

# **DESIGN AND CONSTRUCTION OF WAITER BOT**

**A Project and Thesis 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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**December - 2018**

# Certification

This is to certify that this project and thesis entitled “Design and Construction of Waiter Bot” is done by the following student under my direct supervision and this work has been carried out by them in the Department of Electrical and Electronic Engineering under the Faculty of Engineering of Daffodil International University in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering. The presentation of the work was held on January 2018.

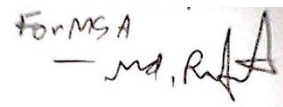
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The project and thesis entitled “Design and Construction of Waiter Bot” submitted by Md. Sofiul Alom, ID No: 152-33-2789, Session: Summer, 2015 has been accepted as satisfactory in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering on December 2018.

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Authors

# ABSTRACT

This project is on “GSM Based Traffic Notified System” This is a kind of Automation system, which helps to control intelligence traffic management by static time scheduling. Construction, development, control and evaluation of controlling traffic to keep the speed limit in the road. Traffic engineering uses engineering methods and techniques to achieve the safe and time efficient movement of people and goods on roadways. The safe and time efficient movement of the people and goods is dependent on Traffic flow, which is directly connected to the traffic characteristics. The three main parameters of a traffic flow are volume, speed and density. In the absence of effective planning and traffic management of the city, the current road infrastructure cannot cater the future needs of the city. Pedestrian and vehicle volumes have increased significantly in the last decade due to the change of the economics of the middle-class families. Microcontroller base Traffic Notified is a register and sends data to the platform over the mobile network. The driver support tool consists of his mobile phone. When the speed limit is exceeded, the diode emits a light and the mobile he has will get an SMS with his current speed and his position which speed should on his vehicle be shown, and the screen signals to the driver that the vehicle has reached an excessive speed. Traffic Burst Notifications are an early warning system for Managed Server customers to help identify a significant spike outside of normal daily traffic usage including its highest usage times. This warning system is only effective once Burst Notifications have been configured according to your unique usage trends. To understand your trends, we would recommend reviewing your console traffic reports and Wastes.

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# LIST OF ABBREVIATIONS

PCB	Printed Circuit Board
SMS	Short Message Service
LED	Light emitting Diode
LCD	Liquid Crystal Display
DVD	Digital Video Disc
RAM	Random Access Memory
ROM	Read Only Memory
UV	Ultra Violet

# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

Technology has continuously been a crucial a part of delivering care. after you deem the leaps and bounds that are revamped the years, it's evident that putt innovation at the forefront of the care sector is thus unbelievably necessary for patient prosperity. in keeping with the report 'Technology, Health and Health Care' by the Commonwealth Department of Health and Aged Care, expectancy in industrialized countries throughout the twentieth century hyperbolic from around forty five to seventy five years. while not the speedy and continual improvement of technology, it's arduous to imagine that we'd have knowledgeable constant results.While technology is, for the foremost half, wholeheartedly embraced by folks as a necessity to produce the simplest doable level of care, there may be one space that doesn't appear to possess such an evident profit. We're talking concerning robots. Because, after all, however may AI ever replicate the emotional intelligence that's required among care professionals like nurses?

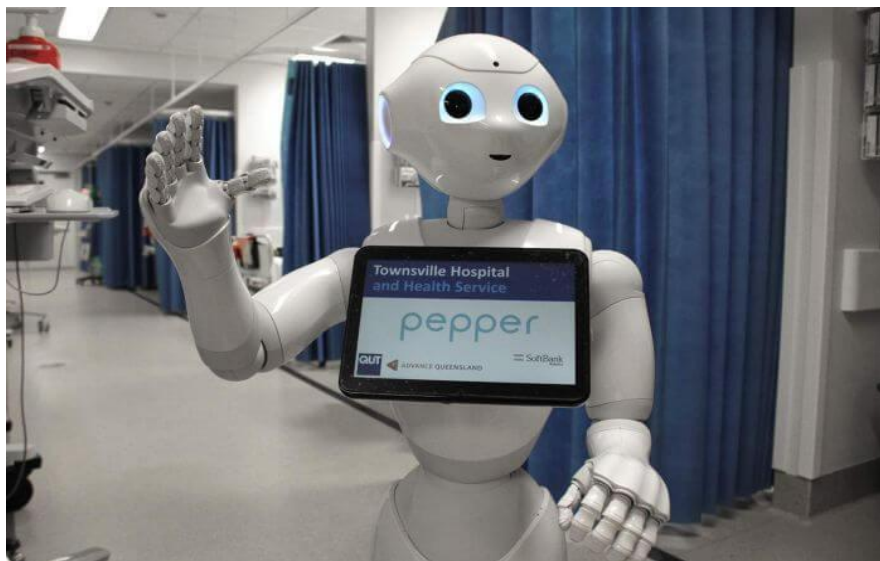


Figure 1.1: Robot Hospital in Australia.

Nurses ought to build selections not solely supported scientific facts and knowledge, however additionally by considering variety of moral problems. It's truthful to mention, then, that a automaton is extremely unlikely ever to be ready to tackle the complexities that a nurse or alternative attention professionals war daily. however what regarding complementing them – is there area and scope to welcome such a partnership? In a time wherever the demand for nurses is high and solely set to continue growing steady, is computer science consequent step in medical diagnosis? in an exceedingly 2014 report, Health hands Australia calculable that by 2025, there'd be a niche of eighty five,000 nurses in Australia alone. the priority then isn't regarding whether or not robots might exclude jobs from the nursing hands, however whether or not they will build any distinction to the apparent strain on those presently operating in it. There's no doubt of the worth of Australian nurses, neither is anyone distrustful the very fact that there's a shortage nobody is aware of a way to fix. though robots aren't ready to replace nurses in any approach, they are doing have the potential to alleviate sure stress points and hopefully, offer tools that free nurses up to produce high-quality care.

## **1.2 Problem Statement**

It is usual in any Bangladeshi Hospital to watch customers leave unhappy and furiously unsuccessful because of poor waiting service. This is often substantially visible in Hospital peak hours. To be crystal clear, this noticeable scene happens because of lack of employers throughout the time once patient are filling higher than the other hospital service. To the issues discovered in Asian nation relating the individual crisis, we tend to begin to seek for solutions to the present downside and eventually found the answers we tend to were trying to find. We've with success discovered that in Harbin, Heilongjiang province in Australia.

## **1.3 Aim of the Project**

The implementation of robots in industrial industries and lots of different companies has verified itself in providing a really promising way forward for advanced AI. We will perceive its influence within the industrial market simply by seeing what proportion effort and financial backing a selected company provides in creating robots like the

waiter-bot. The Harbin Haohai mechanism Company has endowed a complete of five million yuan within the production of those mechanisms and every robot price concerning two hundred, 000 to 300,000 yuans. [1] Supported the small print of this finding we tend to set that an identical project will be enforced in Asian country in an exceedingly price effective manner. Accumulating industrial and promoting facts, we tend to were conjointly ready to understand that this explicit project can have an outstanding result on the country's economic stability as this Thesis project is tried for the primary time in Asian country. If the waiter mechanism gets an eye catching recognition all around Page three Asian country, then this project will additional be improved and enforced in an exceedingly abundant refined and helpful manner. Therefore the inspiration of waiter mechanism gave United States of America hope of turning associate degree innovative plan into a faceable reality.

## **1.4 Scopes**

Several scopes and pointers area unit listed to confirm the project is conducted at intervals its meant boundary. This can be to confirm the project is heading to the proper direction to realize its meant objectives. The primary scope of this project is to grasp theoretical side of IR detector together with operating principles, characteristic of the detector, and quality. From the analyses, an electricity IR detector is chosen to create the system work properly. Meanwhile, the second scope of this project is that the development of associate degree IR detector Track finder system. Base on the investigation that antecedently done, some application of half ocular an exacta precise definite an explicit} part three of the study are used. This includes the event of the hardware and computer code half to manage the system inputs and outputs. The third scope is developing the interface between transmitter and receiver units with the microcontroller wherever the IR detector is found at the tip of transmitter and receiver circuits severally. It involves the formula development to receive signals through the receiver circuit victimization microcontroller. The ultimate scope is system testing. All the system's half area unit assembled along and tested. Any error or unsought result's resolved throughout this section. So as to create the system work with success, any

acquisition components for this technique like analysis on circuits and safety precaution mustn't to be unnoticed.

