

# **DC MOTOR CONTROL USING REMOTE**

A Project submitted in partial fulfillment of the requirements For the Award of  
Degree of Bachelor of Science in Electrical and Electronic Engineering

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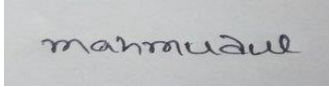
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# Certification

This is to certify that this project entitled “DC MOTOR CONTROL USING REMOTE” is done by the following student under my direct supervision and this work has been carried out by them of the Department of Electrical and Electronics Engineering under the Faculty of Engineering of Daffodil International University in partial fulfillment of the requirement for the degree of Bachelor of Science in Electrical and Electronics Engineering. The presentation of the work was held on

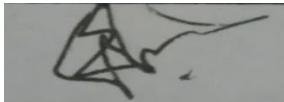
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**Dedicated to**

**Our Beloved Parents**

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# LIST OF ABBREVIATIONS

IDE	Integrated development environment
IR	Infrared Reserve
AVR	Automatic voltage regulation
SPI	Serial peripheral interface
PWM	Plush width modulation
SSP	Synchronous Serial Port
BOR	Brown-out Reset
CMOS	Complementary metal oxide semi-conductor
OST	Oscillator Start-up Timer
CPU	Execution processing unit
RISC	Reduced instruction set computer

# ACKNOWLEDGEMENT

First of all, we give thanks to Allah. Then I would like to take this opportunity to express our appreciation and gratitude to our project supervisor Md. Mahmudur Rahman, Assistant Professor of Department of EEE, Faculty of Engineering, Daffodil International University for being dedicated in supporting, motivating and guiding us through this project. This project can't be done without his useful advice and helps. Also thank you very much for giving us opportunity to choose this project.

I thank our departmental lab for their help during working period. Apart from that, I would like to thank our entire friends for sharing knowledge; information and helping us in making this project a success. Also thanks for lending us some tools and equipment.

To our beloved family, I want to give them deepest love and gratitude for being very supportive and also for their inspiration and encouragement during our studies in this University. Finally, I beg pardon for our unintentional errors and omission if any.

# ABSTRACT

The aim of development of this project is towards providing efficient and simple method for control of DC motor using IR remote. DC motor is the most common type of motor. DC motors normally have just two leads. One positive and one negative, If the leads are switched the motor will rotate in opposite direction. The main objective of this project is to make a DC motor speed control system, (without changing the way that is the leads are connected of the motor), with low cost and easy to control any industry. The project has four main system: 1) Forward direction 2) Reverse direction 3) forward and reverse direction 4) High and low variable speed. This paper discusses the design and implementation of a DC motor speed control system using IR remote. The Microcontroller is programmed by using C-Programming Language so that it can be easily controlled.

# CHAPTER 1

## INTRODUCTION

### Introduction

The DC motor has been used in industries because of its main features like credibility, wide range of motor speed control range, high percentage higher starting torque, low electrical derangement and high weight ratio. For speed control of DC motor other moderators are used. DC Motor is a form of electric motor that changed DC electrical power to mechanical power. A DC motor finds its use in rotation or moving. DC motors are one of the generally used motors in various applications like electronic goods, power tools, bearable fans, etc. The system mainly consists of a Microcontroller as the main processing unit, controlling a DC motor is very necessary. Because, rotating a motor straightly using the microcontroller is not advised as the current from the Microcontroller is very low. The edge of the motor are linked to outside DC supply.

### Problem Statement

The DC motor control system in demand in modern times, is too difficult in terms of its design and formation. The DC motor controller is too difficult, it necessitates regular prophylactic maintenance to be carried out to make sure the system operates well. Meanwhile, when the safeguard is done to the existing process, it could increase the cost of using the process. Therefore, the project is planned with a low cost and all companies can have one for a digital control system motive.

### Project Objectives

Our objective is to scheme a “DC MOTOR CONTROL USING REMOTE” that would fulfill the following objectives:

- i) First I will move DC motor Forward direction by Remote.

- ii) Then I will move DC motor Reverse direction by Remote.
- iii) Then I will move DC motor forward and reverse direction by Remote.
- iv) Then I will control DC motor speed by Remote.

## **Project Scopes**

In a way to achieved above objectives, this project need to be implemented as below:

- i) The DC motor control system can also incorporate the motor driver IC and Module that are connected in parallel.
- ii) The ATMEGA328p microcontroller is used as the heart of this project that controls the entire operations involved.
- iii) The DC motor control system is capable to locate and identified the place that is control the system whereby it is monitored using the monitoring system.
- iv) Capable to the output in the monitoring system.
- v) The circuit can be applied to drive a one DC motor.
- vi) The circuit can be elaborated to single motor by performance dual H-bridge connections.
- vii) Can be used in simple robotic applications to control direction and speed of single motor.

## **Research Methodology**

The main purpose of this project is to design and equipment an instinctive DC motor control that can be made at a low cost with useful and competitive usage. This system is designed to be more users friendly and simple to conduct at any level. The project is also been designed to be more working view using low hardware at the lower level of system. These systems were directed at appoint application.

## **Project Outline**

This Project is organized as follows:

Chapter 1 Introduces the goal of the research work, the problem statements, objectives, scopes and limitations of the project.

Chapter 2 reviews the literature. This chapter reviews various technologies and techniques that have been employed for use DC motor control system.

Chapter 3 analyzes and simulates the theoretical works. The theoretical background is based on the research directed towards the improvement of the project. The theoretical reviews covered are ATmega328p Microcontroller, Battery, and DC motor, Fan, Remote and Output Appliances.

Chapter 4 describes the hardware development part. The topic of the way we develop and design and also about the architect of our system. The project development where it describes the working principle of the system.

Chapter 5 presents the result and It briefs the results of the project development of this project and its exploration based on the system process and the system's function.

Chapter 6 the conclusion of the project and the recommendation defeat for the regularity of the project and further update.

## **Summary**

In this chapter we started with discuss about the DC motor speed control. DC motor easily controlled the IR remote. The DC motor has been use in industries because of its main features like credibility, wide range of motor speed control. The DC motor control system in demand recently, is too hard in term of its design and from.

# CHAPTER 2

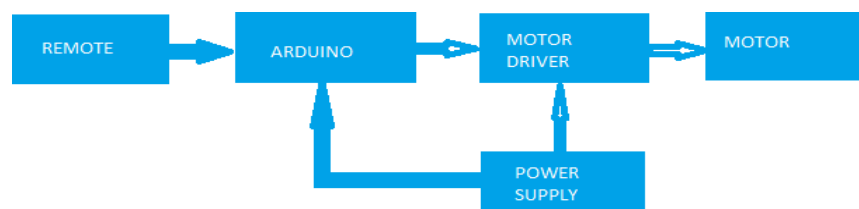
## LITERATURE REVIEWS

### Introduction

This chapter overviews various technologies and techniques [1] that have been employed for use in DC motor control. It also reviews the principles of sensors and the principles of web technologies. This was done with the aim of providing guidance to certain design decisions for later use throughout the project.

### DC motor control Devices

DC engine was inside the main engine types put to connected use and it is as yet famous where low fundamental expense and commendable drive execution are vital. In its characteristic shape, the stator (i.e., the stationary piece of the engine) is a settled magnet, and the rotor (i.e., the pivoting some portion of the engine) conveys an armature twisting connected to a mechanical commutate or which turns current on and off to the winding. The magnet set the field transition which intermission with the armature current to expand the electromagnetic torque, in this manner qualify the engine to perform work. The engine's speed is controlled by settling the DC voltage used to the armature winding. DC Motor controllers can be by hand, remotely or naturally handle. An engine controller is connected to a power root for example a battery pack or power supply.



**Figure 2.1: Flow chart of Motor control by remote using Arduino**

Engine controller is a gadget or gathering of gadgets that serves to administer in some booked frame the execution of an electric engine. An engine controller by remote reason for beginning and halting the engine picking forward or turn around pivot, picking and directing the speed, managing or moderate the torque, and protecting against over-burdens and blames

Each DC engine has a type of controller. The engine controller will have contrasting structure and complicity relying upon the thought process that the engine will perform.

The normal case is a change to join an engine to a power source, for example, in little apparatus or power instruments. The switch might be naturally worked or might be a hand-off or contactor join to some type of sensor to physically begin and stop the engine. The switch may have different positions to choose others associations of the engine. This may permit develop voltage beginning of the engine, turning around control or choice of different paces. Over-burden and over current assurance might avoid in little engine controllers, which depend on the issue circuit to have over current plan of action. Enormous engines have a defensive over-burden hand-off or temperature feeling transfer included the controller and wires or circuit breakers for over current avoidance. A programmed engine controller may likewise include limit switches or different gadgets to ensure the determined machine. Progressively confused engine controllers might be utilized to appropriately control the speed of the associated engine and might be a piece of shut circle control frameworks for exact area of a determined machine. For instance, a numerically controlled machine will appropriate position the slicing device as per a prearranged profile and satisfy for divergent load conditions and occupy powers to keep up instrument position.

