NEW HORIZON COLLEGE OF ENGINEERING

MINI PROJECT REPORT ON

"JOYSTICK CONTROLLED ROBOTIC"

SUBMITTED BY

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CERTIFICATE

Certified that the mini project work entitled "JOYSTICK CONTROLLED ROBOTIC " carried out by SIDDAMREDDY VAMSIKRISHNA**(1NH18EC743), KARNA JAGADEESH(1NH18EC722), THURAKA RAVITEJA(1NH18EC754), THURAKA SIVAKUMAR(1NH18EC755)** bonafide students of Electronics and Communication Department, New Horizon College of Engineering, Bangalore.

The mini project report has been approved as it satisfies the academic requirements in respect of mini project work prescribed for the said degree.

Project Guide HOD ECE

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Name of Examiner Signature with Date

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ACKNOWLEDGEMENT

The satisfaction that accompany the successful completion of any task would be, but impossible without the mention of the people who made it possible, whose constant guidance and encouragement helped us succeed.

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CHAPTER 1

1.1 INTRODUCTION

The term robot is gotten from Czech word "robot" which means constrained work. No one has ever given an exact clarification of what a robot is, albeit every one of those definitions pretty much methods the equivalent. To make things more straightforward, "Robot is a blend of hardware, mechanics and programming which detects it's encompassing through its sensors forms the sensor data and accomplishes something accordingly". The reaction can be velocity or control, such as turning on a LED, pivoting a wheel, moving an arm, raising a caution, etc. The part of software engineering and building which manages robot plan, development, application and activity is called Robotics with applications in software engineering, material science, designing, protection and even numerous family unit gadgets.

Compact music player, phones are on the whole instances of installed frameworks which have a controller worked in to perform explicit exercises. Robots are hypothetically unique in that they are outfitted with sensors to see their condition and actuators to perform specific errands and can take savvy choices. In spite of the fact that robots and installed frameworks appear two limits of designing world, the hole between them is decreasing. We definitely realize that clothes washers can detect soil in fabrics and takes keen choices. Climate control systems can detect outside temperature and change interior room temperature. These are insightful inserted frameworks worked inside another greater framework which sees it condition through its sensors and takes restorative activities, in this way controlling the greater frameworks.

:

CHAPTER 2:

COMPONENTS REQUIRED:

- IC1,IC3 - LM1117-5.0 fixed 5v voltage regulator

- IC2,IC4 -ATtiny13A 13A MCU
- IC5 -L293D motor driver
- T1 -BC547 NPN transistor
- D1,D2 -1N4007 rectifier diode
- LED1,LED4 -5mm LED
- Resistors:
- R1,R3,R4,R6
- R8,R9 -2.2-kilo-ohm
- R2,R5,R7 -10-kilo-ohm
- Capacitors:
- C1,C2,C6,C8 -10uf,25v electrolytic
- C3,C4,C7 -0.1uf ceramic disk
- C5 -100uf,25v electrolytic

- BATTERY 1 -9V battery
- BATTERY 2 -7.5v,2200mAh lithium ion battery
- CON1 -5-pin connector
- CON2 -3-pin connector
- M1,M2 - 5v-7.4v battery operated geared motor
- TX1 -433MHz RF transmitter module
- RX1 -433MHz RF receiver module
- S1 -push-to-on switch
- S2 -on/off switch
- Joystick module
- Jumper wires
- 2-pin terminal connector
- Robot cabinet assembly
- Along with two rear wheels and one castor wheel

CHAPTER 3:

3.1 CIRCUIT DIAGRAMS:

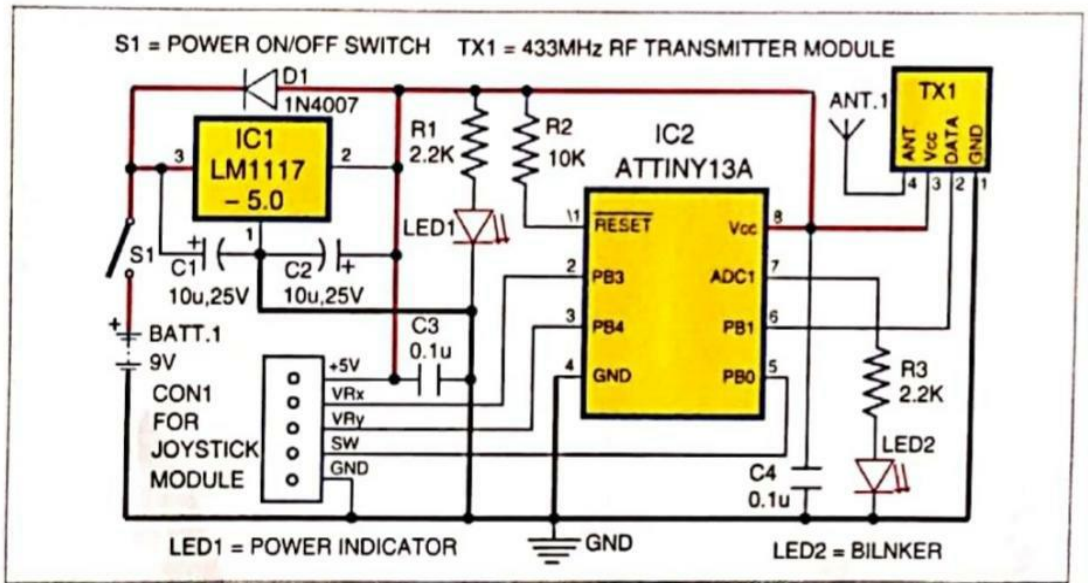


fig.3.1circuit diagram of the transmitter

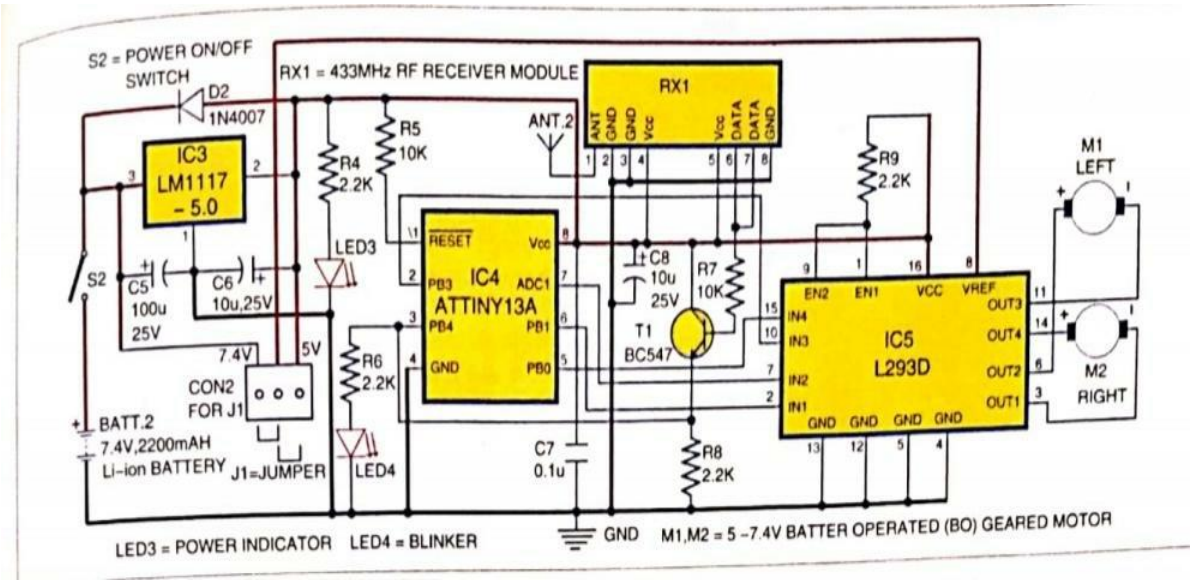


fig.3.2 circuit diagram of the receiver

3.3 WORKING OF TRANSMITTER:

- The transmitter circuit shown in Fig. I is built around joystick module, fixed 5V voltage regulator The 7-5.0 (ICJ), ATtiny13A MCI-J (IC2), 433MHz RF transmitter module (TX l) and a few other components.
- The joystick module, provides x-axis and y-axis control through a switch. Status of joystick movement is read by ATtiny13A MCU, which transmits the status as serial data of eight bits wirelessly through TX I .
- The transmitter section gets 5VDC t power supply from 9V battery through 5V regulator ICI.

3.4 WORKING OF RECEIVER:

- The circuit diagram of the receiver section is shown in Fig.3.2.It is built around fixed 5V voltage regulator LM11I 7-5.0 (1c3), MCU (IC4). 433MHz RF receiver module (RX 1) , motor driver IC L293D) (IC5), two 5V - 7.4V battery operated geared motors (MI and M2) and a few components.
- The receiver circuit contains another eight-pin ATtiny13A MC(J (IC4). [t receives eight-bit transmitted data through RX I and then sends parallel four-bit data (D3 to DO) to IC5. It contains an H-bridge to control motors of the robot. It is powered by two power supplies, 5V and 7.4v via jumper j1 to drive motors Ml and M2. j1 is used to select 5V motor voltage or 7.4V battery voltage.
- 5V regulator IC3 is used for the MCU and RX l . The 5V power supply is derived from 7.4V lithium-ion or 7.4M lithium-polymer batteries. Here, 7.4V lithium-ion battery is used.
- Data transmitted from the transmitter section contains eight bits of serial data; last four bits are a replica of the first four bits. This concept is useful to cross-check the correctness of received data in the receiver section.
- ATtiny13A does not have serial data transmission pins; hence, a separate coding is developed for serially transmitting and receiving using ATtiny13A (like PWM concept), which is explained below.

- Logic low (zero) = signal is one millisecond off with prefix one millisecond on.

Logic high (one) = signal is three milliseconds off with prefix one millisecond on.

- Logic start (or reset) = signal is five milliseconds or more off with prefix one millisecond on. Refer Fig. 5.

3.5 SOFTWARE

The source code is written in c language function send code is used in joystickTx.cto transmit the code, while loop in joysticRx.c continuously monitors the signal and then sends the proper four-bit data to IC L293D to control the motors .accordingly joystick Tx .hex is generated to burn it into Attiny13a(13A) and joystickRx.hex to attiny13a(ic4).For burning the codes you can use any suitable ATtiny13A programmer.

