motor can be controlled by varying the amount of base current in the transistor. If the transistor is in active state, then the motor rotates with half speed as only half of the supply voltage goes to the motor. The motor rotates at its maximum speed when all of the supply voltage goes to it. This happens when the transistor is in saturation.

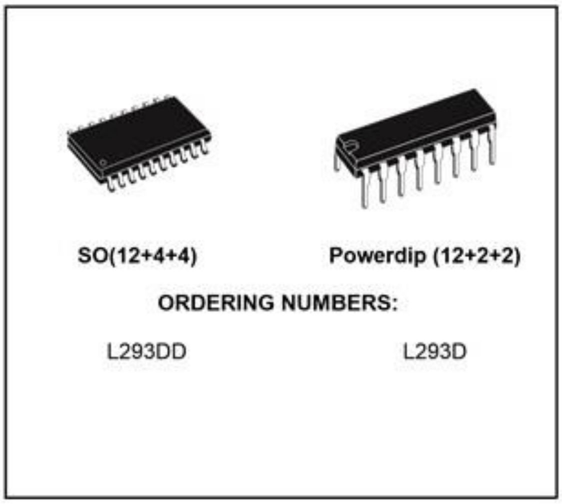
The following circuit is used for driving a motor in one direction.



In the above circuit, the resistors R_b and R_1 are very important. The resistor R_b is used to protect the control circuit from current spikes. The resistor R_1 ensures that the transistor is turned OFF when the input pin is tri-stated.

L293D Motor Driver IC

- 600mA OUTPUT CURRENT CAPABILITY PER CHANNEL
- 1.2A PEAK OUTPUT CURRENT (non repetitive) PER CHANNEL
- ENABLE FACILITY
- OVERTEMPERATURE PROTECTION
- LOGICAL "0" INPUT VOLTAGE UP TO 1.5 V (HIGH NOISE IMMUNITY)
- INTERNAL CLAMP DIODES



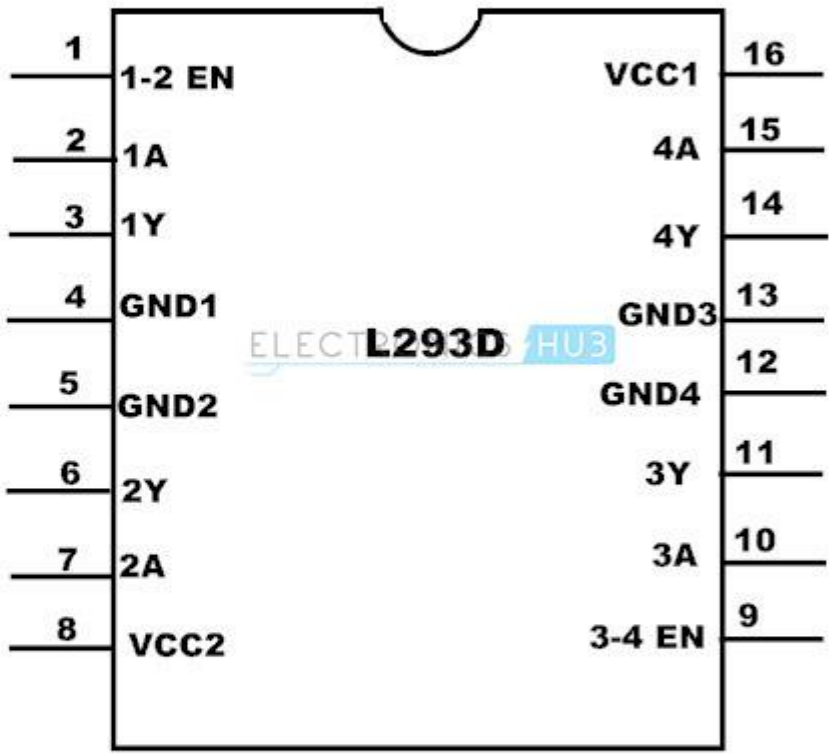
The Device is a monolithic integrated high voltage, high current four channel driver designed to accept standard DTL or TTL logic levels and drive inductive loads (such as relays solenoides, DC and stepping motors) and switching power tranistors.

To simplify use as two bridges each pair of channels is equipped with an enable input. A separate supply input is provided for the logic, allowing operation at a lower voltage and internal clamp diodes are included.