DC engine can be begun by only connecting it to an electrical compartment or by utilizing a switch or electrical switch. A higher engine journey a functioning exchanging by remote unit called an engine starter or engine contactor. Whenever dynamic, a direct on line starter in a flash associates the engine terminals straight to the power supply. Diminished voltage, star-delta or delicate starters interface the engine to the power supply through a voltage shortening gadget and increment the connected voltage gradually or in steps. In littler sizes an engine starter is a programmed worked switch; bigger engines, or those take a gander at remote or programmed control, utilize attractive contactors. High engines degree on medium voltage control supplies may utilize control circuit breakers as exchanging components.





**Figure 2.2: Remote**

### **Forward or Reverse condition of DC motor**

In paper, DC engine is servitor with any microcontroller based framework; it is regularly attach utilizing a Motor Driver IC. A Motor Driver IC dealt the basic momentum for the engine to run. It can likewise observing the bearing of the pivot.

In this venture, an Arduino based remote observing deftness and heading control of DC engine with utilizing Motor Driver IC is planned. A DC Motor can't be attach to a Microcontroller as the yield current of the Microcontroller is low and it can't drive the engine. The goal of this venture is to observing the deftness and heading of a DC Motor with utilizing a Motor Driver IC. I need to frame a H-connect act transistors so as to drive the engine. The working of the venture is deciphering here glad every one of the associations are made according to the circuit outline.

When we press the top orange button remote sand a signal and the signal receive by IR receiver. And the IR receiver sand this signal to microcontroller, microcontroller pull up the pin no 11. Pin no 11 connect the input pin 1. When the input pin high the motor is rotate forward means motor rotate in clockwise. When we press the top green button remote sand a signal and the signal receive by IR receiver. And the IR receiver sand this signal to microcontroller, microcontroller pull-up the pin no 13. Pin no 13 connect the input pin 2. When the input pin high the motor is rotate reverse means motor rotate in anticlockwise.

## **Speed control of DC motor**

DC engines are utilized generally in mechanical variable speed application as a result of most requiring velocity control qualities and are simple in controlling perspective. DC engine speed screen method under other load condition. The realistic framework model of separated energized DC engine with Torque-variety is planned utilizing Arduino. The engine speed is tossed settled in this test. The appearance consequence of the analysis see that an engine is degree inferential at a settled is speed careless of an engine stack.

DC engines are extensively utilized in the modern control claim. DC engines are very multipurpose and variable in parts of speed control. Elite DC engine drives are mainstream in mechanical intrigue for its vast great attributes, for example, high beginning, quickening and limit torque, high repercussion execution, rapidly braking and simpler to be straight control and so forth. DC engine is a truly appealable electrical actuator and is generally utilized for automated controllers. In parallel to AC drive, DC engine drives are ordinary and low costly. When we press the button 1 remote sand a signal and the signal receive by IR receiver. And the IR receiver sand this signal to microcontroller, microcontroller pull up the pin no 11. Pin no 11 connect the input pin 1. When the input pin high the motor is rotate in full speed. When we press the button2 remote sand a signal and the signal receive by IR receiver. And the IR receiver sand this signal to microcontroller, microcontroller pull up the pin no 11. Pin no 11 connect the input pin 1. When the input pin high the motor is rotate medium speed.

## **Summary**

After rethink the probable solutions, we agree to use remote to make this project. According to the benefit of remote over Microcontroller, we made this solution. This task is an open-beginning PC equipment and programming organization, undertaking and client large number that plans and makes microcontroller-based stylistic theme for building computerized gadgets and intuitive articles that can gaining and power the corporal world. DC engine is servitor with any microcontroller based framework it is regularly attach utilizing an engine driver IC. An engine driver IC deals the fundamental current for the engine to run. It can likewise annex the heading of the pivot.

# CHAPTER 3

## EQUIPMENT

### Introduction

The overall principles of designing of DC motor speed control using IR remote. It is an open source electronics prototyping stage based on supply hardware and software. Variable resistor is an essence electromechanical transducer and normally work it adjusts and controls the dc motor speed.

### Equipments

SL no	Name	Model/Value	Quantity
1	Microcontroller	ATMEGA328P	1
2	Remote		1
3	IR Receiver	SH0038	4
4	Voltage regulator	7805	1
5	Crystal	16 MHz	1
6	Variable Resistor	473,103	3
7	Transistor	BC547	4
8	Resistor	10k	1
9	Capacitor	16v 10mf	1
10	Connector		5
11	Power Supply		1

**Table 3.1: Equipment's**

## **Description of each Equipment:**

### **Microcontroller module**

Microcontroller is the major part of the project where all the action flow will be controlled by this hardware pursuant to the joined programming in it. Microcontroller is chosen for the system as the controller. In other word it is the heart of this device system.. Here we use ATmega328p microcontroller.

### **Microcontroller ATMEGA328P:**

#### **ATMEGA328P Microcontroller:**

The ATMEGA328P Associate the Mid-Range faction of the AVR smaller scale gadgets. A square outline of the structure is appeared in Figure 3.2. The scene mind contains 2K words, which mean 2048 directions, since every 14-bit scene mind word is indistinguishable width from each structure order. The information memory (RAM) contains 128 bytes. There are 22 I/O sticks that are client angle on a stick to-stick premise. A few pins are numerous with other structure act. These operation include:

- Exterior break up.
- Switch on PORTB break up.
- Timer0 moment input.
- Timer1 moment/oscillator.
- Catch/parallel/PWM.
- A/D converter.
- SPI/I2C.

#### **ATMEGA328P Device Included:**

##### **High Performance Risk CPU:**

- Only 35 single word injunction to learn.
- All single cycle instructions besides for sequence branches, which are two-cycle.
- controlling speed: DC - 20 MHz clock input DC - 200 ns injunction cycle.
- 2K x 14 words of sequence Memory, 128 x 8 bytes of Data Memory (RAM).
- Pin out consistent to ATMEGA328P.
- break up capability.
- Eight-level deep hardware peck.

- Direct, Indirect and Relative addressing modes.

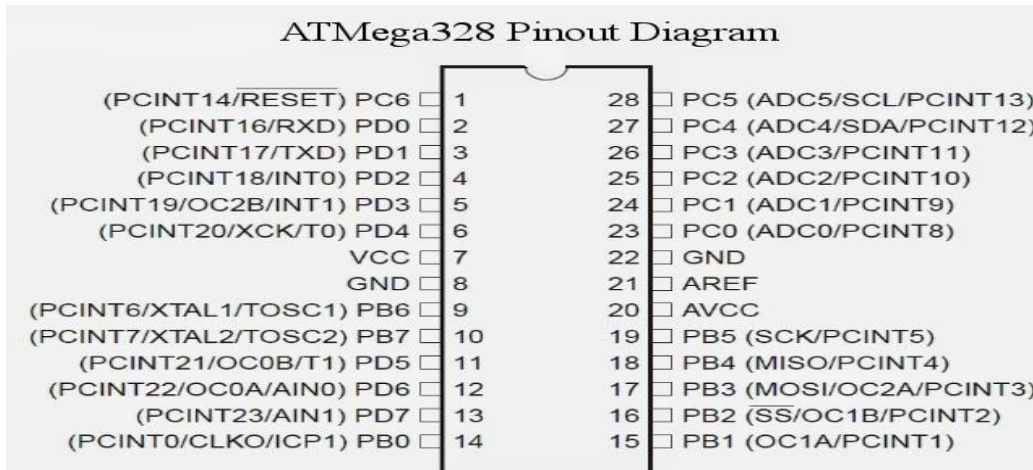
### **Peripheral Features:**

- High fail/genesis Current: 25 mA.
- Timer0: 8-bit timer/counter with 8-bit prescale.
- Timer1: 16-bit timer/counter with prescale, can be incremented during SLEEP via external crystal/clock.
- Timer2: 8-bit timer/counter with 8-bit period register, prescale.
- Receiving, parallel, PWM (CCP) module:
  - Receiving is 16-bit; max. resolution is 12.5 ns.
  - parallel 16-bit; max. resolution is 200 ns.
  - PWM max. resolution is 10-bit.
- 8-bit, 5-channel analog-to-digital converter.
- Synchronous Serial Port with SPI™ (Slave) and I2C™ (Slave).
- Brown-out include state for Brown-out Reset (BOR).