3.6 CONSTRUCTION AND TESTING:

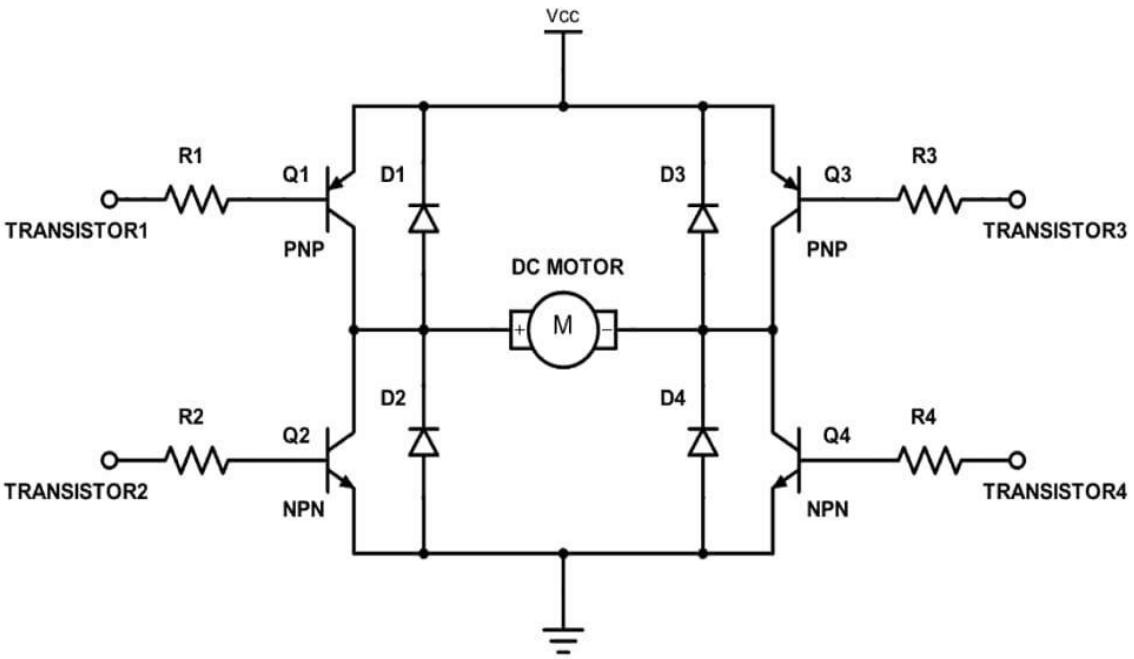
- An actual-size PCB layout of the transmitter section . Assemble the circuit on the PCB. Connect the joystick module across connector CONI using external jumper wires. Power supply for the transmitter is provided by 9V battery.
- An actual-size PCB layout of the receiver section . Make all jumper connections using external wires. Assemble the circuit on the PCB. Power supply for the receiver is provided by 7.4V lithium battery.
- After assembling the circuit on transmitter and receiver PCBs without RF modules, burn/ write JoystickTx.hex and JoystickRx.hex on the respective ATtiny13A MCUs using a suitable AVR programmer. Then, mount the MCUs on the respective PCBs.
- Connect signal output pin 6 of ATtiny13 of the transmitter board and signal input pin 3 of ATtiny13 of the receiver board without connecting.
- Power on both boards and Observe blinker LED2 on the transmitter board. It blinks whenever data bits are correctly transmitted in the loop. Blinker LED4 on the receiving board blinks whenever motor movement data is received.
- Next,take a look at the motors using the joystick. If motors are not rotating. check voltage status of D3 to DO (pins 2.,7,6 and 5) of ATtiny18A of the receiving board using a voltmeter for an L.E.D with 2.2 kilo-ohm resistance in series ,Check connections of the motors and L293D.
- To change direction of rotation of the motors, interchange the wire connections on the receiving board as per requirement.
- If everything is alright. power off both boards. Remove the connecting wires between transmitter and receiver boards .Connect RF modules on the transmitter and receiver boards, and test for RF connectivity.
- Fix the receiver unit on chassis of the robot along with the wheels.M1 and M2 are fixed on the chassis along with a castor wheel at the front of the robot. Keep the transmitter unit and the joystick with you to control the robot. Now, you can control the robot using the joystick from a distance of up to thirty metres: the range depends on RF modules

CHAPTER 4:

4.1 PROPOSED METHODOLOGY

- The circuit presented here uses a joystick to control a robot.aA joystick is more comfortable to use and accurate to control a robot as compared to switches.
- The circuit is simple and low cost . It uses a two attiny13a eight microcontrollers for both transmitter and receiver circuits.
- The circuit of the joystick controlled robot comprises a transmitter and receiver.

4.2 H-BRIDGE**:**



- A H-bridge is an electronic circuit that switches the extremity of a voltage applied to a heap. These circuits are regularly utilized in mechanical technology and different applications to permit DC engines to run advances or in reverse.
- Most DC-to-AC converters (power inverters), most AC/AC converters, the DC-to-DC push–pull converter, most motor controllers, and numerous different sorts of intensity gadgets use H-spans. Specifically, a bipolar stepper engine is constantly determined by an engine controller containing to H-bridges

CHAPTER 5

5.1 HARDWARE COMPONENTS DISCRIPTION:

5.1.1 JOYSTICK:

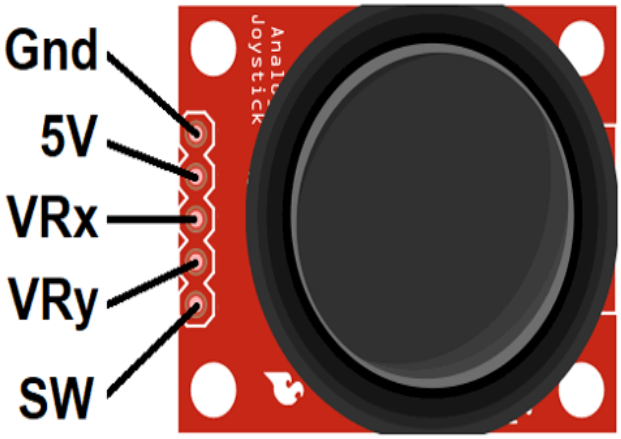


fig.5.1 joystick module

5.1.1.1 Pin Configuration

Pin No.	Pin Name	Description
1	Gnd	Ground terminal of Module
2	+5v	Positive supply terminal of Module
3	VRx	Voltage Proportional to X axis
4	VRy	Voltage Proportional to Y axis
5	SW	Switch

5.1.1.2 Where Joysticks Are Used?

At the point when we listen "Joystick" we consider Game controllers. In the event that we talk about Electronics there are numerous helpful use of Joystick. These kind of module are for the most part utilized in Arduino based DIY tasks and Robot Control. As we probably am aware, the module gives simple yield so it tends to be utilized for taking care of the simple info dependent on heading or development. It can likewise be associated with a versatile camera to control its development.