This device is suitable for use in switching applications at frequencies up to 5 kHz.The L293D is assembled in a 16 lead plastic packaage which has 4 center pins connected together and used for heatsinking

L293D IC is a motor driver IC that works on the concept of H – bridge. This IC allows the motor to drive in both the directions. L293D IC is a 16 pin device with two sets of inputs and outputs. Hence it is possible to control two DC motors with a single IC.

The pin diagram of L293D IC is as below.



The pins 2, 7 and 10, 15 are the control signals which are used to control the rotation of the motors.

For motor 1,

Pin 2 = logic 1 and pin 7 = logic 0 —- forward direction

Pin 2 = logic 0 and pin 7 = logic 1 —- reverse direction

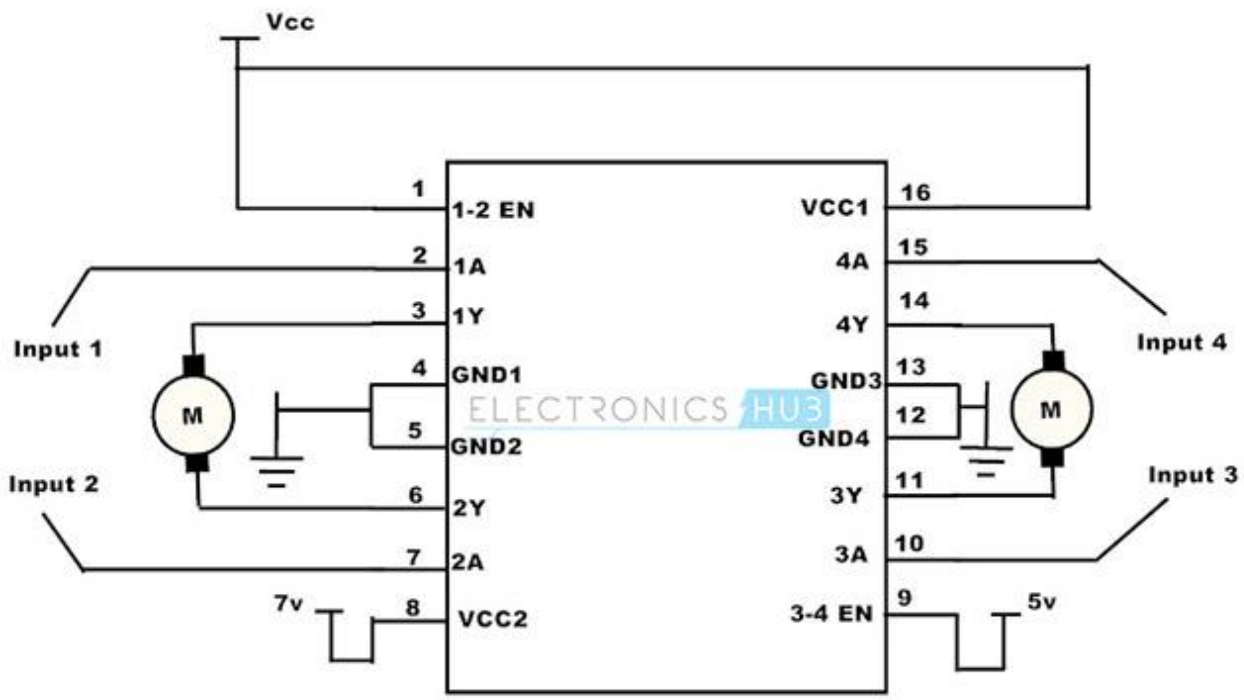
For other combinations, there is no rotation.