## **1.5 Organization of the Report**

This thesis consists of six chapters. In initial chapter it discuss regarding the matter statement, objectives and scope of the project. In chapter 2, it'll discuss a lot of on theory and literature reviews that are done. Chapter 3 can discuss regarding the methodology that been done to finish this project. It'll make a case for details like the association of the circuit and therefore the device to finish the circuit. Results are bestowed in chapter four. Last however not least, chapter 5 can discuss the conclusion and recommendation that may be in hot water the longer term work.



# CHAPTER 2

## SYSTEM REVIEWS

### 2.1 Introduction

Most sensors square measure electrical or electronic, though alternative varieties exist. A sensing element could be a variety of electrical device. Sensors square measure either direct indicating (e.g. a mercury-in-glass thermometer or electrical meter) or square measure paired with Associate in Nursing indicator (perhaps indirectly through Associate in Nursing analog to digital convertor, a pc and a display) so the worth detected becomes human decipherable. Additionally to alternative applications, sensors square measure heavily employed in medication, trade and AI. A standard demand within the field distance sensing is that of distance identification, or sorting of objects by navigational instrument. Usually this sort of application is easier than a general digital hospital setup with AI Technology and connect with digitalized our country.

### 2.2 Hard-wire Part General Block Diagram

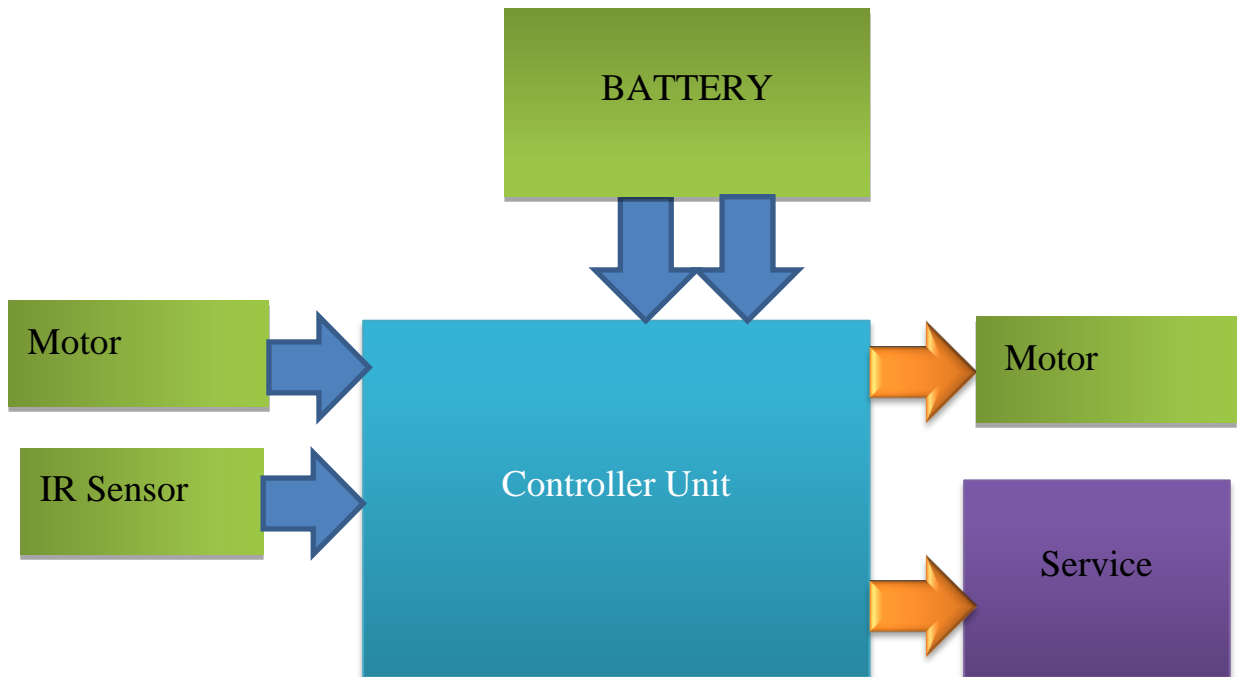


Fig. 2.1: Hard wire Part General Block Diagram

### 2.2.1 Block Diagram Description

The framework configuration appeared inside the figure higher than at a look furnishes America with a straightforward comprehension of anyway every framework was interfaced with each other. As we can imagine, the microcontroller (Arduino UNO) gets the finder contribution as its goal data. It at that point flags the Center point engine controller units to run the engine with connection to the IR indicator and in this manner the RFID esteems got severally. Injured individual inaction these qualities, the microcontroller recognizes whether any snag is inside the way and conjointly chooses whether or not the instrument has achieved its implied goal. When it achieves its right position it at that point flags the RFID card to veer off from its inactive position and set-up a relationship to the straight instrument thereupon allowing it to serve the dinner. The entire strategy would more be able to be referenced inside the future sections.

### Voltage and Current Specification

Discrete Components	Ratings
Adapter charger voltage	5v/12v DC
Lead Acid Battery Voltage	5v/9v/ 12V DC
Continuous charge/load current	590mA

## 2.3 Circuit Diagram

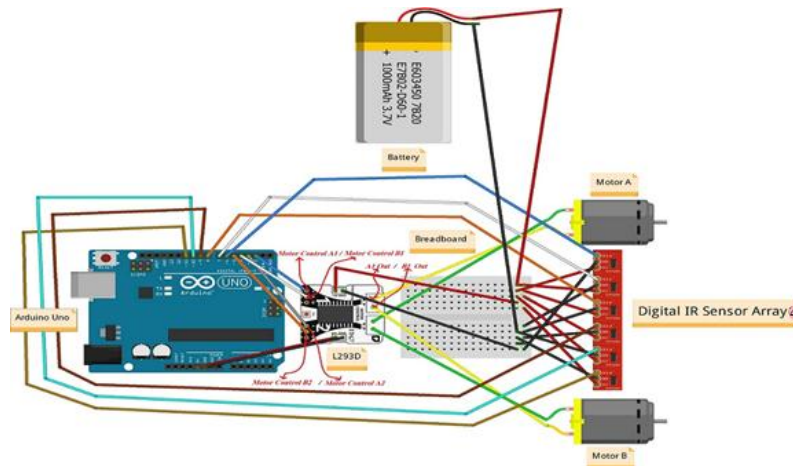


Fig. 2.2: Circuit Diagram

## 2.4 Working Processor our Circuit

A line supporter golem could be a golem that pursues an express way controlled by a criticism system. Structuring the mechanical half or the body of the golem. Characterizing the mechanics of the robots. Structuring the administration of the golem. The line following golem is one among oneself working robots. That distinguishes and fallows a line drawn on the domain. The street is shown by perspective on a square surface or square line on a white surface. This procedure ought to be sense by the street. This application is relies on the sensors. Here we will in general square measure exploitation 2 sensors for way discovery reason. That is closeness identifier and IR indicator. The nearness identifier utilized for way identification and IR finder utilized

for hindrance recognition. These sensors mounted at face of the golem. The microcontroller is relate degree canny gadget the all-out circuit is controlled by the microcontroller.

### **Applications of line follower robot:**

- Industrial Applications: These robots can be utilized as computerized hardware transporters in businesses supplanting customary transport lines.
- Automobile applications: These robots can likewise be utilized as programmed vehicles running on streets with installed magnets.
- Domestic applications: These can likewise be utilized at homes for residential purposes like floor cleaning and so forth.
- Guidance applications: These can be utilized out in the open spots like shopping centers, exhibition halls and so on to give way direction.