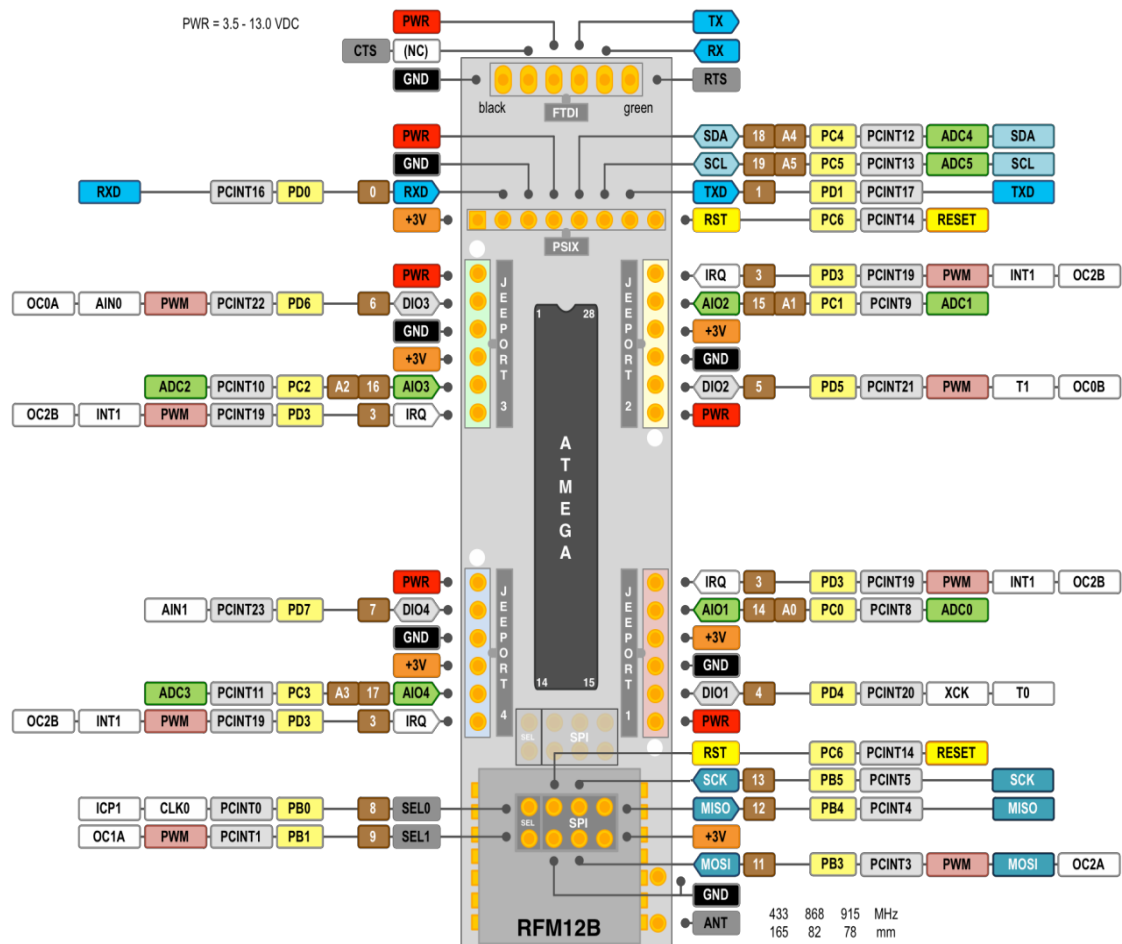
### **Cmos Technology:**

- less power, large speed CMOS FLASH processing.
- Fully fixed design.
- Wide conduct voltage range: 2.0V to 5.5V.
- Industrial heat range.
- less power expense:
  - - < 0.6 mA racial @ 3V, 4 MHz
  - 20  $\mu$ A racial@ 3V, 32 kHz
  - < 1  $\mu$ A racial standby current

## Pin Diagram:



**Figure 3.1: Pin Configuration of ATMEGA328P.[2]**



**Figure 3.2: Pin configuration**



**Figure 3.3: Microcontroller ATMEGA328P.**

#### **Special Microcontroller Features:**

- 1,000 wipe/write cycle FLASH sequence memory racial.
- Power-on Reset (POR), Power-up Timer (PWRT) and Oscillator Start-up Timer (OST).
- Watchdog Timer (WDT) with its radical on-chip RC oscillator for probable activities.
- Sequence code protection.
- Ability saving SLEEP mode.
- Selectable oscillator choice.
- In-Circuit Serial Programming (ICSP) via 2 pins.
- Processor read access to sequence memory.

#### **Memory Organization:**

There are two maintenance obstructs in the ATMEGA328P gadget. These are the succession memory and the information memory. Each square has diverse transports with the goal that corresponding course can arrive. succession memory can be perused deep down by the client code. The information memory can likewise be part down into the typical rationale RAM and the Special Function Registers (SFRs). The SFRs control the "center".

ATMEGA328Papparatus have a 13-bit arrangement counter effective of tending to a 8K x 14 succession memory space. The follow extend for this grouping memory is 0000h - 07FFh.

Getting to a situation over the physically hardware address will thought process a wraparound. The RESET Vector is at 0000h and the separation Vector is at 0004h.

The Data Memory is isolated into numerous banks that hold the normal goal Registers and the Special Function Registers. Bits RP1 (STATUS<6>) and RP0 (STATUS<5>) are the bank chosen bits. Each bank enduring up to 7Fh (128 bytes). The littler territory of each bank are safeguarded for the Special Function Registers. Over the Special Function Registers Are normal expectation Registers, hardware as settled RAM. All gear banks contain SFRs. Some "high use" SFRs from one bank might be speculum in another bank, for code melt away and snappier access e.g., the STATUS record is in Banks.

### AVR Memory Spaces

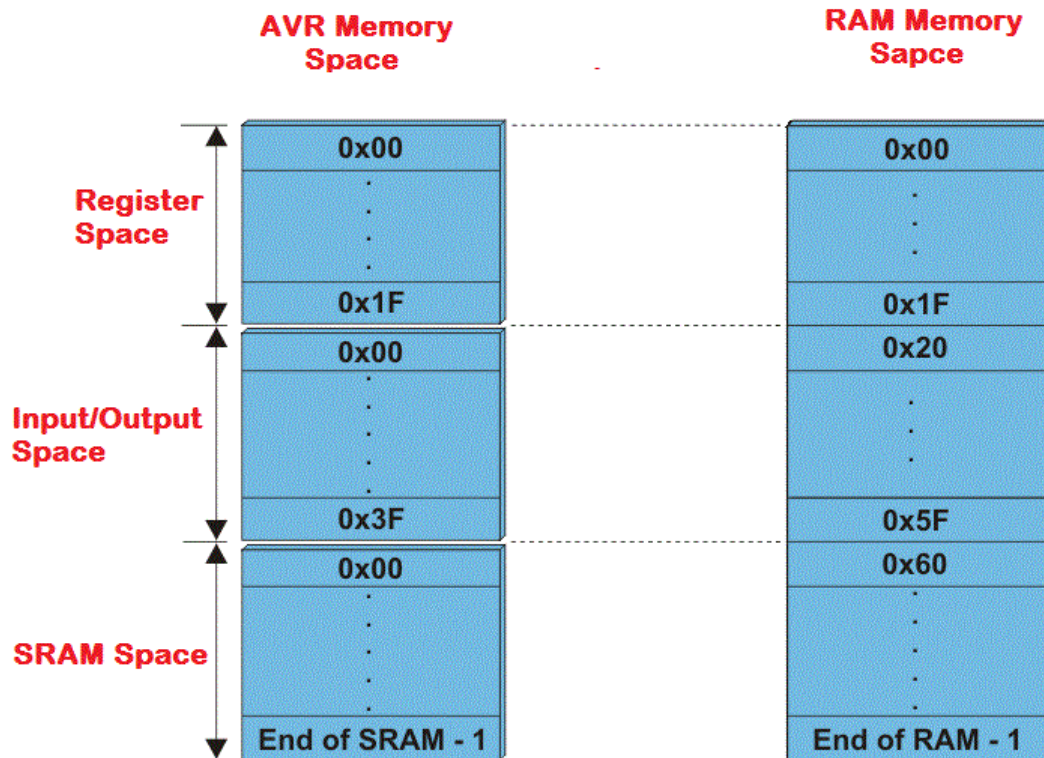


Figure 3.4: AVR Memory spaces



### **Advantages:**

#### **Small instruction set to learn:**

- RISC tectonics.
- Built-in oscillator with selectable speeds.
- Easy first level, in-circuit sequence plus in-circuit debugging Pickets units enough for less than \$50.
- Accessible microcontrollers.
- Presence of processors in DIL joint make them simple to handle for hobby use.

### **Limitations:**

- One compiler.
- Register-bank press is requisite to access the entire RAM of many design.
- process and registers are not perpendicular; some instruction can address RAM and/or immediate fixed, while different can use the compiler only. The next peck restriction has been addressed in the ATMEGA328P series, but only appeal to earlier cores.
- The hardware call pack is not addressable, so preemptive motive switching cannot be appointment.
- Software-appointment pack is not useful, so it is hard to reentrant code and help local changeable.