Similarly for motor 2,

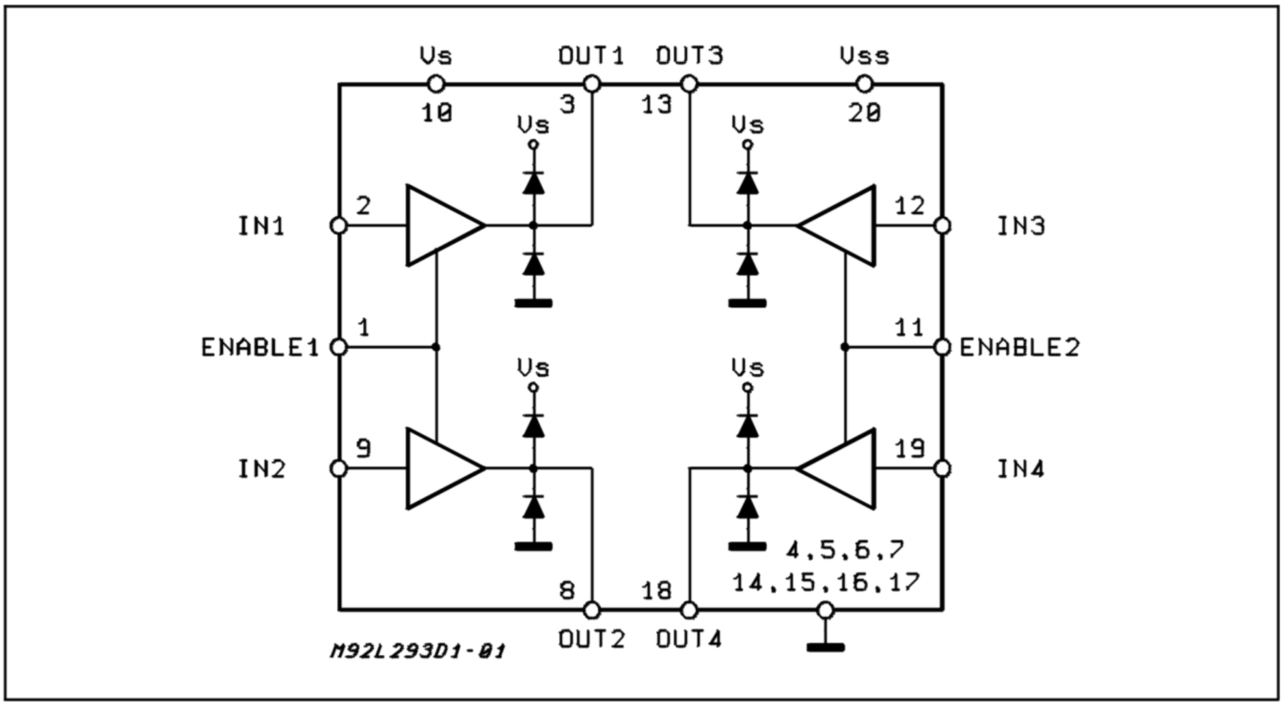
Pin 10 = logic 1 and pin 15 = logic 0 ——forward direction

Pin 10 = logic 0 and pin 15 = logic 1 ——reverse direction.

The circuit for controlling two motors using L293D motor driver IC is shown below.



The voltage supply VCC1 is used for the internal operations i.e. to activate signals or to enable or disable. To drive the motor, the supply VCC2 is used. Generally VCC1 = 5V and VCC2 = 9 or 12 V.