### **2.5 List of Components used in Circuit**

<b>No</b>	<b>Component Name</b>	<b>Quantity</b>	<b>Used</b>
01	Arduino UNO	01	To Control the System.
02	Lipo Battery 12v	01	To power supply.
03	4 Array IR module	01	To control IR sensor
04	4 Array IR sensor	04	To intensity of line distance
05	10 K Resistance	01	To Alarm
06	Cluster Ball	01	To Robot move
07	Jumper wire	(---)	To connection
08	Gear Motor 250 RPM	02	To move our robot
09	L298N Driver	01	To Move

10	Push Button	01	To Start to Move
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Table 2.1: Component list.

## 2.6 Conclusion

In refinement, tonometer could be an answer that isn't exclusively less demanding to actualize anyway is also simpler to institutionalize, making it more affordable. Extra fundamentally, the quality yield is specifically perfect with the human vision reaction as is in a split second material for imaging applications. Of these variables made tonometer to end up an extremely profitable explanatory device in its title. On the off chance that, for the moment, our consideration centers not around the sensors anyway on the genuine uses of identification and measurement, it'll rapidly wind up clear that Separation is really a significant entrenched procedure with a few fundamental applications in an exceedingly monstrous shift of fields or business.

# CHAPTER 3

## COMPONENT DESCRIPTION

### 3.1 Introduction

This chapter discusses the theories applied in developing the project. The reasons of the theories included during this chapter square measure history concerning sensors and piezoelectric effect, the essential principle of application of sensors, and therefore the kind of sensors and describe our part application and its background history and the way its work.

### 3.2 Arduino UNO

The Arduino UNO is AN ASCII content document microcontroller board bolstered the microchip ATmega328P microcontroller and created by Arduino.cc. The board is provided with sets of advanced and simple info/yield (I/O) sticks that will be interfaced to differed amplification sheets (shields) and elective circuits. The board has fourteen Advanced pins, six Simple pins, and programmable with the Arduino IDE (Incorporated Improvement Condition) by means of a thoughtful B USB link. It is jumped up by a USB link or by AN outer nine V battery, in spite of the fact that it acknowledges voltages somewhere in the range of seven and twenty volts. It's conjointly simply like the Arduino Nano and stone worker. The equipment reference style is circulated underneath an unsophisticated Lodge Attribution Offer Alike two.5 permit and is out there on the Arduino site. Format and generation records for a couple of renditions of the equipment additionally are available. "Uno" implies that one in Italian and was picked to stamp the release of Arduino bundle (IDE) one.0. The Uno board and form one.0 of Arduino bundle (IDE) were the reference adaptations of Arduino, at present developed to more up to date discharges. The Uno board is that the underlying in an exceptionally arrangement of USB Arduino sheets, and furthermore the reference show for the Arduino stage. The ATmega328 on the Arduino Uno comes prearranged with a boot loader that empowers

transferring new code thereto while not the work of AN outside equipment PC client. It conveys exploitation the first STK500 convention. The Uno conjointly varies from every single going before board in this it doesn't utilize the FTDI USB-to-sequential driver chip. Rather, it utilizes the Atmega16U2 (Atmega8U2 up to variant R2) modified as a USB-to-sequential gadget [1].

### 3.2.1 General Pin functions

- LED: There is a built-in LED driven by digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.
- VIN: The input voltage to the Arduino/Genuino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- 5V: This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 20V), the USB connector (5V), or the VIN pin of the board (7-20V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage the board.
- 3V3: A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
- GND: Ground pins.
- IOREF: This pin on the Arduino/Genuino board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage and select the appropriate power source or enable voltage translators on the outputs to work with the 5V or 3.3V.
- Reset: Typically used to add a reset button to shields which block the one on the board

### 3.2.2 Special Pin Functions

Every one of the fourteen advanced pins relate degraded vi Simple sticks on the Uno will be utilized as an info or yield, exploitation stick Mode(),digital Compose(), and computerized Read() capacities. They work at five volts. Each stick will offer or get

twenty Mama as directed operational condition and has an inside draw up obstruction (disengaged as a matter of course) of 20-50k ohm. A greater part of 40mA is that the value that needs to not be surpassed on any I/O stick to maintain a strategic distance from changeless damage to the microcontroller. The Uno has VI simple data sources, marked A0 through A5, everything about give ten bits of goals (for example 1024 totally extraordinary qualities). As a matter of course they live from ground to five volts, it possible to change the higher completion of their differ exploitation the AREF stick and in this way the simple Reference () perform.

**In addition, some pins have specialized functions:**

- Serial: pins 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.
- External Interrupts: pins 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value.
- PWM (Pulse Width Modulation) 3, 5, 6, 9, 10, and 11 Can provide 8-bit PWM output with the analog Write () function.
- SPI (Serial Peripheral Interface): 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication using the SPI library.
- AREF (Analog Reference): Reference voltage for the analog inputs.



Fig 3.1: Arduino UNO.



### 3.3 Lipo Battery 12V

Whether you have a crawler, biped or rover, you are going to want battery pack to urge your automaton moving on its own. Metallic element chemical compound batteries square measure nice an excellent good} alternative for automaton batteries as a result of they need nice capacity-to-weight ratios, activity you with many power for little or no weight. Our 3s 11.1V 2200mAh 30C Lipo Battery may be a nice medium sized battery that may discharge up to 66A continuously! To create it simple to connect/disconnect the battery from your project, every of those batteries incorporates a feminine T-Connector (Dean's extremist Plug compatible). They even have a customary 4-pin JST connective (.1"/2.54mm) that breaks out every cell for balance charging or battery testing. You'll charge these batteries with our mini Balance Charger or the Imax B6 Multi-Function Lipo Balance Charger. These batteries can plug directly into the chargers - with no want for device cables! [2].

Battery Specs	
<b>Voltage</b>	11.1V Nominal - 12.6V Max
<b>Capacity</b>	2200mAh
<b>Cell Count</b>	3
<b>Size</b>	25 x 34 x 104 mm
<b>Weight</b>	183 Grams
<b>Max Continuous Discharge</b>	30C
<b>Max Continuous Discharge Current</b>	66A
<b>Recommended Charge</b>	1C
<b>Recommended Charge Current</b>	2.2A
<b>Power Connector</b>	Female T-Connector (Deans Ultra Plug compatible)
<b>Balance Connector</b>	Standard JST - 4 Pin(.1"/2.54mm)

Fig 3.2: Chart of lipo battery.



Fig 3.3: Lipo Battery 12V.

### 3.4 Four Array IR module& Sensor

A sensing element array may be a cluster of sensors, typically deployed in an exceedingly bound pure mathematics pattern, used for grouping and process magnetism or acoustic signals. The advantage of employing a sensing element array over employing a single sensing element lies within the undeniable fact that Associate in nursing array adds new dimensions to the observation, serving to estimate a lot of parameters and improve the estimation performance. {for example for instance as Associate in Nursing example} an array of omnidirectional antenna parts used for beam forming will increase antenna gain within the direction of the signal whereas decreasing the gain in different directions, i.e., increasing S/N (SNR) by amplifying the signal coherently. Another example of sensing element array application is to estimate the direction of arrival of happening magnetism waves. The connected process technique is named array signal process. Application samples of array signal process embody radar/sonar, wireless communications, seismology, machine condition observation, astronomical observations fault designation, etc. victimization array signal process, the temporal and special properties (or parameters) of the happening signals interfered by noise and hidden within the

knowledge collected by the sensing element array will be calculable and unconcealed. This can be referred to as parameter estimation [3] [4].