### **IR Receiver (HS0038).**

#### **Description.**

IR receiver controls do not output continuous infrared light. The LED output is "chopped" via control circuitry into pulses of a given frequency, such as 34 KHz, 38 KHz, 40 KHz or 56 KHz. The IR sensor at the other end filters incident IR at the specified frequency, and ignores any IR that does not conform to this chopping frequency or modulation. This ensures that stray infrared light, such as from sunlight, heat sources, or incandescent lamps, is ignored by the sensor, and only the correctly modulated incoming IR is acted upon. This block diagram illustrates the operation of the classic, and now obsolete, TSOP17xx family of IR receivers,

with the band pass stage shown. This part, for instance, offers the following versions by chopping frequency:

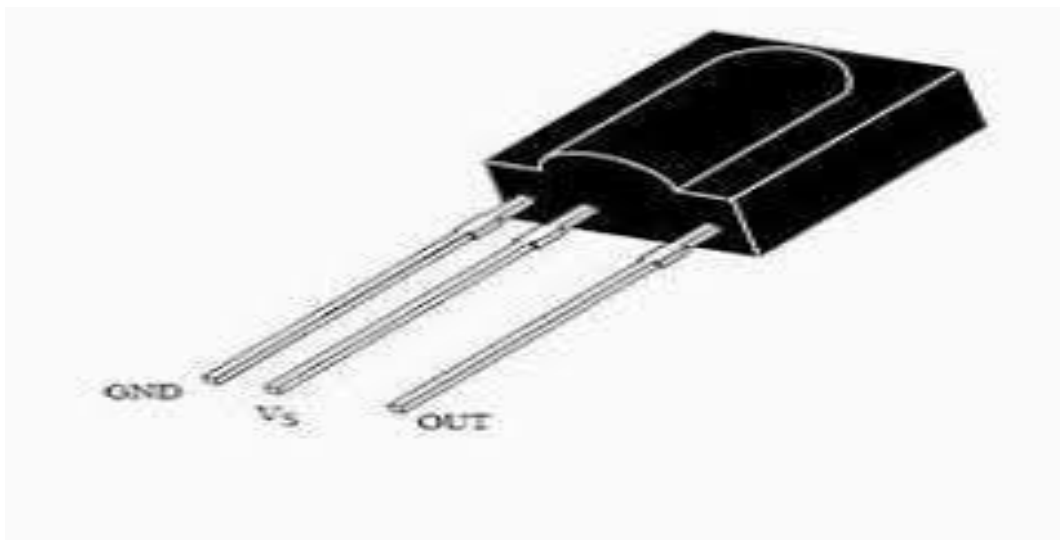
- TSOP1730 30 kHz.
- TSOP1733 33 kHz.
- TSOP1736 36 kHz.
- TSOP1737 36.7 kHz.
- TSOP1738 38 kHz.
- TSOP1740 40 kHz,
- TSOP1756 56 kHz.

There are various diverse such cleaving frequencies bolstered by standard IR sensors for remote controls, so two distinct remotes don't meddle with one another.

The above slashed (tweaked) IR flag is additionally turned on and off in a double heartbeat stream, to pass on the real remote control directions, of which a few distinct guidelines exist.

That goes past the flow question, a touch of looking will give extra data.

The HS0038 arrangement IR beneficiary is scaled down grantee for infrared remote control frameworks. Stick diode and preamplifier are consolidated on direction outline; the epoxy joint is planned as IR channel. The demodulated yield movement can specifically be allowed by a microchip. HS0038A2. Is the standard IR remote control beneficiary arrangement, following all real transmission codes.



**Figure 3.5: IR receiver HS0038A2.**

### Features:

1. Photo detector and preamplifier in one package.
2. Intestinal filter for PCM recurrence.
3. prosperous defend against electrical field disorder.
4. TTL and CMOS congruence.
5. Output operative less.
6. less power expense.
7. High salvation against ambient light.
8. Continuous data dispatch possible (800 bit/s).
9. compatible length  $\geq 10$  cycles/burst.

### Block Diagram

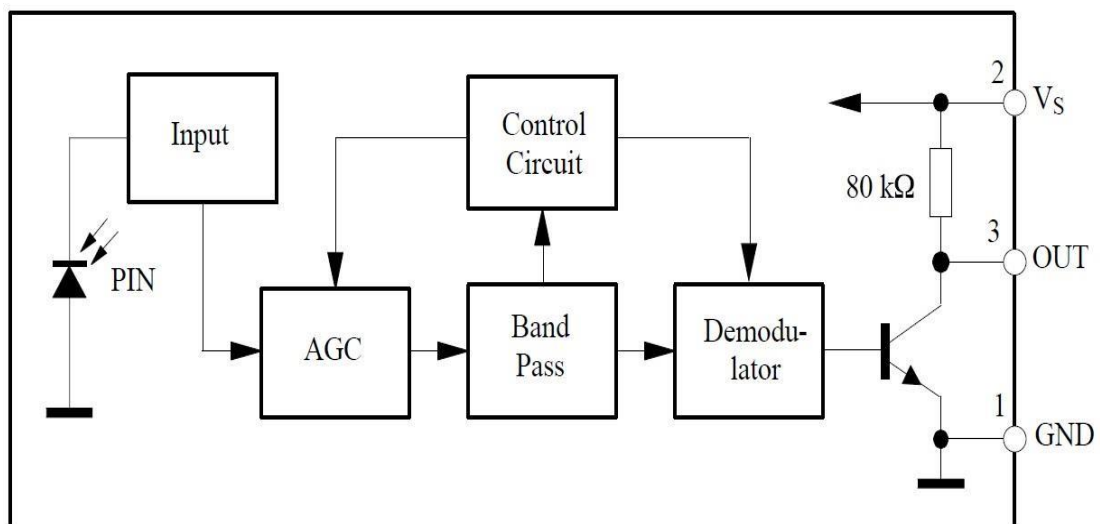


Figure 3.6: Block Diagram of IR receiver HS0038A2.

## Application Circuit

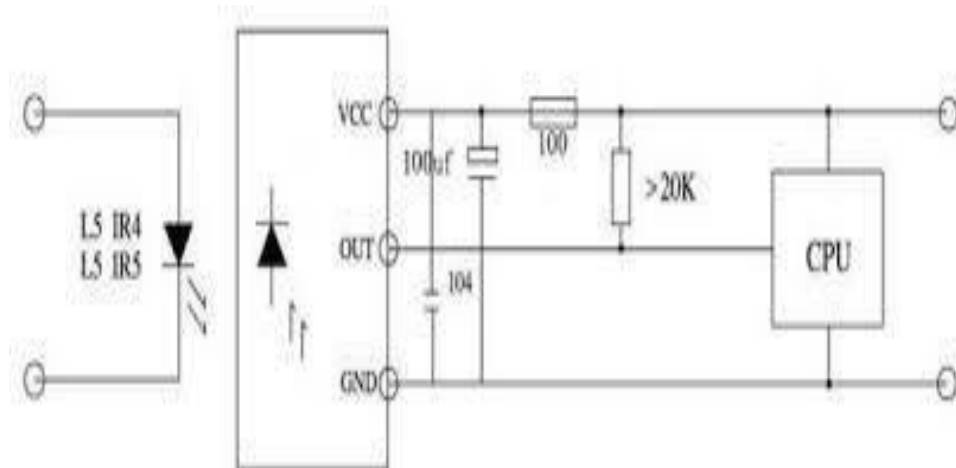


Figure 3.7: Application Circuit of IR receiver HS0038A2. [3]

## Transistors (BC547):

### Description of Transistors (BC547):

BC547 is a NPN bi-polar intersection transistor. A transistor, represents downfall of obstruction, is commonly used to develop current. A short present at its premise observing higher current workmanship gatherer and producer terminal.

BC547 is capitally utilized for increment and exchanging thought process. It has an expansive current gain of 800. Its equivalent transistors are BC548 and BC549.

The transistor last requires a settled DC voltage to deal with in the intrigue locale of its subjective bends. This is known as the biasing. For intensification request, the transistor is one-sided with the end goal that it is in a route on for all information assention. The info motion at base is extend and performed at the producer. BC547 is utilized in basic producer perspective for intensifiers. The voltage divisor is the for the most part utilized biasing mode. For exchanging augment, transistor is one-sided with the goal that it dwells completely on if there is a flag at its base.

## Transistors Diagram:



Figure 3.8: Transistors

### 3.2.3.3 Transistors Pin Diagram:

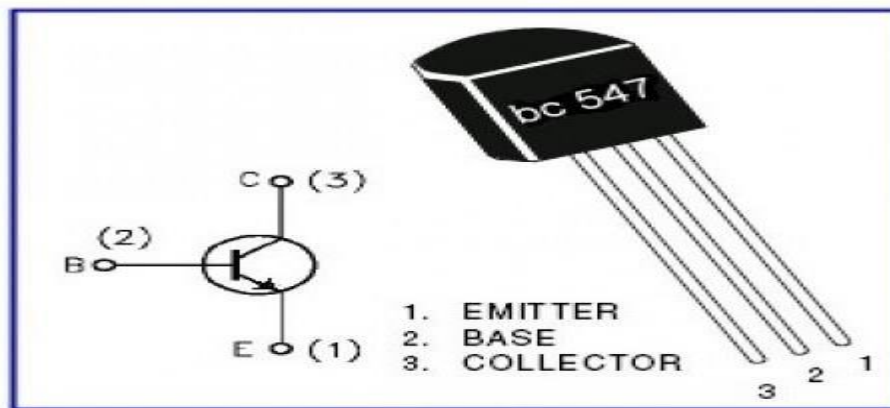


Figure 3.9: Transistors Pin Diagram. [5]

## Capacitor:

### Description:

Capacitor is an electronic component that store electric charge. The capacitor is made of 2 close conduits that are disconnect by a dielectric segment. The plates increase electric charge when joint to control source. The capacitance is the volume of electric charge that is repository in the capacitor at voltage of 1 Volt. The capacitance is estimation in units of Farad (F).The capacitor disjoint current in direct current (DC) circuits and short out in rotating current (AC) circuits.