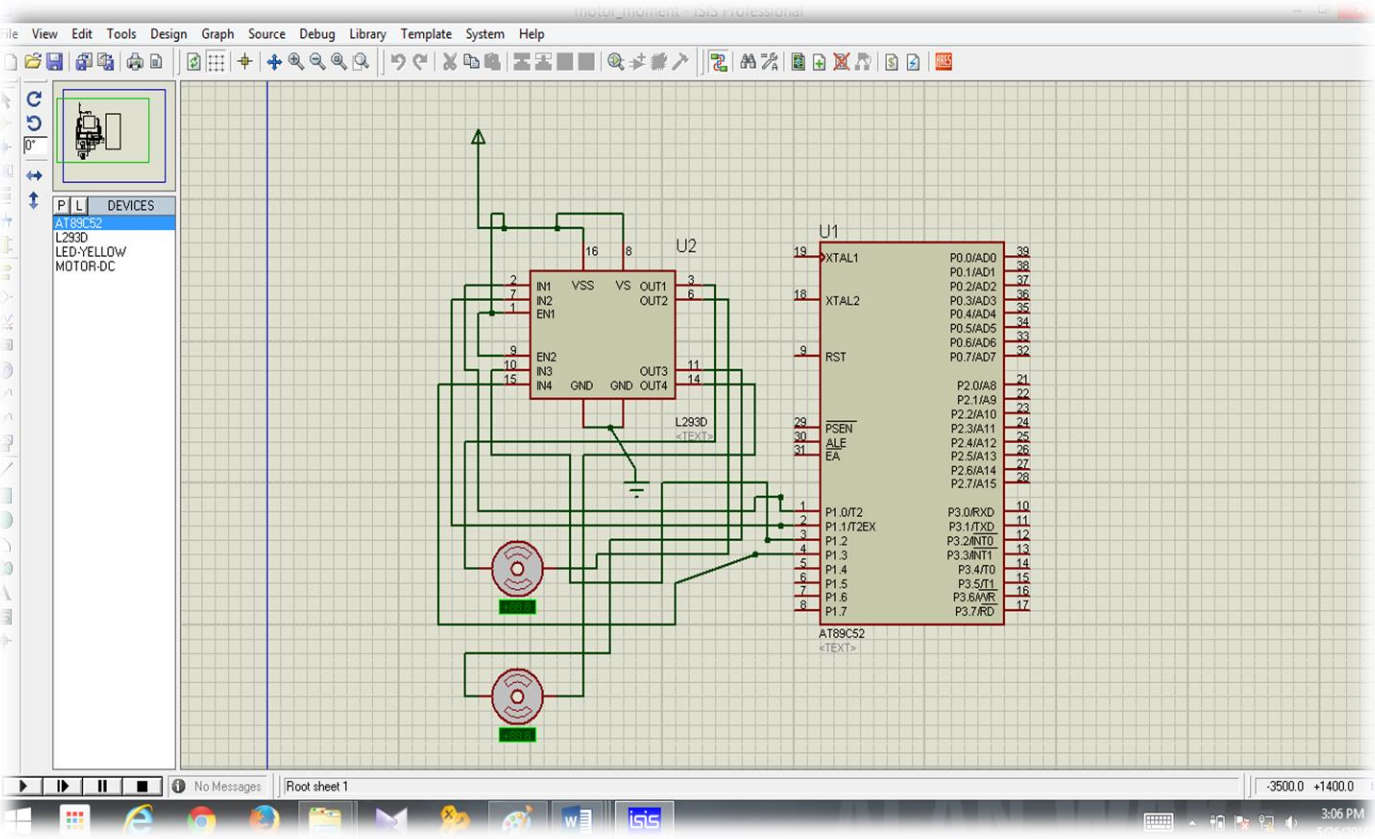
ABSOLUTE MAXIMUM RATINGS

Symbol	**Parameter**	**Value**	**Unit**
VS	Supply Voltage	36	V
VSS	Logic Supply Voltage	36	V
V_i	Input Voltage	7	V
Ven	Enable Voltage	7	V
Io	Peak Output Current (100 µs non repetitive)	1.2	A
Ptot	Total Power Dissipation at T_{pins} = 90 °C	4	W
Tstg, Tj	Storage and Junction Temperature	– 40 to 150	°C

Truth table:

Input	Enable (*)	Output
H	H	H
L	H	L
H	L	Z
L	L	Z

Connection of L293D with controller and DC motor in proteus :


View Edit Tools Design Graph Source Debug Library Template System Help
DEVICES
AT89C52
L293D
LED-YELLOW
MOTOR-DC
U2
IN1 IN2 EN1 EN2 IN3 IN4 VSS VS OUT1 OUT2 OUT3 OUT4 GND GND
L293D
U1
XTAL1
XTAL2
RST
PSEN
ALE
EA
P1.0/T2
P1.1/T2EX
P1.2
P1.3
P1.4
P1.5
P1.6
P1.7
P0.0/AD0
P0.1/AD1
P0.2/AD2
P0.3/AD3
P0.4/AD4
P0.5/AD5
P0.6/AD6
P0.7/AD7
P2.0/A8
P2.1/A9
P2.2/A10
P2.3/A11
P2.4/A12
P2.5/A13
P2.6/A14
P2.7/A15
P3.0/RXD
P3.1/TXD
P3.2/INT0
P3.3/INT1
P3.4/T0
P3.5/T1
P3.6/WR
P3.7/RD
AT89C52
No Messages
Root sheet 1
-3500.0 +1400.0
3:06 PM

LIQUID CYSTAL DISPLAY (LCD)

LCD display consists of an array of tiny segments known as pixels that can be manipulated to present information. As a result of this technology, many types of this displays are used in applications like calculator, watch, messaging boards, clock, equipment, machines and a host of other devices that one can think of.
Most of the Display types are reflective, meaning that they use only ambient light to illuminate the display. Even displays that do require an external light source consume much less power than CRT devices.