### 3.4.1 Specifications

- Power supply: 3.3 V to 5 V
- Current: 1 A
- Temperature: -10 °C to +50 °C
- M3 screws
- Distance: 1mm - 60 cm adjustable
- Dimensions: Motherboard command: 44x40x12 mm
- Small plates: 25x12x12 mm



Fig 3.4: Four Array IR module

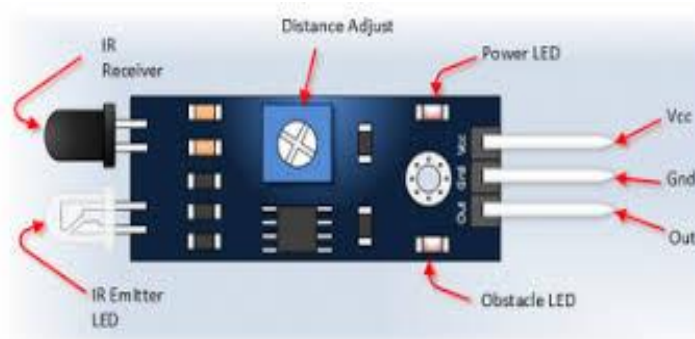


Fig 3.5: Four Array IR Sensor.

### 3.5 10 K Resistance

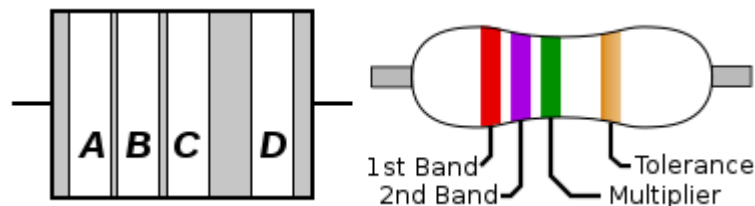
A resistance may be a passive two-terminal electrical element that implements ohmic resistance as a circuit component. In electronic circuits, resistors square measure accustomed cut back current flow, change signal levels, to divide voltages, bias active components, and terminate transmission lines, among alternative uses. High-energy resistors that may dissipate several watts of electric power as heat, could also be used as a part of motor controls, in power distribution systems, or as take a look at hundreds for generators. Mounted resistors have resistances that solely amendment slightly with temperature, time or in operation voltage. Variable resistors will be accustomed change circuit components (such as a volume management or a lamp dimmer), or as sensing devices for heat, light, humidity, force, or chemical activity. Resistors unit common parts of electrical networks and electronic circuits and are omnipresent in equipment. Sensible resistors as distinct elements will be composed of assorted compounds and forms. Resistors also are enforced inside integrated circuits. The electrical operate of an electrical device is fixed by its resistance: common industrial resistors are factory-made over a spread of over 9 orders of magnitude. The value of the resistance falls inside the producing tolerance, indicated on the part [5].



Fig 3.6: 10K Resistance

### 3.5.1 Resistance color code

An electronic code is employed to point the values or ratings of electronic parts, typically for resistors, however additionally for capacitors, inductors, diodes et al. A separate code, the 25-pair code, is employed to spot wires in some telecommunications cables. Totally different codes are used for wire leads on devices like transformers or in building wiring.



To distinguish left from right there is a gap between the C and D bands.

- The first significant figure of component value (left side)
- The second significant figure (some precision resistors have a third significant figure, and thus five bands).
- The decimal multiplier (number of trailing zeroes)
- If present, indicates tolerance of value in percent (no band means 20%)

In the on top of example, a resistance with bands of red, violet, green, and brown has 1st digit a pair of (red; see table below), second digit seven (violet), followed by five (green) zeroes: 2700000 ohms. Gold signifies that the tolerance is  $\pm 5\%$ . Resistors factory-made for military use may additionally embody a fifth band that indicates part failure rate (reliability); seek advice from MIL-HDBK-199[4] for additional details. Tight tolerance resistors could have 3 bands for important figures instead of 2, or a further band indicating temperature constant, in units of ppm/K. All coded parts have a minimum of 2 price bands and a multiplier; alternative bands area unit optional [6].

Ring color			Significant figures	Multiplier		Tolerance		Temperature coefficient	
Name	Code	RAL				Percent [%]	Letter	[ppm/K]	Letter
None	–	–	–	–	–	±20	M	–	–
Pink	PK	3015	–	$\times 10^{-3}$ <sup>[3]</sup>	$\times 0.001$	–	–	–	–
Silver	SR	–	–	$\times 10^{-2}$	$\times 0.01$	±10	K	–	–
Gold	GD	–	–	$\times 10^{-1}$	$\times 0.1$	±5	J	–	–
Black	BK	9005	0	$\times 10^0$	$\times 1$	–	–	250	U
Brown	BN	8003	1	$\times 10^1$	$\times 10$	±1	F	100	S
Red	RD	3000	2	$\times 10^2$	$\times 100$	±2	G	50	R
Orange	OG	2003	3	$\times 10^3$	$\times 1000$	±0.05 <sup>[3]</sup>	W	15	P
Yellow	YE	1021	4	$\times 10^4$	$\times 10\ 000$	±0.02 <sup>[3][nb 1][5]</sup>	P	25	Q
Green	GN	6018	5	$\times 10^5$	$\times 100\ 000$	±0.5	D	20	Z <sup>[nb 2]</sup>
Blue	BU	5015	6	$\times 10^6$	$\times 1\ 000\ 000$	±0.25	C	10	Z <sup>[nb 2]</sup>
Violet	VT	4005	7	$\times 10^7$	$\times 10\ 000\ 000$	±0.1	B	5	M
Grey	GY	7000	8	$\times 10^8$	$\times 100\ 000\ 000$	±0.01 <sup>[3][nb 3][nb 1][5]</sup>	L (A)	1	K
White	WH	1013	9	$\times 10^9$	$\times 1\ 000\ 000\ 000$	–	–	–	–

Fig 3.7: Resistance color code.

### 3.6 Caster While

Metal ball caster, 1mm thick plate from the machine stepping, it's the inclination to help 15KG payload. The Caster is vigorous and light-weight. it's 20mm high circular body, with an entire load of exclusively 37g; and tremendous steel ball around little ball around the greatest sum as forty to turn the most parchment ball much more swimmingly, that manufacture the robot walk or move at an extra adaptable and comfortable methods. Our very much loved 2WD Arduino robot Stage adjusts this caster. In its crude kind, a wheel could be a round square of an intense and tough material at whose inside has been drilled a roundabout gap through that is put A pole bearing with respect to that the wheel pivots once a moment is connected by gravity or power to the wheel in regards to its hub, haggle in this manner making along one among the six clear machines. when put vertically underneath a supporting stage or case, the wheel turning on the even shaft makes it

feasible to move critical burdens; when put on a level plane, the wheel turning on its vertical shaft makes it possible to control the turning movement acclimated frame materials (for example a potter's wheel); when mounted on a section associated with a rudder or a case mounted on various wheels, one will the board the heading of a vessel or vehicle (for example a ship's wheel or guiding wheel); when associated with a wrench, the wheel creates or transmits vitality (for example the flywheel) [7].

### 3.6.1 Caster While Specifications

- Fixed hole: 4mm
- Center Distance to Fixed holes: 40mm
- Ball body height: 20mm
- Ball protruding height: 4mm
- Bearing ball number: 40
- Maximum load: 15KG
- Ball diameter: 15mm



Fig 3.8: Metal ball caster wheel.

## 3.7 Jumper wire

A jump wire (also referred to as jumper wire, or jumper) is associate degree electrical wire, or cluster of them in a very cable, with a instrumentality or pin at every finish (or generally while not them – merely "tinned"), that is generally accustomed interconnect the elements of a board or alternative example or take a look at circuit, internally or with alternative instrumentation or elements, while not fastening. Individual jump wires square measure fitted by inserting their "end connectors" into the slots provided in a very board, the header instrumentality of a board, or a bit of equipment [8].