A joystick isn't entirely different from the remote control created in the past venture. A joystick

works like an accelerometer sensor. Like an accelerometer sensor yields the adjustment in X-axis, Y-axis and Z-axis measurements of the direction of the sensor in space, likewise, a joystick sends the adjustment in X-axis, Y-axis and Z-axis measurements of the direction of the stick mounted in it. Just X-axis and Y-axis changes are required to move the robot on a surface. In this undertaking, the robot can move in forward, in reverse, left or right bearing dependent on the tilt of the joystick module. The joystick module is interfaced with the microcontroller.

5.1.2 433MHz TRANSMITTER AND RECEIVER MODULES:

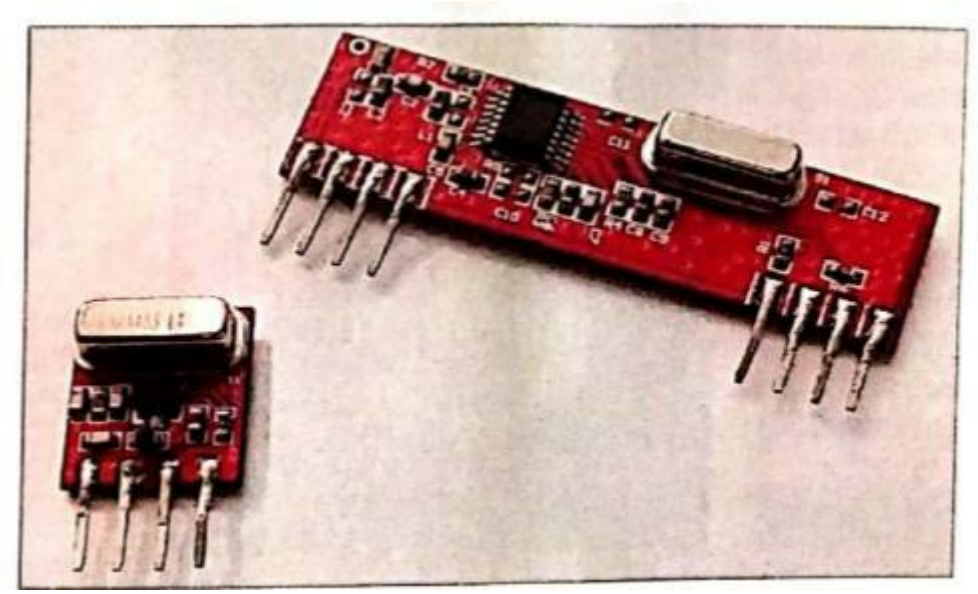


Fig.5.2 433MHz transmitter(left) and receiver(right) modules

5.1.1.3 Pin Configuration:

No:	Pin Name	Description
1	Vcc	Power supply (+5V only)
2	Data	Data to be transmitted is sent to the current pin
3	Ground	Connected to the ground of the circuit
4	Antenna	Solder wire/antenna to enhance vary

5.1.1.3 Where to use 433 MHz RF modules:

The 433MHz remote module is one of the modest and simple to utilize modules for every single

remote undertaking. These modules can be utilized uniquely two by two and just simplex correspondence is conceivable. Which means the transmitter can just transmit data and the collector can just get it, so you can just send information from direct A toward B and not from B to A.

The module could cover at least 3 meters and with appropriate radio wire a force supplies it can reach upto 100 meters hypothetically. In any case, for all intents and purposes we can barely get around 30-35 meters in a typical test conditions.

So on the off chance that you are searching for a straightforward remote correspondence to transmit data inside a short separation then these RF pair could be the correct decision.

5.1.1.4 How to use 433MHz RF modules:

The module itself cannot work on its own as it required some kind of encoding before being transmitter and decoding after being received; so it has to be used with an encoder or decoder IC or with any microcontroller on both ends. The simplest way to use it is with the HT12E Encoder and HT12D Decoder IC.

The module uses ASK (Amplitude shift keying) and hence it's easy to interface with microcontrollers as well. If you are trying to use this with Arduino, then the Radiohead library would make things easy for you. However you cannot expect noiseless data for a long distance form this module as this is very much susceptible to noise. The rage depends on the voltage supplied to Receiver and the noise present in the environment

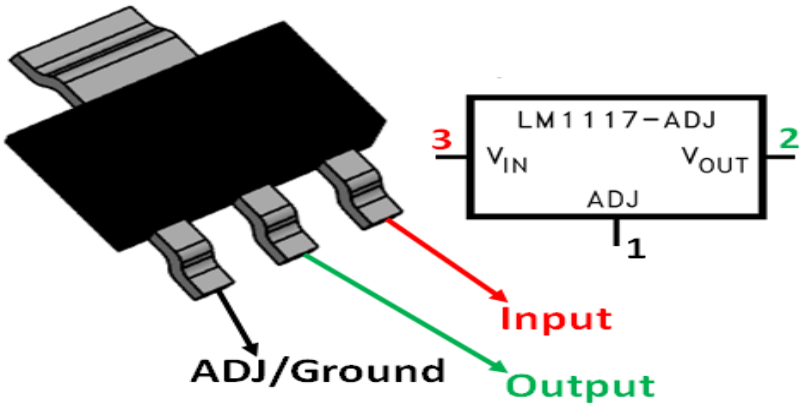
5.1.1.5 **Applications:**

- Home automation
- Transmit Serial data for short distance
- Car security system
- Wireless logging

- Short distance communication

5.1..3 LM1117-5.0 fixed 5v regulator:

Fig.5.3 LM1117 regulator

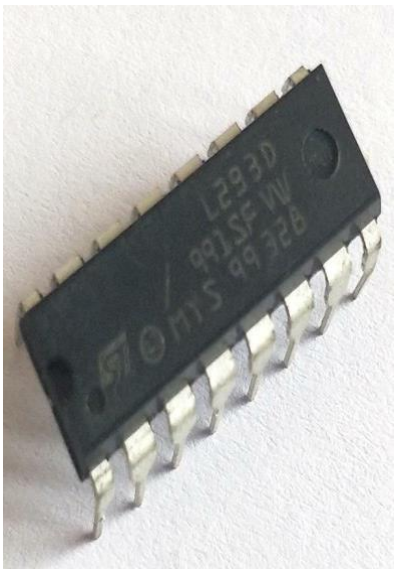


5.1.1.5 Pin Configuration

Pin Number	Pin Name	Description
1	Adjust/Ground	This pins adjusts the output voltage, if it's sets afixed voltage regulator it acts as ground
2	Output Voltage (Vout)	The regulated output voltage set by the alter pin may be obtained from this pin
3	Input Voltage (Vin)	The input voltage that must be be regulated is given to this present pin

LM1117 IC is an adjustable voltage regulator that can provide a fix as well as variable voltage. Firstly, it can provide a fixed voltage of 1.8, 2.5, 2.85, 3.3, and 5 volts. Most importantly, it has an adjustable output voltage which we can set in a range of 12.5 to 13.8 Volts. This voltage regulator can regulate the input voltage even when it is closer to the voltage supply value. It has a built thermal and current limiting protection.

5.1.4 L293 MOTORDRIVER:



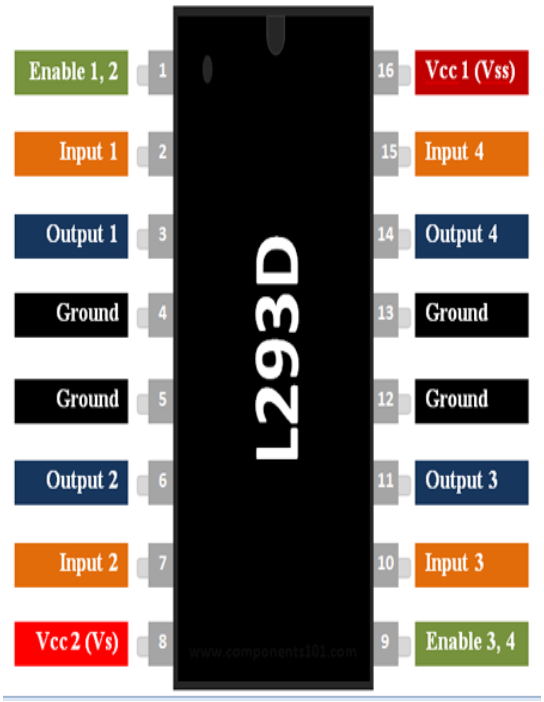


Fig.5.4 L293 motor driver

5.1.1.7 L293D Pin Configuration

Pin Number	Pin Name	Description
1	Enable 1,2	This pin allows the input pin Input 1(2) and Input 2(7)
2	Input one	Directly controls the Output 1 pin. Controlled by digital circuit
3	Output 1	Connected to at atleast one end of Motor 1
4	Ground	Ground pins area unit connected to ground of circuit (0V)
5	Ground	Ground pins area unit connected to ground of circuit (0V)
6	Output 2	Connected to different end of Motor one
7	Input	Directly controls the Output 2 pin Controlled by digital circuits
8	Vcc2 (Vs)	Connected to Voltage pin for running motors (4.5V to 36V)
9	Enable 3,4	This pin allows the input pin Input 3(10) and Input 4(15)
10	Input 3	Directly controls the Output 3 pin. Controlled by digital circuits
11	Output 3	Connected to one at atleast at end of Motor 2

12	Ground	Ground pins area unit connected to ground of circuit (0V)
13	Ground	Ground pins area unit connected to ground of circuit
14	Output 4	Connected to a different end of Motor 2
15	Input 4	Directly controls the Output 4 pin. Controlled by digital circuits
16	Vcc2 (Vss)	Connected to +5V to modify IC perform

5.1.1.8 Where to use L293D IC

The L293D is a well known 16-Pin Motor Driver IC. As the name proposes it is primarily used to drive engines. A single L293D IC is fit for running two DC engines simultaneously; likewise the bearing of these two engines can be controlled autonomously. So on the off chance that you have engines which has working voltage under 36V and working current under 600mA, which are to be constrained by computerized circuits like Op-Amp, 555 clocks, advanced entryways or even Micron rollers like Arduino, PIC, ARM and so forth this IC will be the correct decision for you.

5.1.1.9 How to use a L293D Motor Driver IC

Utilizing this L293D engine driver IC is extremely basic. The IC takes a shot at the standard of Half H-Bridge, let us not dive excessively deep into what H-Bridge implies, yet until further notice simply realize that H connect is a set up which is utilized to run engines both in clock shrewd and hostile to clockwise bearing. As said before this IC is equipped for running two engines at the any heading simultaneously, the circuit to accomplish the equivalent is demonstrated as follows.

All the Ground pins should to be grounded. There are two force pins for this IC, one is the Vss(Vcc1) which gives the voltage to the IC to work, this must be associated with +5V. The other is Vs(Vcc2) which gives voltage to the engines to run, in light of the determination of your engine you can associate this pin to anyplace between 4.5V to 36V, here I have associated with +12V.