An LCD basically consists of two glass plates with some liquid crystal material between them. The small size compared to CRT makes it practical for applications where size, current consumption and weight are the main consideration in electronics design.

A liquid crystal display is a thin, lightweight display device with no moving parts. It consists of an electrically controlled light polarizing liquid trapped in cells between two transparent polarizing sheets.
The polarizing axes of the two sheets are aligned perpendicular to each other. Each cell is supplied with electrical contacts that allow an electric field to be applied to the liquid inside.

The typical LCD modules which will be able to display graphics or characters when interface with a microcontroller or microprocessor.
Light is polarized by one sheet, rotated through the smooth twisting of the crystal molecules, then passes through the second sheet. The whole assembly looks nearly transparent. A slight darkening will be evident because of light losses in the original polarizing sheet. When an electric field is applied, the molecules in the liquid align themselves with the field, inhibiting rotation of the polarized light. As the light hits the polarizing sheet perpendicular to the direction of polarization, all the light is absorbed and the cell appears dark.

One of the most common devices attached to an any controller is an LCD display. Some of the most common LCDs connected to the controller are 16x2 and 20x2 displays. This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively.

Fortunately, a very popular standard exists which allows us to communicate with the vast majority of LCDs regardless of their manufacturer. The standard is referred to as HD44780U, which refers to the controller chip which receives data from an external source (in this case, the 8051) and communicates directly with the LCD.

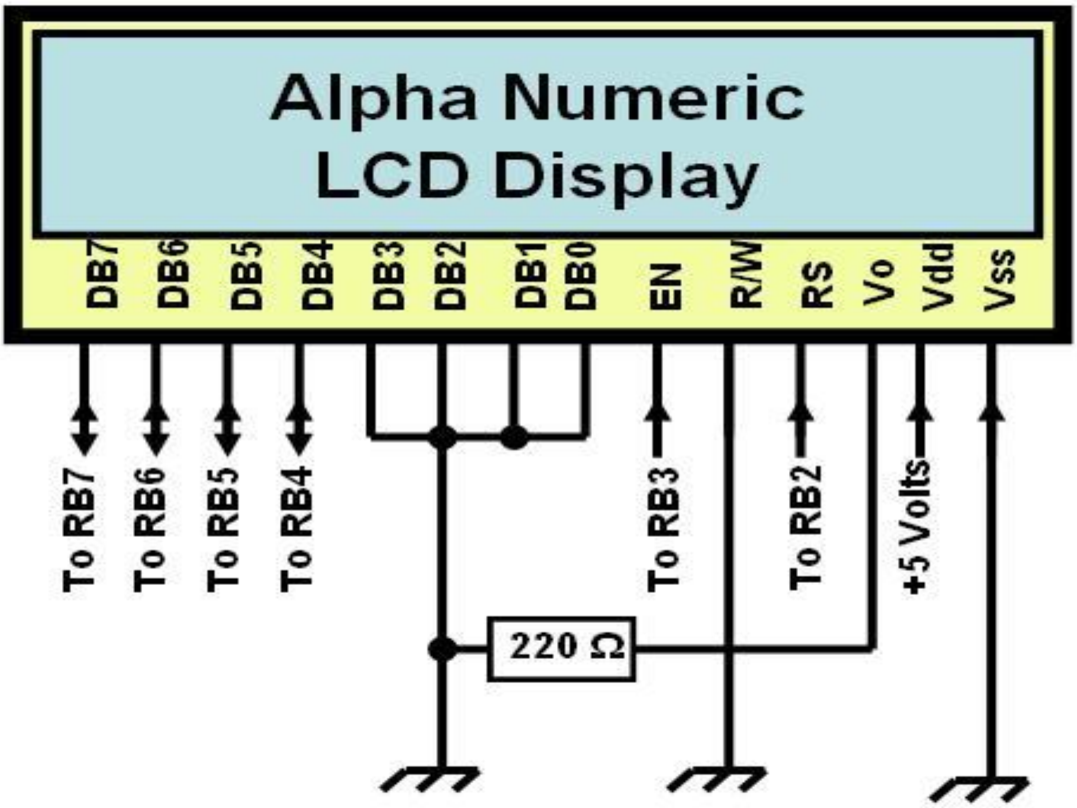
44780 BACKGROUND

The 44780 standard requires 3 control lines as well as either 4 or 8 I/O lines for the data bus. The user may select whether the LCD is to operate with a 4-bit data bus or an 8-bit data bus. If a 4-bit data bus is used, the LCD will require a total of 7 data lines (3 control lines plus the 4 lines for the data bus). If an 8-bit data bus is used, the LCD will require a total of 11 data lines (3 control lines plus the 8 lines for the data bus). The three control lines are referred to as **EN**, **RS**, and **RW**.