### 3.7.1 Types

There are different types of jumper wires. Some have the same type of electrical connector at both ends, while others have different connectors. Some common connectors are:

- Solid tips – are used to connect on/with a breadboard or female header connector. The arrangement of the elements and ease of insertion on a breadboard allows increasing the mounting density of both components and jump wires without fear of short-circuits. The jump wires vary in size and color to distinguish the different working signals.
- Crocodile clips – are used, among other applications, to temporarily bridge sensors, buttons and other elements of prototypes with components or equipment that have arbitrary connectors, wires, screw terminals, etc.
- Banana connectors – are commonly used on test equipment for DC and low-frequency AC signals.
- Registered jack (RJNN) – are commonly used in telephone (RJ11) and computer networking (RJ45).
- RCA connectors – are often used for audio, low-resolution composite video signals, or other low-frequency applications requiring a shielded cable.
- RF connectors – are used to carry radio frequency signals between circuits, test equipment, and antennas.





Fig 3.9: Jumper wire.

### 3.8 Gear Motor 250 RPM

A DC engine is any of a class of turning electrical machines that changes over power control into vitality. The preeminent regular sorts esteem the powers made by attractive fields. About each kind of DC engines have some inner system, either mechanical gadget or electronic, to sporadically alteration the course of current stream somewhat of the engine. DC engines were the essential kind wide utilized, since they may be supercharged from existing direct-current lighting power dispersion frameworks. A DC engine's speed is controlled over a decent shift, exploitation either a variable offer voltage or by powerful the quality of current in its field windings. Little DC engines region unit used in devices, toys, and machines. The all-inclusive engine will work power anyway could be a light-weight brushed engine utilized for moveable power instruments and apparatuses. Bigger DC engines territory unit used in impetus of electrical vehicles, lift and raises, or in drives for steel moving factories. The entry of intensity physical science has made supplanting of DC engines with air conditioning engines potential in a few applications. A curl of wire with a present going through it produces Relate in nursing attractive power field lined up with the center of the loop. The course and greatness of the power field

made by the curl is adjusted with the bearing and extent of this moving through it. A simple DC engine incorporates a stationary arrangement of magnets inside the stator loop. Relate in nursing a curl with one or extra windings of protected wire folded over a delicate iron center that focuses the power field. The windings ordinarily have numerous turns round the center, and in monster engines there is many parallel current ways. The closures of the wire winding zone unit associated with a pundit. The analyst allows each curl to be stimulated progressively and interfaces the turning loops with the outside power offer through brushes. (Brushless DC engines have physical science that switch the DC current to each loop on and off and haven't any brushes.) The whole amount of current sent to the curl, the curl's size and what it's folded over direct the quality of the attractive power field made [9].



Fig 3.10: Gear Motor 250 RPM.

### **3.9 L298N Driver**

The L298 Driver could be a high voltage, high ebb and flow twin full scaffold driver intended to just acknowledge typical TTL rationale levels and drive inductive hundreds such transfers, solenoids, DC and venturing engines. 2 change inputs territory unit gave to modify or incapacitate the gadget severally of the information signals. The producers

of the lower transistors of each scaffold zone unit associated along the relating outside terminal might be utilized for the alliance of partner degree outer detecting obstruction. The L298 incorporates 2 control yield arranges (A, B). The capacity yield stage could be a scaffold design relate degreed its yields will drive an inductive load in like manner or differential mode, depending on the condition of the information sources. The present that courses through the heap turns out from the extension at the sense yield relate degree outside opposition (RSA, RSB.) licenses to find the force of this current. Each extension is driven by proposes that of 4 doors the contribution of that territory unit In1 In2 ENA and In3; In4; ENB. The In sources of info set the extension state once the direct unit input is high; an espresso condition of the straight unit input hinders the scaffold. Every one of the information sources zone unit TTL perfect. A non-inductive capacitance, in some cases of 100nF, ought not to out of the ordinary between every versus what's more, VSS, to ground, as near as feasible to GND stick. When the huge capacitance of the capacity offer is only excessively far from the IC, a second littler one ought to be required near the L298. The sense obstruction, not of a wire wound sort, ought to be grounded near the negative post of versus that must be near the GND stick of the IC. Each information ought to be associated with the supply of the driving signs by recommends that of an extremely short way. Stimulant and flip-Off before to appear On the accessibility Voltage and before to Kill it, the change in-put ought to be headed to the Low state [10].

### 3.9.1 Feature

- Operating supply voltage up to 46 V
- Total DC current up to 4 A
- Low saturation voltage
- Over temperature protection.
- Logical "0" input voltage upto 1.5 V (HIGH NOISE IMMUNITY)
- Two motor direction indicator LEDs
- An onboard user-accessible 5V low-dropout regulator
- Scotty EMF-protection diodes
- Screw-terminals for power and motor connections.
- High quality PCB FR4 Grade with FPT Certified.



Fig 3.11: L298N Driver.

### 3.10 Push-Button

A push-catch (additionally spelled pushbutton) or just catch is a straightforward switch system for controlling some part of a machine or a procedure. Catches are normally made out of hard material, typically plastic or metal. The surface is typically level or molded to suit the human finger or hand, in order to be effortlessly discouraged or pushed. Catches are frequently one-sided switches, albeit numerous un-one-sided catches (because of their physical nature) still require a spring to come back to their un-pushed state. Terms for the "pushing" of a catch incorporate squeezing, discouraging, crushing, slapping, hitting, and punching. The "push-catch" has been used in mini-computers, push-catch phones, kitchen apparatuses, and different other mechanical and electronic gadgets, home and business. In modern and business applications, push catches can be associated together by a mechanical linkage so the demonstration of pushing one catch makes the other catch be discharged. Along these lines, a stop catch can "constrain" a begin catch to be discharged. This technique for linkage is utilized in straightforward manual tasks in which the machine or process has no electrical circuits for control. Red pushbuttons can likewise have expansive heads (called mushroom heads) for simple activity and to encourage the ceasing of a machine. These pushbuttons are called crisis stop catches and for expanded security are ordered by the electrical code in numerous wards. This huge mushroom

shape can likewise be found in catches for use with administrators who need to wear gloves for their work and couldn't impel an ordinary flush-mounted push catch [11].



Fig 3.12: Push-Button.

### 3.11 Cost Analysis

In this section we will show cost of my project that means cost sheet representation of our project.

#### 3.11.1 Cost Sheet:

No	Component Name	Quantity	Purchase Price (TK)
01	Arduino UNO	01	
02	Battery 12v	01	
03	4 Array IR module	01	
04	4 Array IR sensor	04	
05	10 K Resistance	01	
06	Cluster Ball	01	
07	Jumper wire	(---	
08	Gear Motor 250 RPM	02	
09	L298N Driver	01	
10	Push Button	01	

Table 3.1: Cost sheet

# CHAPTER 4

## SOFTWARE ANALYSIS

### 4.1 Introduction

In this chapter the software used and the language in which the program code is defined is mentioned and the program code dumping tools are explained. The chapter also documents the development of the program for the application.

### 4.2 Description of our Software

The ASCII text file Arduino setting makes it simple to put in writing code and transfer it to the I/O board. It runs on Windows, Mac OS X, and Linux. The setting is written in Java and supported process, avr-gcc, and different open supply code. The screen shot of Arduino one.6.8 is shown below...