The Enable pins (Enable 1,2 and Enable 3,4) are utilized to Enable Input pins for Motor 1 and Motor 2 individually. Since as a rule we will utilize both the engines both the pins are held high of course by interfacing with +5V gracefully. The information pins Input 1,2 are utilized to control the

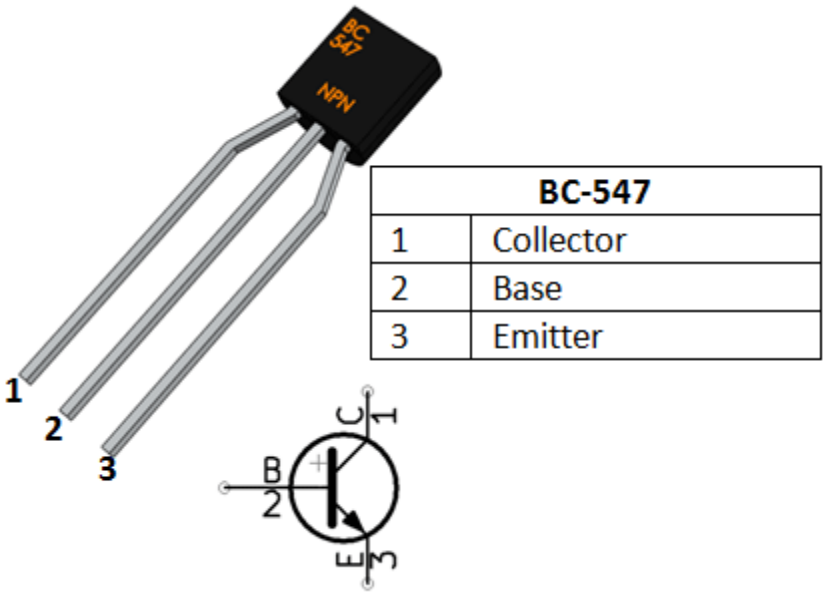
engine 1 and Input pins 3,4 are utilized to control the Motor 2. The information pins are associated with the any Digital circuit or microcontroller to control the speed and heading of the engine. You can flip the info pins dependent on the accompanying table to control your engine.

Input 1 = HIGH(5v)	Output 1 = HIGH	Motor 1 rotates in Clock wise Direction
Input 2 = LOW(0v)	Output 2 = LOW	
Input 3 = HIGH(5v)	Output 1 = HIGH	Motor 2 rotates in Clock wise Direction
Input 4 = LOW(0v)	Output 2 = LOW	

Input 1 = HIGH(5v)	Output 1 = HIGH	Motor 1 rotates in Clock wise Direction
Input 2 = LOW(0v)	Output 2 = LOW	
Input 3 = HIGH(5v)	Output 1 = HIGH	Motor 2 rotates in Clock wise Direction
Input 4 = LOW(0v)	Output 2 = LOW	

Input 1 = HIGH(5v)	Output 1 = HIGH	Motor 1 stays still
Input 2 = HIGH(5v)	Output 2 = HIGH	
Input 3 = HIGH(5v)	Output 1 = LOW	Motor 2 stays still
Input 4 = HIGH(5v)	Output 2 = HIGH	

5.1.2 BC-547 TRANSISTER:



BC-547	
1	Collector
2	Base
3	Emitter

Fig.5.5 Bc547 transister

5.1.2.1 Pin Configuration

Pin Number	Pin Name	Description
1	Collector	Current flows in through collector
2	Base	Controls the biasing of transistor
3	Emitter	Current Drains out through emitter

Brief Description on BC547

BC547 is a NPN transistor consequently the collector and emitter will be left open (Reverse biased) when the base pin is held at ground and will be shut (Forward biased) when a signal is given to base pin. BC547 has an gain value of 110 to 800, this worth decides the intensification limit of the transistor. The most extreme measure of current that could move through the Collector pin is 100mA, consequently we can't associate loads that devour more than 100mA utilizing this transistor. To bias a transistor we need to flexibly current to base pin, this current (IB) ought to be constrained to 5mA.

At the point when this transistor is completely biased then it can permit a limit of 100mA to flow across the collector and emitter. This stage is called Saturation Region and the ordinary voltage permitted over the Collector-Emitter (VCE) or Base-Emitter (VBE) could be 200 and 900 mV individually. At the point when base current is expelled the transistor turns out to be completely off, this stage is called as the Cut-off Region and the Base Emitter voltage could be around 660 mV.

5.1.2.2 BC547 Transistor Features

- Bi-Polar NPN Transistor
- DC Current Gain is 800 maximum
- Continuous Collector current (IC) is 100mA
- Emitter Base Voltage (VBE) is 6V
- Base Current(IB) is 5mA maximum
- Available in To-92 Package

5.1.3 DIODE:

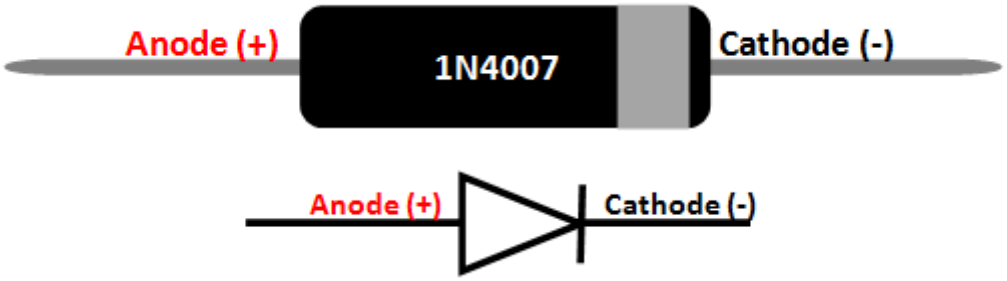


Fig.5.6 Diode

5.1.2.3 Pin Configuration:

Pin No.	Pin Name	Description
1	Anode	Current always Enters through Anode
2	Cathode	Current always Exits through Cathode

5.1.2.4 Description:

A diode is a device which permits current move through only one direction. That is the current ought to consistently spill out of the Anode to cathode. The cathode terminal can be recognized by utilizing a dark bar as appeared in the image above.

For 1N4007 Diode, the maximum current conveying limit is 1A it withstand tops up to 30A. Subsequently we can utilize this in circuits that are intended for under 1A. The opposite current is 5uA which is unimportant. The force scattering of this diode is 3W.