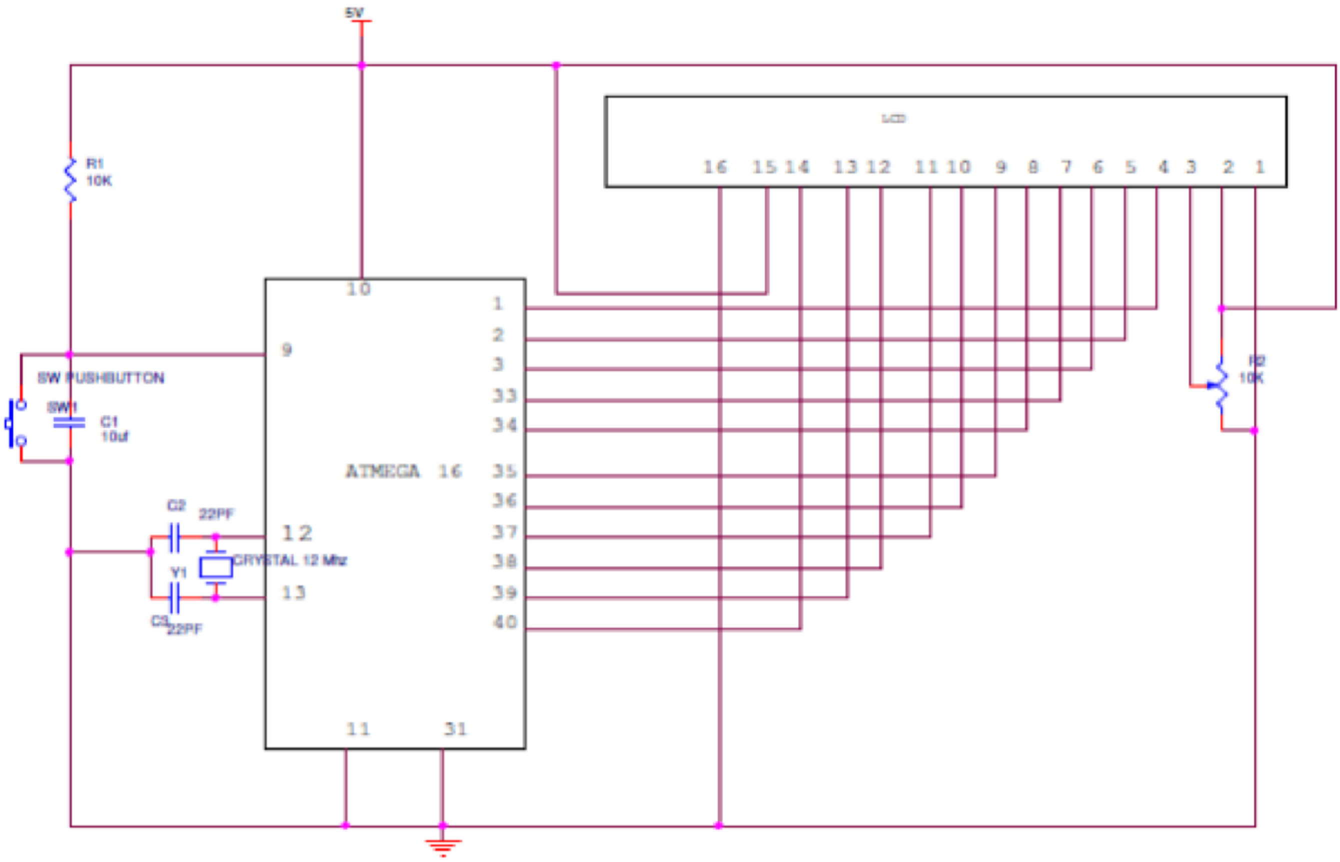
The **EN** line is called "Enable." This control line is used to tell the LCD that you are sending it data. To send data to the LCD, your program should first set this line high (1) and then set the other two control lines and/or put data on the data bus. When the other lines are completely ready, bring **EN** low (0) again. The 1-0 transition tells the 44780 to take the data currently found on the other control lines and on the data Bus and to treat it as a command.