### Capacitor pictures:

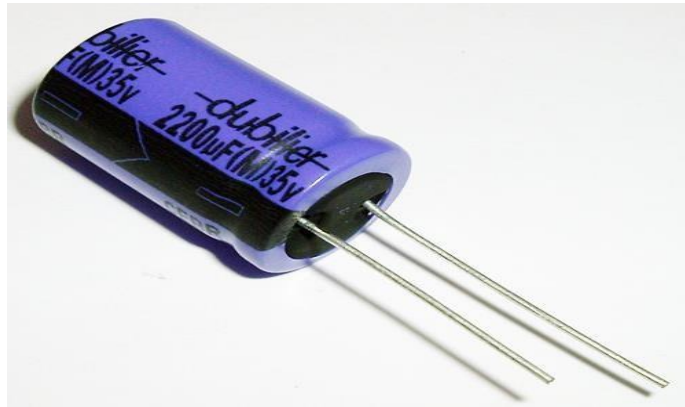



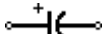



Figure 3.10: Capacitor

### Capacitor symbols

Capacitor		
Polarized capacitor		
Variable capacitor		

### Capacitance.

The capacitance (C) of the capacitor is same to the electric charge (Q) share by the voltage (V):

$$C = \frac{Q}{V}$$

C is the capacitance in farad (F).

Q is the electric charge in coulombs (C), that is reservoir on the capacitor.

V is the voltage within the capacitor's conductor in volts (V).

### Capacitance of plates capacitor.

The capacitance (C) of the conductor capacitor is same to the permittivity ( $\epsilon$ ) times the plate area (A) share by the diversion or space within the plates (d).

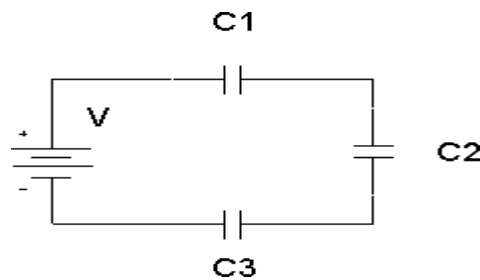
$$C = \epsilon \times \frac{A}{d}$$

C is the capacitance of the capacitor, in farad (F).

$\epsilon$  is the permittivity of the capacitor's dialectic element, in farad per meter (F/m).

A is the area of the capacitor's plate in square meters (m<sup>2</sup>).

d is the distance within the capacitor's plates, in meters (m).

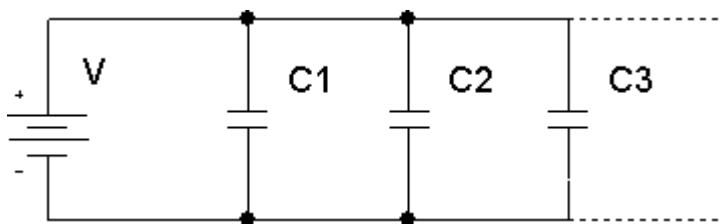


### Capacitors in series.

The total capacitance of capacitors in series, C1,C2,C3,.. :

$$\frac{1}{C_{Total}} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \dots$$

### Capacitors in parallel.



The total capacitance of capacitors in parallel, C1,C2,C3,.. :

$$C_{Total} = C_1 + C_2 + C_3 + \dots$$

### Capacitor is current.

The capacitor's passing current  $i_c(t)$  is same to the capacitance of the capacitor, times the collection of the passing capacitor's voltage  $v_c(t)$ :

$$i_c(t) = C \frac{dv_c(t)}{dt}$$

### Capacitor's Voltage.

The capacitor's passing voltage  $v_c(t)$  is same to the basic voltage of the capacitor, plus  $1/C$  times the entire of the passing capacitor's current  $i_c(t)$  over time  $t$ :

$$v_c(t) = v_c(0) + \frac{1}{C} \int_0^t i_c(\tau) d\tau$$

### Energy of capacitor

The capacitor's gathered energy  $E_C$  in joules (J) is same to the capacitance  $C$  in farad (F) times the quad capacitor's voltage  $V_C$  in volts (V) share by 2:

$$E_C = C \times V_C^2 / 2. [6]$$

## Resistance:

### Resistance Description:

Obstruction is the absolute opposite that a meaning offers to the surge of electric flow. The capitalized letter R. speaks to it. The measure unit of opposition is the ohm, once in a while worked out as a tongue, and every so often symbolized by the capitalized Greek letter omega: When an electric flow of one ampere goes with a material corner to corner which a fundamental contrast (voltage) of one volt stay, at that point the obstruction of that material is one ohm. In ordinary, when the utilized voltage is held settled. In the event that the obstruction is double, the current is slashed in fractional; if the opposition is half-done, the current is double. This framework additionally keep up valid for most little recurrence substituting current (AC) frameworks, for example, family unit use circuits. In some AC circuits, additionally at high frequencies, the condition is progressively unpredictable in light of the fact that some material in these strategy can station and discharge vitality, just as



disseminating or changing over it. The electrical opposition per unit length, field, or volume of a component is known as resistivity. Resistivity figures are regularly checking for copper and aluminum wire, in ohms per kilometer. Absolute opposite to AC, yet not to DC, is a substance known as reactance. In an AC circuit, the obstruction and reactance blend vector pared to yield impedance. Opposition negate with conductance, which is an amount of the straightforwardness with which electrical flow moves through an issue. a prologue to electrical opposition: [7] At the point when electrons stream with a knob or another conductor, the conductor grants whatever blockage to the current. This blockage is called electrical obstruction.

full the conductor upper the opposition. less its zone the upper its opposition. Each substance has an electrical obstruction and the intention the conveyor convey warm when the flow goes through it.



**Figure 3.11: 10k Resistance.**

In typically, When an electric flow of one ampere goes with a material askew which a primary contrast (voltage) of one volt stay, at that point the opposition of that material is one ohm. In typical, when the utilized voltage is held settled. On the off chance that the opposition is double, the current is slashed in incomplete; if the obstruction is half-done, the current is double. This framework likewise keep up valid for most little recurrence exchanging current (AC) frameworks, for example, family use circuits. In some AC circuits, in addition at high frequencies, the condition is progressively mind boggling in light of the fact that some material in this strategy jars terminal and discharge vitality, just as dispersing or changing over it. The electrical obstruction per unit length, territory, or volume of a component is known as resistivity. Resistivity figures are regularly checking for copper and aluminum wire, in ohms per kilometer. another to AC, however not to DC, is a territory known as reactance. In an AC circuit, the opposition and reactance blended vector bud to yield impedance.

## Resistor Color Code:

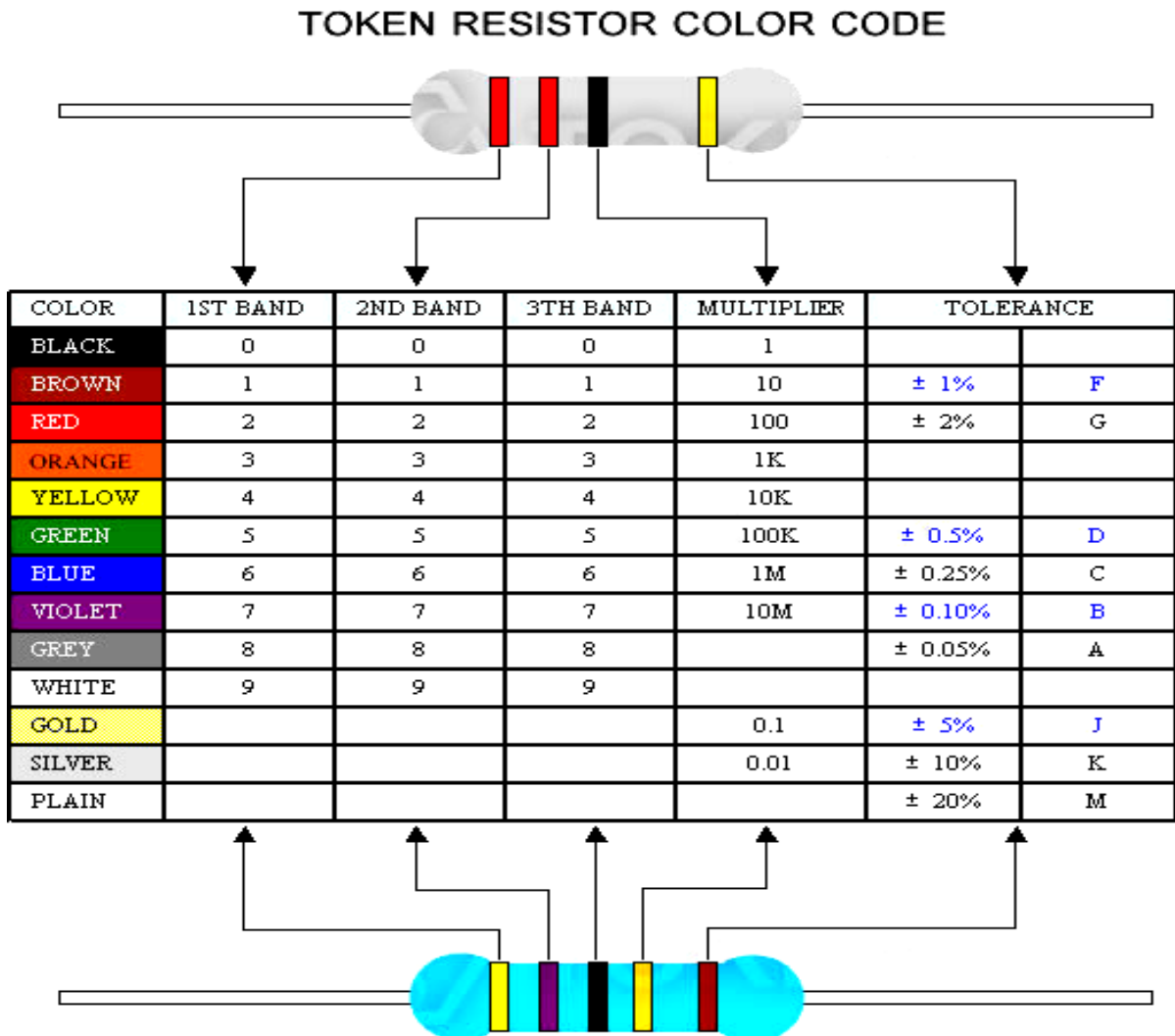


Figure 3.12 : Resistor color code.[8]

## Crystal (16 MHz):

### Crystal (16 MHz) Description:

A precious stone oscillator is an electronic oscillator circuit that uses the mechanical beat of a piezoelectric component to raise an electrical signal with an appropriate recurrence. This recurrence is ordinarily used to monitor time, as in quartz wristwatches, to deal with a settled clock motion for computerized systems, and to balance out frequencies for radio transmitters and receivers. The most well-known kind of piezoelectric resonator is the quartz crystal, so oscillator circuits made up of them are known as

gem oscillators , however other piezoelectric component along polycrystalline earthenware production are matured in same circuits.