5.1.2.5 Uses of diode:

- Can be utilized to forestall turn around extremity issue
- Half Wave and Full Wave rectifiers
- Used as an protective device

- Current flow regulators

5.1.4 ATTINY13A:

1. VCC Supply voltage**.**

2. GND Ground.

3. Port B (PB5:PB0) Port B is a 6-piece bi-directional I/O port with inner draw up resistors (chose for each piece). The Port B yield cushions have even drive qualities with both high sink and source capacity. As data sources, Port B sticks that are remotely pulled low will source current if the draw up resistors are actuated. The Port B pins are tri-expressed when a reset condition gets dynamic, regardless of whether the clock isn't running. Port B likewise serves the elements of different extraordinary highlights of Attiny13a.

4. Reset input**.**

5. A low level on this pin for longer than the base heartbeat length will create a reset, regardless of whether the clock isn't running and gave the reset pin has not been impaired. The base heartbeat length is given in Table 18-4 on page 120. Shorter heartbeats are not ensured to create a reset. The reset pin can likewise be utilized as a (frail) I/O pin.

   The ATtiny13A is a low-power CMOS 8-bit microcontroller dependent on the AVR improved RISC design. By executing incredible guidelines in a solitary clock cycle, the ATtiny13A accomplishes throughputs moving toward 1 MIPS for every MHz permitting the framework planner to upgrade power utilization as opposed to preparing speed.

- The AVR core consolidates a rich guidance set with 32 universally useful working registers. All the 32 registers are straightforwardly associated with the Arithmetic Logic Unit (ALU), permitting two independent registers to be accessed to in one single guidance executed in one clock cycle. The resulting architecture is more code productive while accomplishing through puts up to multiple times quicker than traditional CISC microcontrollers.

- The ATtiny13A gives the accompanying highlights: 1K byte of In-System Programmable Flash, 64 bytes EEPROM, 64 bytes SRAM, 6 broadly useful I/O lines, 32 universally useful working registers, one 8-piece Timer/Counter with look at modes, Internal and External Interrupts, a 4-

channel, 10-piece ADC, a programmable Watchdog Timer with interior Oscillator, and three programming selectable force sparing modes. The Idle mode stops the CPU while permitting the SRAM, Timer/Counter, ADC, Analog Comparator, and Interrupt framework to keep working. The Power-down mode spares the register substance, incapacitating all chip capacities until the following Interrupt or Hardware Reset. The ADC Noise Reduction mode stops the CPU and all I/O modules with the exception of ADC, to limit exchanging clamor during ADC transformations. The gadget is fabricated utilizing Atmel's high thickness non-unpredictable memory innovation. The On-chip ISP Flash permits the Program memory to be re-customized In-System through a SPI sequential interface, by a traditional non-unpredictable memory developer or by an On-chip boot code running on the AVR center. The ATtiny13A AVR is bolstered with a full set-up of program and framework advancement instruments including: C Compilers, Macro Assemblers, Program Debugger/Simulators, and Evaluation units.

5.1.5 LED:

- A light-emitting diode (LED) is a semiconductor light source that produces light when current courses through it. Electrons in the semiconductor recombine with electron holes, discharging vitality as photons.

• The colours of the light is controlled by the vitality required for electrons to cross the band gap of the semiconductor.

• White light is obtained by utilizing different semiconductors or a layer of light-emanating phosphor on the semiconductor gadget.

• Appearing as handy electronic parts in 1962, the most punctual LEDs radiated low-power infrared (IR) light

• Infrared LEDs are utilized in remote-control circuits, for example, those utilized with a wide assortment of customer hardware. The primary obvious light LEDs were of low force and restricted to red. Present day LEDs are accessible over the obvious, bright (UV), and infrared frequencies, with high light yield.

• Early LEDs were regularly utilized as indicator lights, supplanting little glowing bulbs, and

in seven-portion shows. Late advancements have created high-yield white light LEDs reasonable for room and outside territory lighting. LEDs have prompted new shows and sensors, while their high exchanging rates are helpful in cutting edge interchanges innovation.