Fig. 4.1: Software Platform

It is additionally capable of assembling and uploading programs to the board with one click. There's generally not have to be compelled to edit build files or run programs on a



### 4.3 Line following system

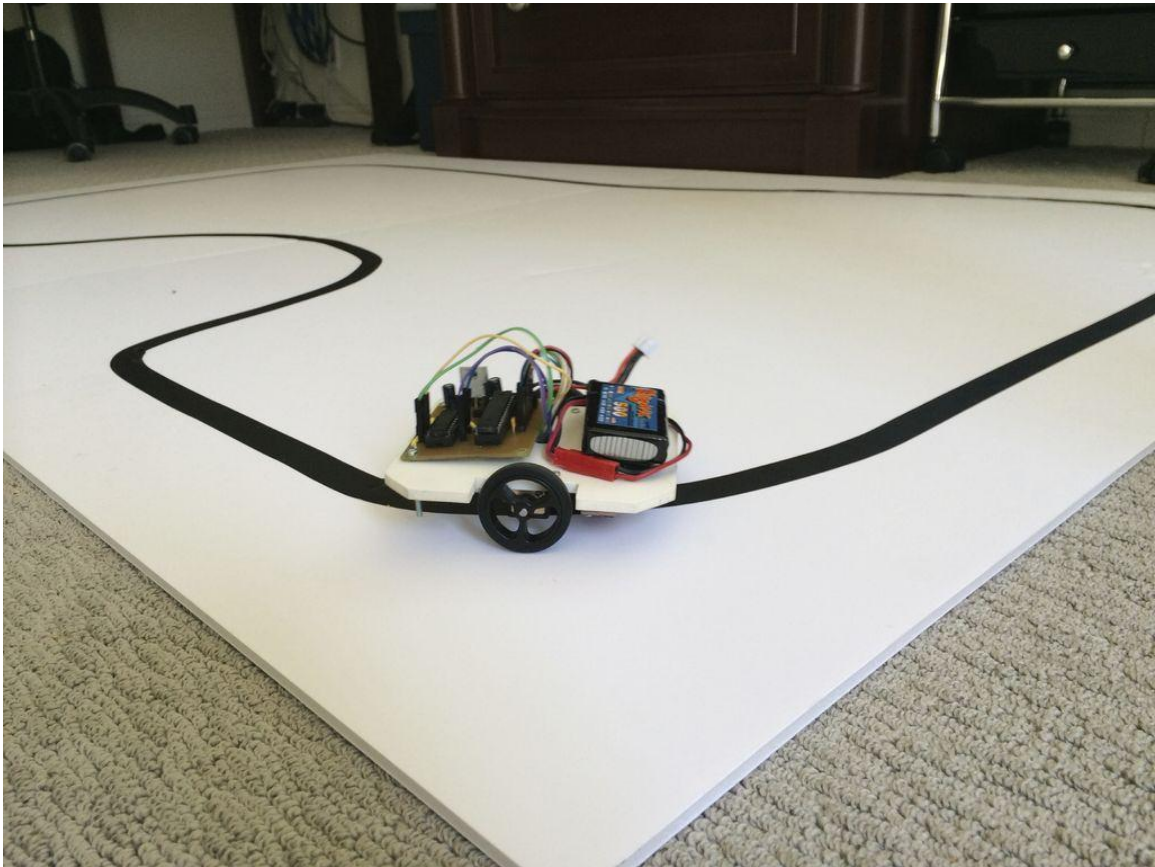


Fig 4.2: Service line.

A Line Follower mechanism, because the name suggests, is an automatic guided vehicle, that follow a visible line embedded on the ground or ceiling. Usually, the visual line is that the path during which the road follower mechanism goes and it'll be a black line on a white surface however the opposite means (white line on a black surface) is additionally attainable. sure advanced Line Follower Robots use invisible field of force as their ways. massive line follower robots ar sometimes employed in industries for helping the machine-driven production method. they're conjointly employed in military applications, human help purpose, delivery services etc. Line follower mechanism is one amongst 1st{the primary} robots that beginners and students would get their first robotic expertise with. during this project, we've designed a straightforward Line Follower mechanism victimisation Arduino and a few different parts.



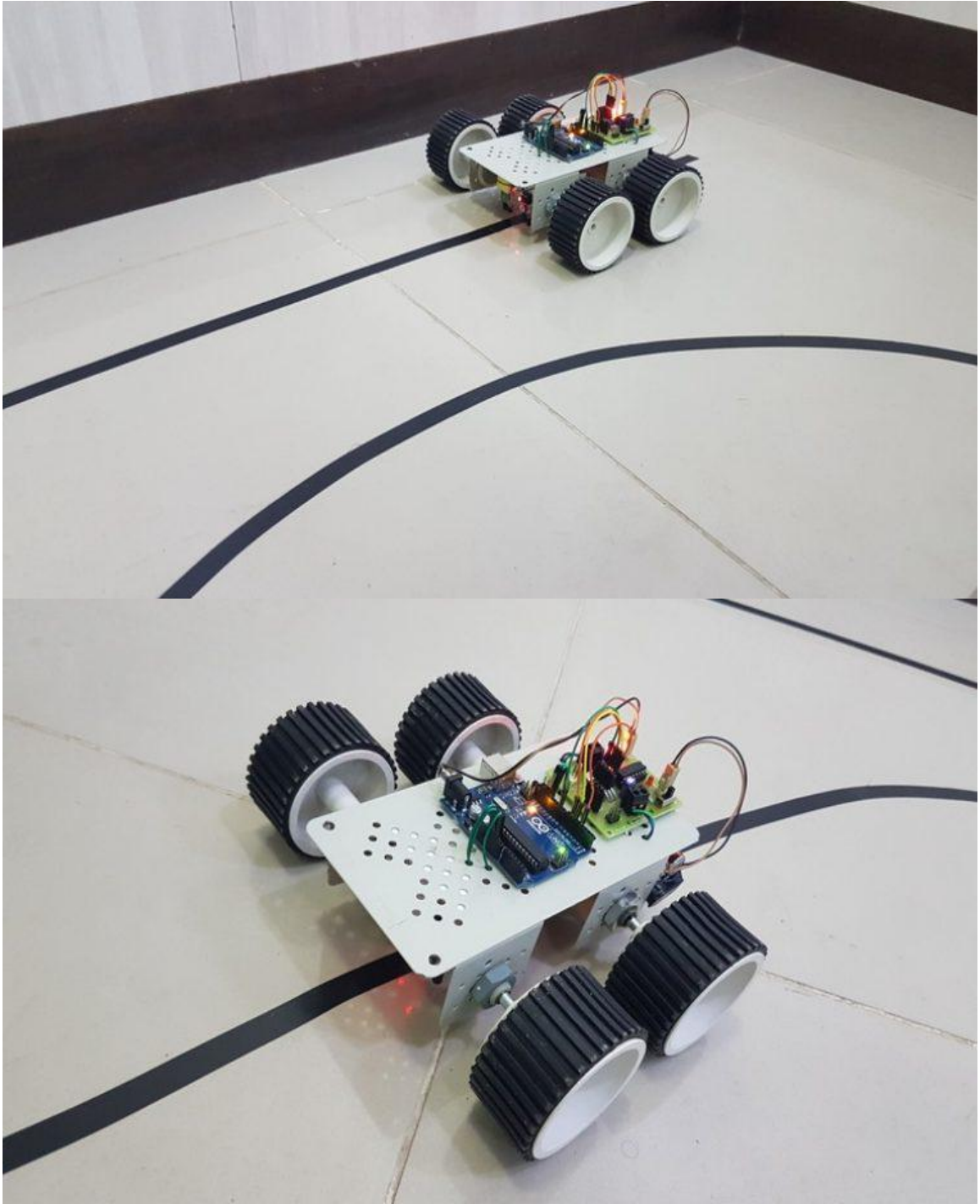


Fig 4.3: Line follower Robots are following line.