### **Operation:**

A precious stone is a solid in which the component particles, atoms, or particles are aggregate in an efficient arranged, rehashing design hanging in every one of the three spatial measurements.

about any article worked of a flexible component could be old like a precious stone, with pertinent transducers, since universally handy have normal resounding frequencies of vibration. For instance, press is exceptionally flexible and has a high nimbleness of sound. It was frequently antiquated in mechanical channels previously quartz. The resounding recurrence depend on size, flexibility, and the dexterity of sound in the component. High-recurrence precious stones are commonly cut in the state of a normal, rectangular plate. Low-recurrence precious stones, for example, who old in advanced watches, are commonly cut in the state of a tuning fork.

Quartz has the further advantage that its flexible settled and its size option so that the recurrence dependence on temperature can be little. The particular attributes depend on the method of vibration and the edge at which the quartz is cut (in respect to its crystallographic tomahawks) [16]. In this manner, the thunderous recurrence of the plate, which depend on its size, does not exchange much. This implies a quartz clock, channel or oscillator remain correct. For sensitive intrigue the quartz oscillator is rose in a temperature-controlled repository, called a precious stone stove, and can likewise be climbed on stun exploiter to check irritation by outside mechanical vibrations.[9]

### Crystal diagram:



**Figure 3.13: 4MHz Crystal. [10]**

### Voltage regulator:

#### Voltage regulator Description:

A voltage controller is used to manage voltage level. At the point when a consistent, trustworthy voltage is fundamental, at that point voltage controller is the proposed gadget. It creates a steady yield voltage that remains settled for any adjustments in an input voltage or load conditions. It goes about as a shield for watching component from harms. A voltage controller is a gadget with a simple feed-forward circuit and its advantage is negative feedback control. There are basically two kinds of voltage controllers: Linear voltage controllers and switching voltage controllers; these are antiquated in more extensive circuits. A switching voltage controller is the example kind of voltage controllers. It is achievable in two sorts, which are buck and boost in little power, low voltage frameworks.



**Figure 3.14: Voltage Regulator**

As we have some time ago said about that directed power supply is a gadget that motorized on DC voltages and furthermore it can attest its yield precisely at a consistent voltage all the time regardless of whether there is a viable adjustment in the DC input voltage.

ICs controller is mainly old in the circuit to protect the best possible voltage which is seek after by the power supply. A controller is predominantly work with the capacitor attach in parallel to the information terminal and the yield terminal of the IC controller. For the stop of colossal modifications in the contribution just as in the yield channel, capacitors are old. While the detour capacitors are antiquated to limitation the low time frame bolt on the info and yield level. Sidestep capacitors are predominantly of low qualities that are antiquated to sidestep the low time frame beats straightforwardly into the Earth. [11]

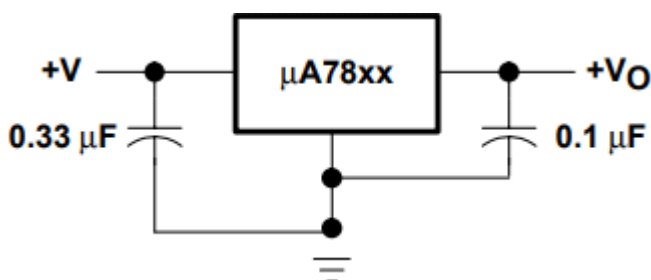
### Brief Description on 7805 Voltage Regulator IC.

Voltage controllers are extremely typical in electronic circuits. They give a settled yield voltage for an alternate info voltage. In our occasion the 7805 IC is a notable controller IC that request its allure in the greater part of the tasks.

The yield current of this IC can go up to 1.5A. In any case, the IC bear from solid warmth misfortune thus a Heat come up short is counsel for ventures that spend increasingly present. For example, if the input voltage is 15V and you are store 1A, then  $(15-5) * 1 = 10W$ . This 10 Watts will be decreased as heat.

### 7805 as +5V Voltage Regulator:

This is a racial intrigue circuit of the 7805 IC. We simply vital two capacitors of vale 33uf and 0.1uf to get this IC working.

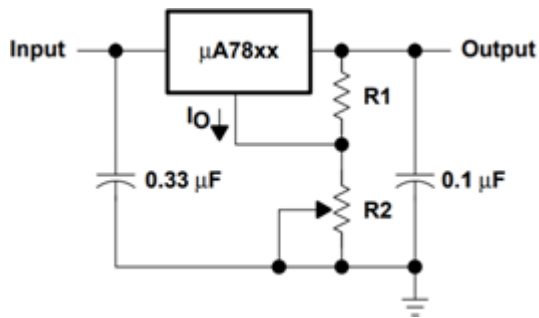


The information capacitor 0.33uF is a fired capacitor that degree with info inductance issue and the yield capacitor 0.1uF is additionally a clay capacitor that join to the strength of the

circuit. These capacitors ought to be introduced near the terminals for them to work essentially.

### 7805 as adjustable output Regulator

This IC can likewise go about as a movable yield voltage controller, reason you can likewise be observing the yield voltage for your decision esteem utilizing the underneath circuit.



Here, the info voltage can be anyplace between 11V-27V, and the yield voltage can be arrange utilizing the estimation of obstruction R1 and R2. The esteem can be determined utilizing the beneath formulae.

$$V_O = V_{xx} + \left( \frac{V_{xx}}{R1} + I_Q \right) R2$$

Where,  $V_{xx}=5$ ,  $I_Q = 5 \times 10^{-3}$

### 7805 Applications

- Constant +5V output regulator to power microcontrollers and sensors in most of the projects
- Adjustable Output Regulator.
- Current Limiter for certain appeal.
- Regulated Dual Supply.
- Output Polarity-Reversal-Protection Circuit.[12]

As we have assembled the entire circuit till now to be part on the 5V DC supply, so we need to support an IC controller for 5V DC. Furthermore, the most ordinarily utilized IC controllers get into the market for 5V DC direction use is 7805. So we are subjunctive indistinguishable IC in the circuit from U1. IC 7805 is a DC controlled IC of 5V. This IC is extremely delicate and is broadly occupied with a wide range of circuit like a voltage

controller. It is a three terminal gadget and mainly called information , yield and ground. Stick graph of the IC 7805 is appeared in the outline underneath.

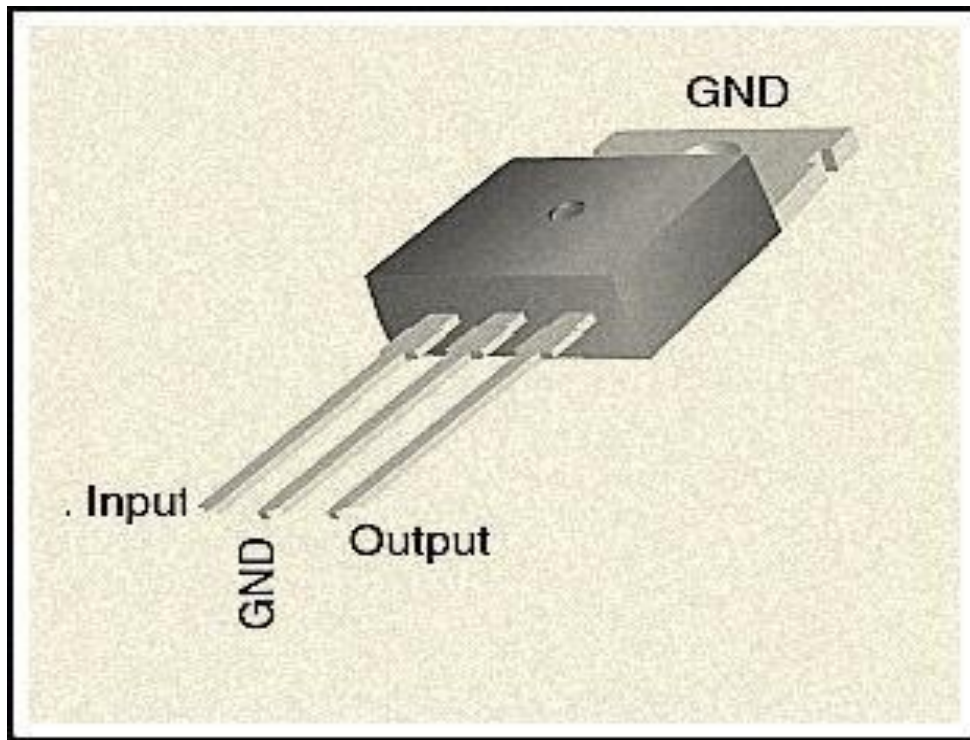


Figure 3.15: Pin Diagram of IC 7805. [13]

### 3.2.3 Printed Circuit Board:

#### 3.2.3.1 Printed Circuit Board Description:

A printed circuit board (PCB) instrumentally bolsters and electrically associates electronic component utilizing conductive tracks, cushions and other frame cut from copper sheets stratified onto a non-conductive substrate. PCB's can be single tense (one copper layer), twofold restless (two copper layers) or multi-layer. Conductor on different layers is connected with plated-per gaps called visa. PCB's may include component - capacitors, resistors or dynamic gadgets - appended in the substrate.