5.1.6 JUMPER WIRES:

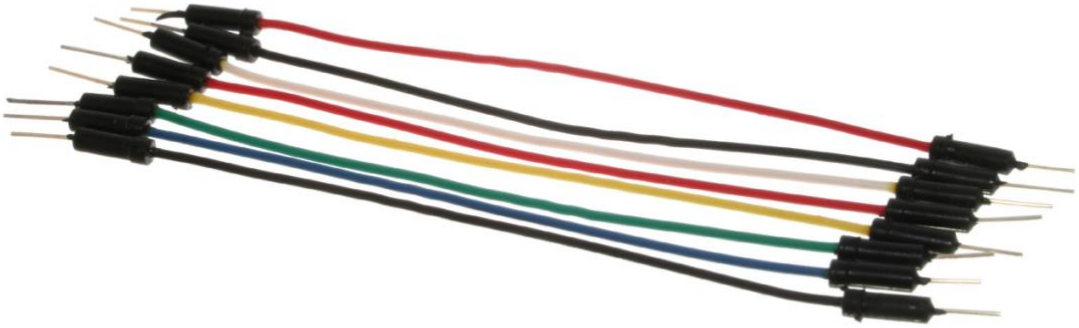


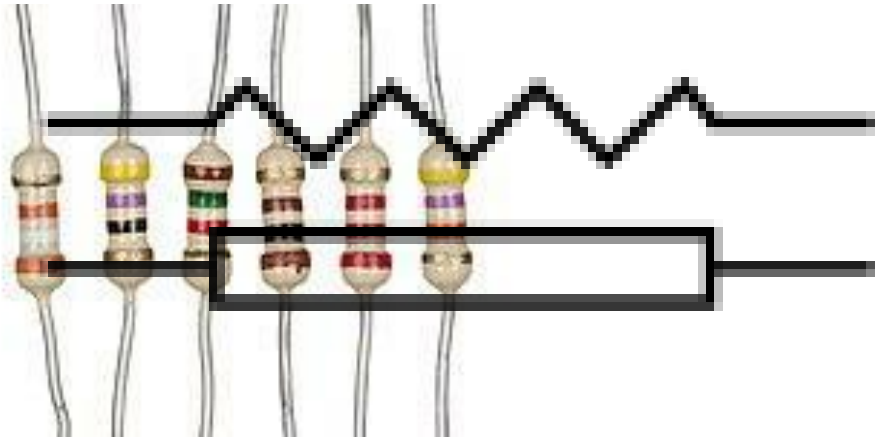
fig.5.7 Jumper wires

- A jump wire (otherwise called jumper wire, or jumper) is an electrical wire, or gathering of

them in a link, with a connector or pin at each end (or once in a while without them – essentially "tinned"), which is ordinarily used to interconnect the segments of a breadboard or other model or test circuit, inside or with other hardware or parts, without soldering.

- Individual jump wires are fitted by inserting their "end connectors" into the openings gave in a breadboard, the header connector of a circuit board, or a bit of test gear.

5.1.7 RESISTORS:



5.1.2.6 **DISCRIPTION:**

A resistor is an passive electrical part that implements electrical obstruction as a circuit component. In electronic circuits, resistors are utilized to lessen current stream, change signal levels, to isolate voltages, inclination dynamic components, and end transmission lines, among different employments. High-power resistors that can disseminate numerous watts of electrical force as warmth, might be utilized as a component of engine controls, in power circulation frameworks, or as test loads for generators. Fixed resistors have protections that lone change marginally with temperature, time or working voltage. Variable resistors can be utilized to alter circuit components, (for example, a volume control or a light dimmer), or as detecting gadgets for heat, light, stickiness, power, or synthetic action.

• Resistors are essential components of electrical systems and electronic circuits and are pervasive in electronic gear. Useful resistors as discrete segments can be made out of different mixes and structures. Resistors are also additionally actualized within integrated circuits.

• The electrical capacity of a resistor is determined by its obstruction regular business resistors are fabricated over a scope of more than nine significant degrees. The ostensible estimation of the obstruction falls inside the assembling resilience, demonstrated on the segment.

5.1.8 CAPACITORS:

Fig.5.8 capacitors

An electrolytic capacitor is a polarized capacitor whose anode or positive plate is made of a metal that forms a insulating oxide layer through the Anodizing. This oxide layer acts as the dielectric of the capacitor. A solid, liquid , or gel electrolyte covers the surface of this oxide layer, serving as the cathode or negative plate of the capacitor. Because of their thin dielectric oxide layer and enlarged anode surface, electrolytic capacitors have an a lot higher capacitance-voltage (CV) item per unit volume than ceramic capacitors or film capacitors, and so can have huge capacitance values. There are three families of electrolytic capacitor: aluminium electrolytic capacitors, tantalum electrolytic capacitors, and niobium electrolytic capacitors.

Electrolytic capacitors are polarized components because of their asymmetrical construction and must be operated with a higher voltage (more positive) on the anode than on the cathode at all time. For this reason the anode terminal is marked apart with a plus sign and the cathode with a minus sign. Applying a reverse polarity voltage, or a voltage exceeding the maximum rated working voltage of as little as 1 or 1.5 volts, can destroy the dielectric and thus the capacitor. The failure of electrolytic capacitors can be hazardous, resulting in an explosion or fire. Bipolar electrolytic capacitors which may be operated with either polarity are also made, using special constructions with two anodes connected in series. A Bipolar electrolytic capacitor can also be made by connecting two normal enclose anode to anode or cathode to cathode.

CHAPTER 6

6.1 APPLICATIONS:

- Currently, robots perform a number of different jobs in numerous fields and the amount of tasks delegated to robots is rising progressively.
- The best way to split robots into types is a partition by their application such as industrial, domestic or household, medical, military etc.

6.2 FUTURE SCOPE:

- There is no denying that Robotic technologies are all set to change the way things are done in the industries in which they are being implemented.
- Entrepreneurs are voicing a similar sentiment and are clearly optimistic about the use of Robotics in various industrial segments.
- Robotics is mainly capturing industries like manufacturing, pharmaceutical, FMCG, packaging and inspection. A bit of Robotics would also be seen in the healthcare sector primarily in the form of assistive and skill development technologies.
- The other promising sectors are defence and education. World had come across PC revolution and mobile revolution in the recent past now it is the time for inevitable robotics. Considering that the global players, like Google, FESTO and Tesla are investing in Robotics along with substantial increase in amateur robotic enthusiasts, Open source tools and platforms available for robotics, It is assured that significant development in this field will occur in another 5-10 years.

6.3 ADVANTAGES:

Following are the advantages or points of interest of Joystick:

- It is useful for playing PC and computer games.

- It is very simple to use by beginners.

- It is quick interface.

- It is easier to navigate.

- The control is in 2D (three measurements).

- They provide fast interactions as required in most games and hence used in games such as racing or flying styles etc.

6.4 DISADVANTAGES :

1. Robot are not work without human work
2. Robots are always depends on computer
3. If the given code is invalid the robot function may differ.

6.5 CONCLUSION:

Robotics is fast entering into the industrial space, and many other utilities application it is but natural that a lot of employment and entrepreneurship opportunities are opening up for people who wish to enter this growing and exciting field. It is evident from the above provided details that the robots have proved time and again that they can do the impossible. Man's short stay in this planet is influenced by these machines created by the human brain. Hopefully in a few years these man-made machines or the so called "Brain child of mankind" will find its path along every walks of human life

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