#### 4.4 Flow Chart Diagram

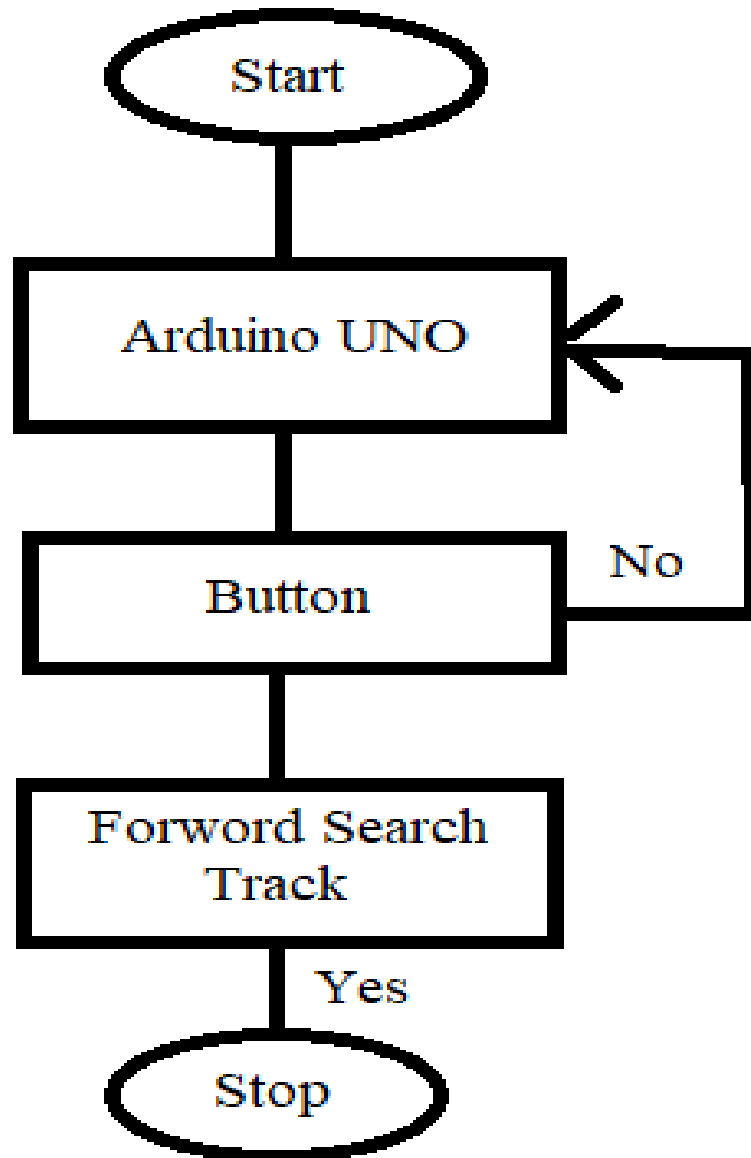


Fig 4.4: Flow Chart Diagram of our system.

# CHAPTER 5

## Result & Performance Analysis

### 5.1 Result

In this part we will see exactly how the Robot performed and how much achievement rate it has accomplished. In light of the quantity of preliminaries executed from the earliest starting point of the venture usage, a record of every achievement and every disappointment were noted. With the assistance of this information we could make a bar outline which demonstrates us precisely how often the venture was a triumph and how frequently the task was a disappointment out of an all-out number of preliminaries. The bar diagram is given beneath.

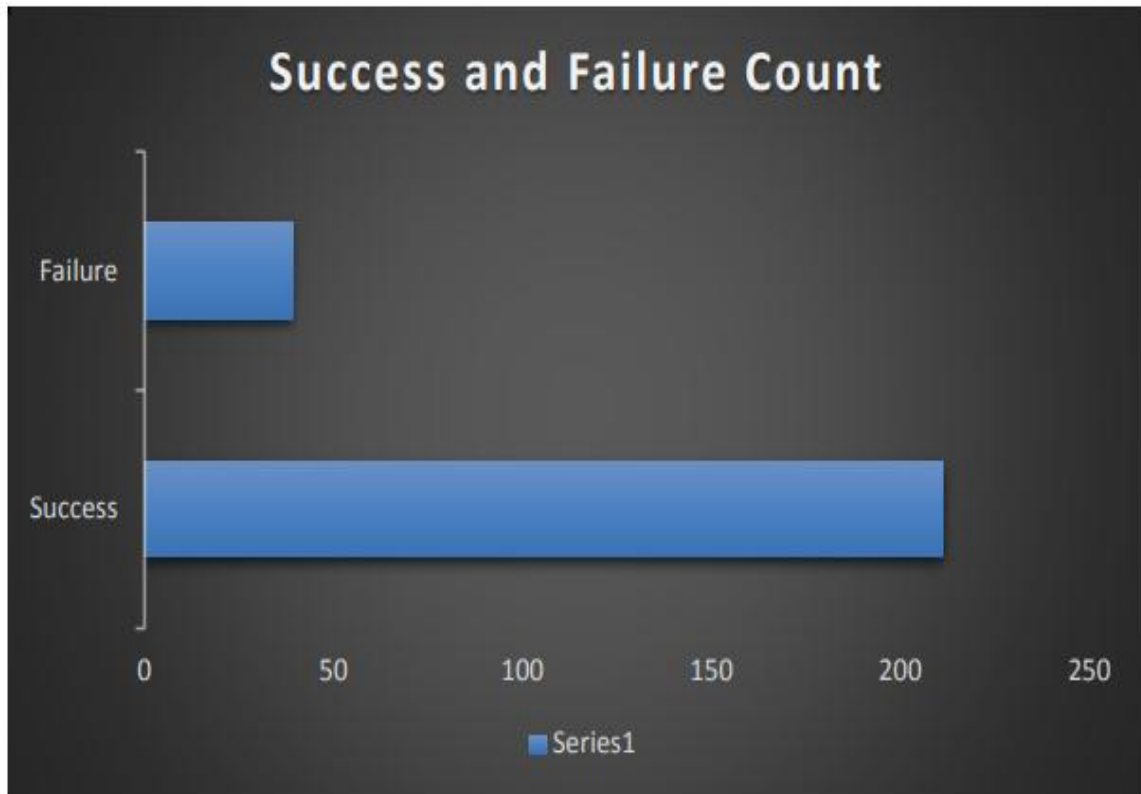


Fig 5.1 Success and Failure Count

As we can see from the diagram, unmistakably out of a way of multiple times, we tend to could make a living fruitful of multiple times and have conjointly gone up against with a disappointment of thirty-nine times. To be a ton of expand, the essential eleven to sixteen trails were an interminable disappointment. This was because of toward the beginning of the task we tend to were not able frame the machine watch the street itself. The IR finder esteems used in the code weren't right and furthermore the separation between the IR indicators clusters and furthermore the ground wasn't right. This explicit issue was fathomed once an all-encompassing dull anyway watchful technique for institutionalization. By at present the machine was to some degree equipped for police work reference point and dark line with very authentic exactness. None the less, the machine couldn't stop at the right place at the right time. When it did, it acclimated stop just a little sum front of the individual table. This was on account of inactivity of movement of the robot in light of the fact that the machine had a generous amount of weight. in this manner future couple of preliminaries were conjointly blended with a little measure of progress anyway a ton of disappointments. Therefore the engine speed must be tag in venture with our need and furthermore the robot was tuned perfectly. At long last, towards the highest point of the preliminaries the machine worked neatly while not the need of any institutionalization. A graph of the entire extent of progress and furthermore the all-out extent of disappointments is given underneath.

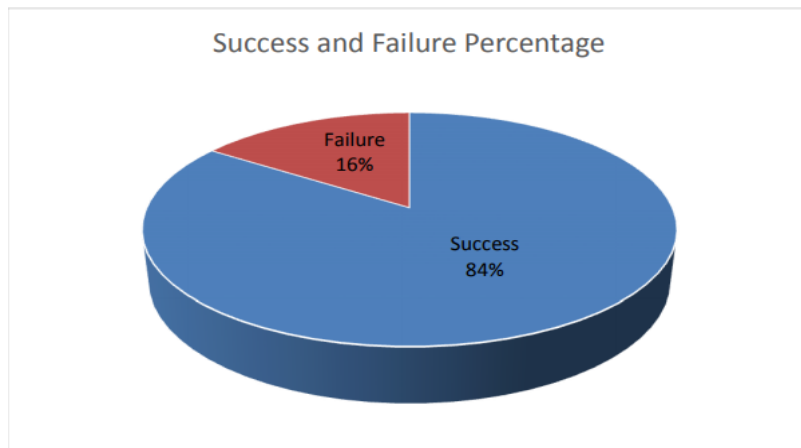


Fig 5.2 Success and Failure Percentage

As we will see, the chart higher than provides North American country Associate in nursing estimate of the exactitude and accuracy of the golem. When extreme diligence and relentless trial and error procedures we have a tendency to were with success ready to generate successful rate of eighty four with the golem.