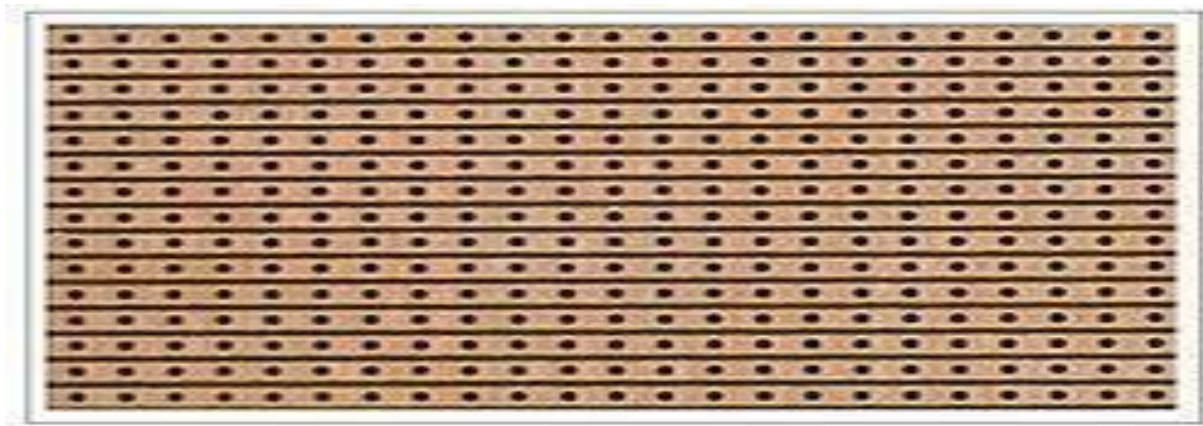
At the point when the board has just copper interface and no connected component it is all the more appropriately called a printed wiring board (PWB) or cut wiring board. Albeit increasingly exact, the term printed wiring board has pursue into non-use. A PCB populated with electronic component is known as a printed circuit gathering (PCA), printed circuit



board get together or PCB get together (PCBA). The IPC present term for gathered loads up is circuit card get together (CCA), for collected backplanes it is backplane gatherings. The term PCB is antiquated casually both for uncovered and amassed sheets.

### 3.2.3.2. Design of Printed Circuit Board:

Printed circuit load up work of art creation was at initial a manual framework done on clear Mylar sheets at a size of generally 2 or multiple times the planned size. The schematic plan was first change into a format of component stick cushions, at that point find were killed to deal the fundamental association between. Pre-printed non-repeating Mylar networks bolster in format, and rub-on dry exchanges of typical readiness of circuit part (cushions, contact fingers, coordinated circuit profiles, etc) institutionalized the design.



**Fig 3.16: Image of The Vero board**

Present day utilization is low work sharp since PCs can naturally act a significant number of the design steps. The ordinary progression for a business printed circuit board chart would contain. Schematic catch through an electronic outline computerization instrument.

making stack layers out of the PCB. 1 to 12 layers or more depend on outline intricacy. Ground plane and power plane are unequivocal. Flag planes where signals are killed are in best layer just as inside layers [3].

Line impedance want utilizing dielectric layer thickness, directing copper thickness and follow width. Follow breakage likewise considered if there should be an occurrence of different signs. Arrangement of the component. Warm caution and geometry are considering. warbler and grounds are stamped. In the rounded screw and box clasp outline, fixing the

screw impact the conductor straightforwardly against the base of the cinch. These frameworks are perfect for cost sensitive, lighter obligation bid or advance with rare wire terminations. Wire defenders are measure. measure shading is dark for rounded screw and green for box shellfish.

### **3.4 Summary**

Break down the hypothetical works. The hypothetical audits secured are microcontroller, engine driver IC, ATmega328p Microcontroller, 12V AC-DC Adapter yield Appliances and variable resistor balanced the engine speed. Microcontroller is a solid release of guidance in a solitary clock order to the acclaim. The framework comprises two primary parts of distinguishing microcontroller module and dc engine which is associated in parallel to the microcontroller gadget. Within design of the microcontroller focal handling unit (CPU) is the cerebrum of the microcontroller which controls the release of the task.

# CHAPTER 4

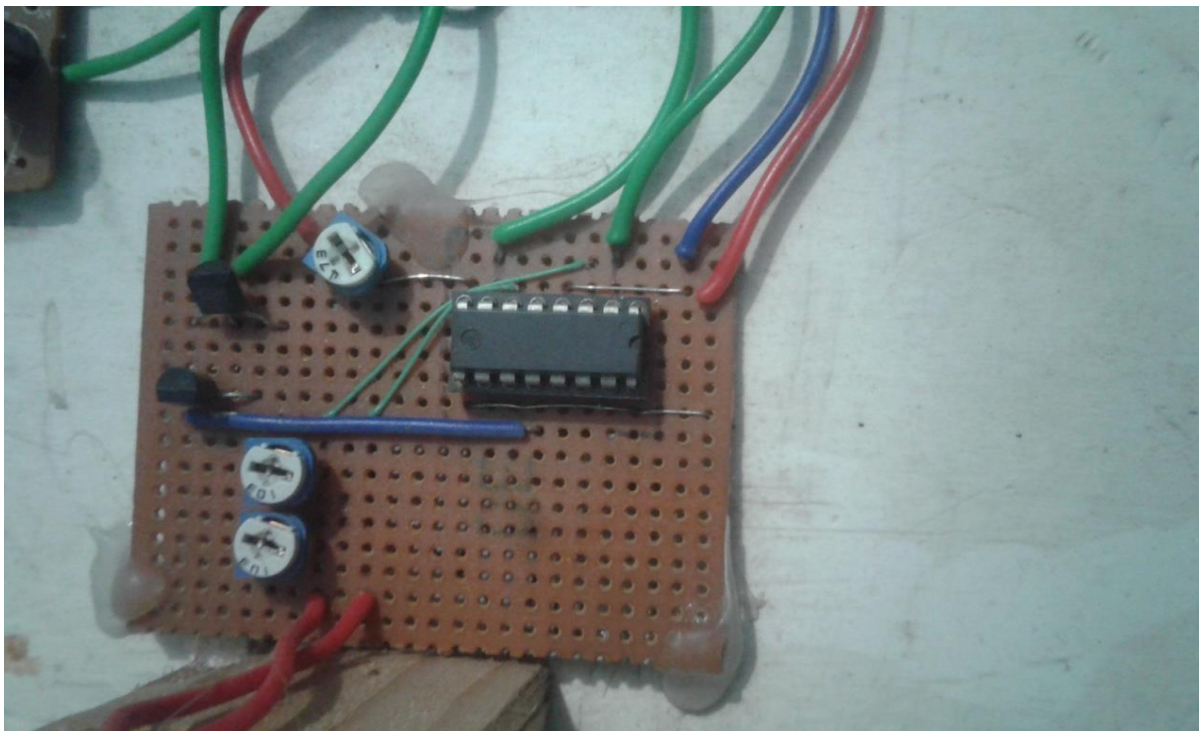
## RESULTS AND COST ANALYSIS

### Introduction

The point of the venture was to materials a severe home framework and the objective was met. The microcontroller unit replay to the sign sent by the cell phone as indicated by the need of the intrigue just as triggers the caution upon a caviling circumstance. The point of the venture to deal with the electronic gadget remotely was likewise accomplished.