The **RS** line is the "Register Select" line. When RS is low (0), the data is to be treated as a command or special instruction (such as clear screen, position cursor, etc.). When RS is high (1), the data being sent is text data which sould be displayed on the screen. For example, to display the letter "T" on the screen you would set RS high.

The **RW** line is the "Read/Write" control line. When RW is low (0), the information on the data bus is being written to the LCD. When RW is high (1), the program is effectively querying (or reading) the LCD. Only one instruction ("Get LCD status") is a read command. All others are write commands--so RW will almost always be low. Finally, the data bus consists of 4 or 8 lines (depending on the mode of operation selected by the user). In the case of an 8-bit data bus, the lines are referred to as DB0, DB1, DB2, DB3, DB4, DB5, DB6, and DB7.



Circuit diagram of interfacing LCD 16x2 with AVR (atmega16) controller:



LCD controlling command for 8051:

Code (Hex)	Command to LCD Instruction Register
1	Clear display screen
2	Return home
4	Decrement cursor (shift cursor to left)
6	Increment cursor (shift cursor to right)
5	Shift display right
7	Shift display left
8	Display off, cursor off
A	Display off, cursor on
C	Display on, cursor off
E	Display on, cursor blinking
F	Display on, cursor blinking
10	Shift cursor position to left
14	Shift cursor position to right
18	Shift the entire display to the left
1C	Shift the entire display to the right
80	Force cursor to beginning to 1st line
C0	Force cursor to beginning to 2nd line
38	2 lines and 5x7 matrix

CHAPTER 4

CONCLUSION AND FUTURE SCOPE

CONCLUSION

Usually people drive very harshly in heavy traffic prone areas as they are in a hurry, but in that hurriedness they often end in loosing either their life or someone other life on road.

Our project is based on **“Automatic Vehicle Speed Control System”**, so it has a great significance in termination and reduction of overall accidents and casualties in high traffic prone areas.

This project has a system that checks the speed of the vehicle using IR sensors and microcontroller and sends warning signals to driver to lower down the speed if speed is on higher side. Incase driver don’t reduce the speed then within seconds our system will take over the control and will reduce ate speed of vehicle automatically.

Hence,this project is a great life saving system in heavy traffic areas.

SCOPE

- Scope of this project idea is very bright as it is a life saving tool and there is nothing more important than human life.
- In future every vehicle will have such type of system that will reduce number of fatal accidents.
- This system can increase it's compatibility by using ultra-sonic sensors.
- Ultra-sonic sensors can detect any hurdles on road such as breakers, buildings etc.
- The system with ultra-sonic sensor will be very effective while driving in hilly areas where sharp turns causes problems especially in night.
- This system will also reduce vehicle mash-up on road while over-taking or going with high speed as it will detect vehicle in-front and automatically maintains safe distance and speed.

CHAPTER 5

REFERENCE AND BIBLIOGRAPHY

BIBLIOGRAPHY

[1] "The 8051 Microcontroller Architecture, Programming & Applications “By Kenneth J Ayala.

[2] "The 8051 Microcontroller & Embedded Systems" by Mohammed Ali Mazidi and Janice Gillispie Mazidi.

[3] International journal of scientific &engineering research, volume 4 oct 13

[4] ATMEL AVR studio & ATmega 16 data sheet.

[5] The 8051 micro controller Architecture, Programming & Applications by Ramesh S.Gaonkar.

[6] Electronic components by D.V.Prasad.

[7] Fundamentals of microprocessors and microcomputers by B.Ram.

[8] International journal of engineering trends and technology, volume 3, 2012.

REFERENCE

1. www.mitel.databook.com
2. www.atmel.databook.com
3. www.franklin.com
4. www.keil.com
5. www.google.com
6. www.wikipedia.com
7. http://www.ijser.org
8. www.8051freeprojectsinfo.com
9. www.8052.com
10. www.microsoftsearch.com
11. www.nxp.com
12. www.national.com
13. www.electronicshub.org