### RESULT

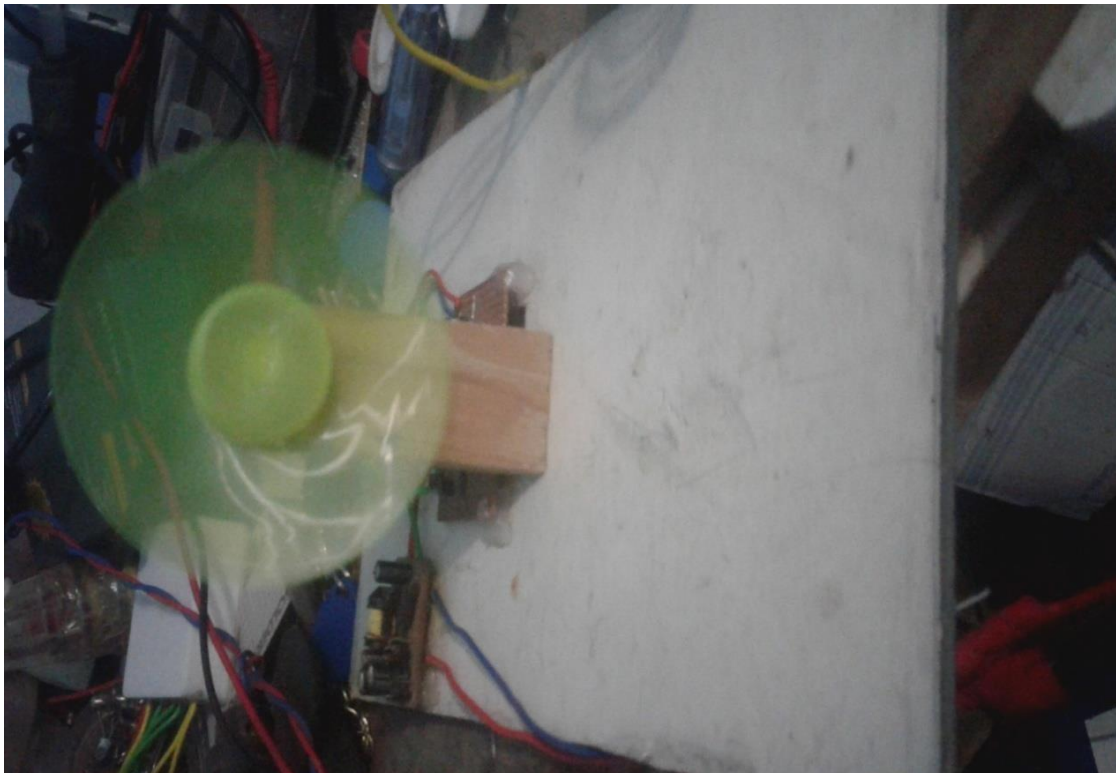
To regard is the performance and replay of the system to hostile DC motor control. The result of the tests think the system renders meant replay under other test conditions reliably. The experimental set-up shown in figure



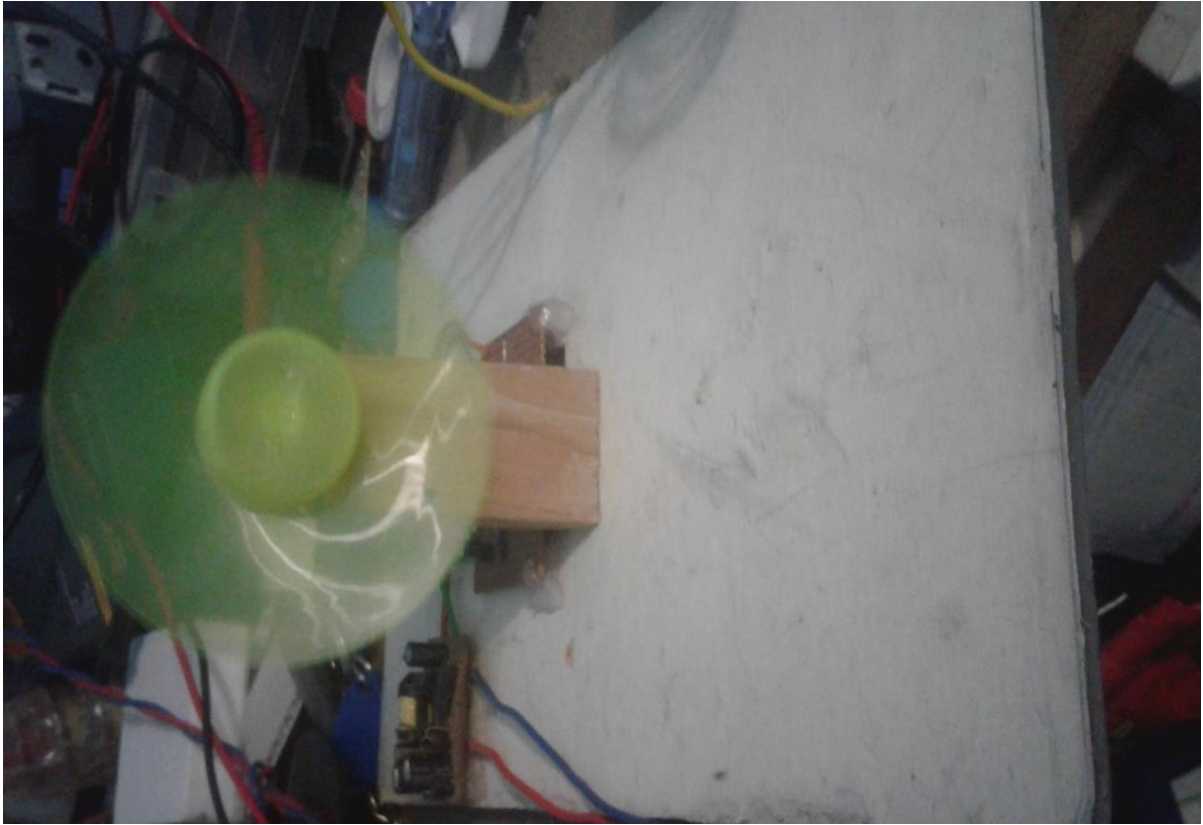
**Figure 4.1: Proposed assembly for hardware of the Remote control electric Motor.**



**Figure 4.2: Off mode of the Remote control electric Motor.**



**Figure 4.3: On mode and clock wise of the Remote control electric Motor.**



**Figure 4.4: On mode and anticlockwise of the Remote control electric Motor.**



**Figure 4.5: On mode and Solow mode of the Remote control electric Motor.**

## DISCUSSION

In this project we observed that very easily control DC motor moved forward direction and reverse direction and DC speed control using IR remote. We upload this whole project.

## CHAPTER CONTENTS

This chapter explains the overview of this project which includes the information of the list below:

### COST SHEET:

SL no	Name	Model/Value	Quantity	Price Tk
1	Microcontroller	ATMEGA328P	1	540
2	Remote		1	100
3	IR Receiver	SH0038	4	30
4	Voltage regulator	7805	1	20
5	Crystal	16 MHz	1	20
6	Variable Resistor	473,103	3	30
7	Transistor	BC547	4	40
8	Resistor	10k	1	5
9	Capacitor	16v 10mf	1	10
10	Connector		5	10
11	Motor	6 volt dc	1	100
12	Fan		1	20
13	PVC Board		1	30
			Total	960

**Table 4.1: Cost sheet**

## **SUMMARY**

The part as characterized before was to control engine, affirm is bearing by checking through program and after that demonstrating its situation on yield gadget and DC engine pushed ahead heading and switch course and control DC engine speed. In this venture we saw that effortlessly control DC engine forward heading and turn around bearing and DC engine speed control utilizing IR remote. Costing is dependably an essential issue to make any extend.

# CHAPTER 5

## CONCLUSION

### 5.1 Introduction

This chapter explains the overview of this project which includes the information of the list below:

Conclusions

Future Scopes of the Work

#### **Conclusion:**

The engine lead framework has tentatively vindicated to work ideal by subjunctive shape actualize to it and the execute were effectively keeps up from a remote gadget. The remote customer was successfully tried on a segment of other separation from various point, consequently playing out its compactness and wide equalization. This venture won't just offer advantage to the general individuals yet will be a shelter for the developed and incapable.

#### **Future Scopes of the Work:**

There is dependably remain an endless extent of favorable position to a framework chart. It's solitary the time and monetary limits that enlist a limit on the enhancement. Following are the les increment that may add further charge to the framework.

This task can be additionally advanced by reduced it with the web to screen your home while sitting in a far territory. By doing this, one can rest an eye on his or her engine observing through a web associated with the client's cell phone or PC or PC. That won't just raise the security of your engine in this present day yet will likewise bolster in protection of vitality like on the off chance that you left any engine drive gadget exchanged on by mistake, you can subdual the state of the gadget on the graphical interface made on your portable and can turn it off deal with the web network.



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# Appendix

## Programming Code for Whole System

```
#include <IRremote.h>
#include <IRremoteInt.h>
int RECV_PIN = 4;
IRrecv irrecv(RECV_PIN);
decode_results results ;
int fan1 = 13;
int fan2 = 12;
int fan3 = 11;
void setup()
{
    // put your setup code here, to run once:
    pinMode(fan1, OUTPUT);
    pinMode(fan2, OUTPUT);
    pinMode(fan3, OUTPUT);
    Serial.begin(9600);
    irrecv.enableIRIn();
}
void loop() {
    // put your main code here, to run repeatedly:
    if (irrecv.decode(&results))
    {
        Serial.println(results.value);

        translateIR();
        irrecv.resume();
    }
}
void translateIR()
{
    switch (results.value)
```

```
{
case 16754775:
digitalWrite(fan1, HIGH);
break;
case 16718055:
digitalWrite(fan1, LOW);
break;
case 16753245:
digitalWrite(fan2, HIGH);
break;
case 16769565:
digitalWrite(fan2, LOW);
break;
case 16753225:
digitalWrite(fan3, HIGH);
break;
case 16769535:
digitalWrite(fan3, LOW);
break;
}
}
```