## 5.2 IR Sensor Waiter Bot Robot

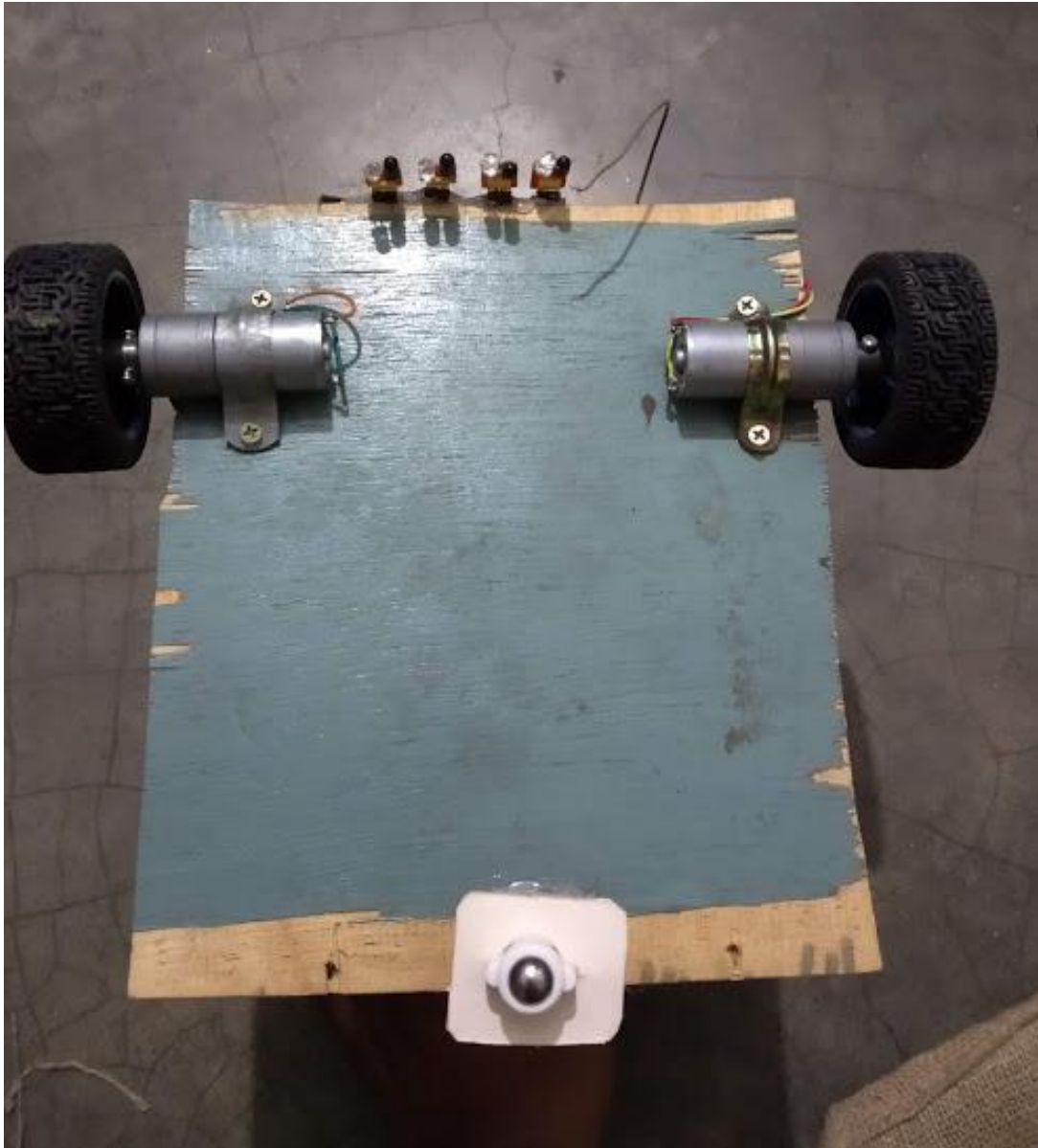


Fig 5.3: Project Layout.

### 5.3 Proposed assembly for the Digital Hospital Management system

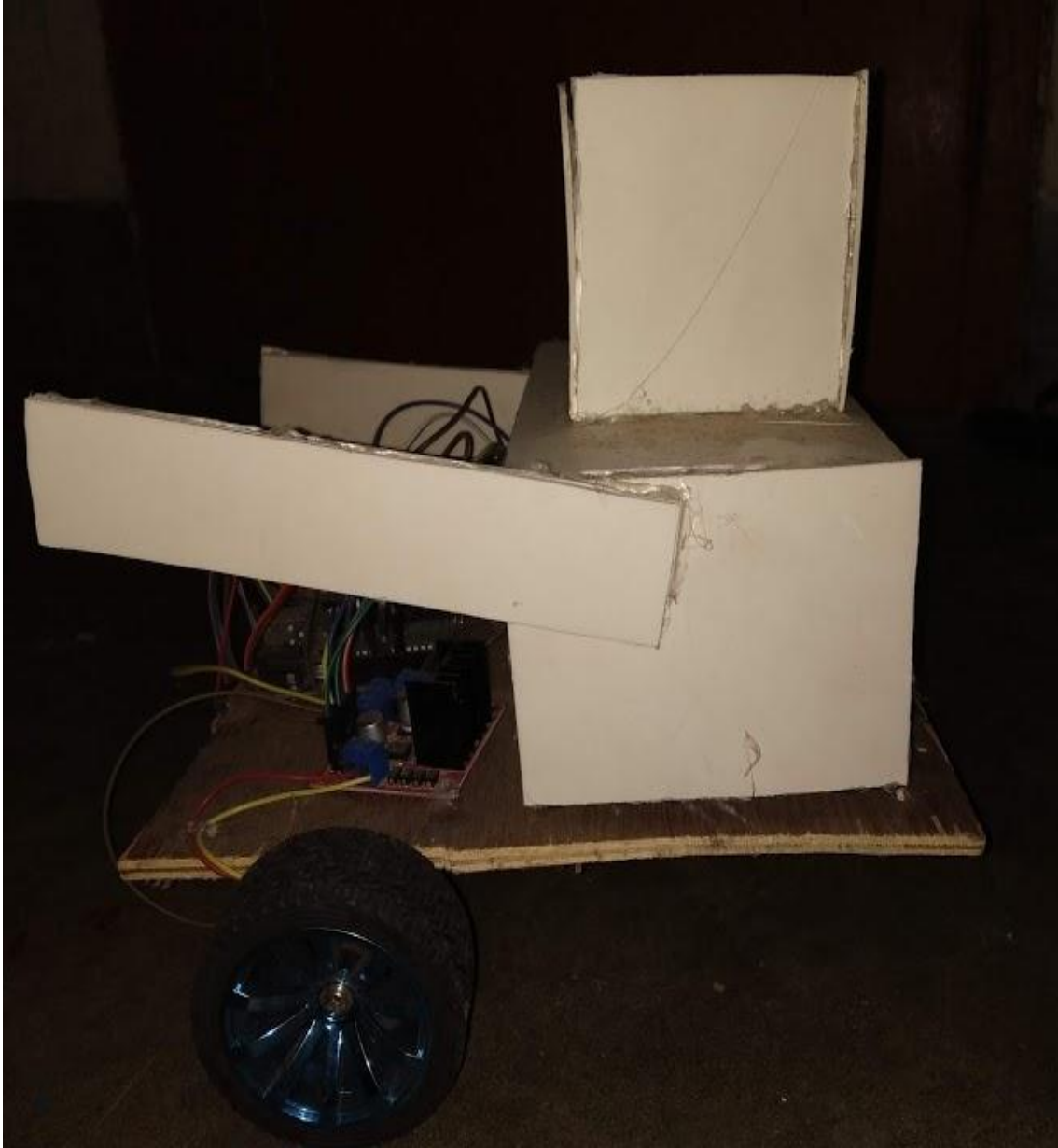


Fig 5.4: Digital Hospital Management system.

## 5.4 Proposed assembly for Digital Hospital Management system of the Whole projects

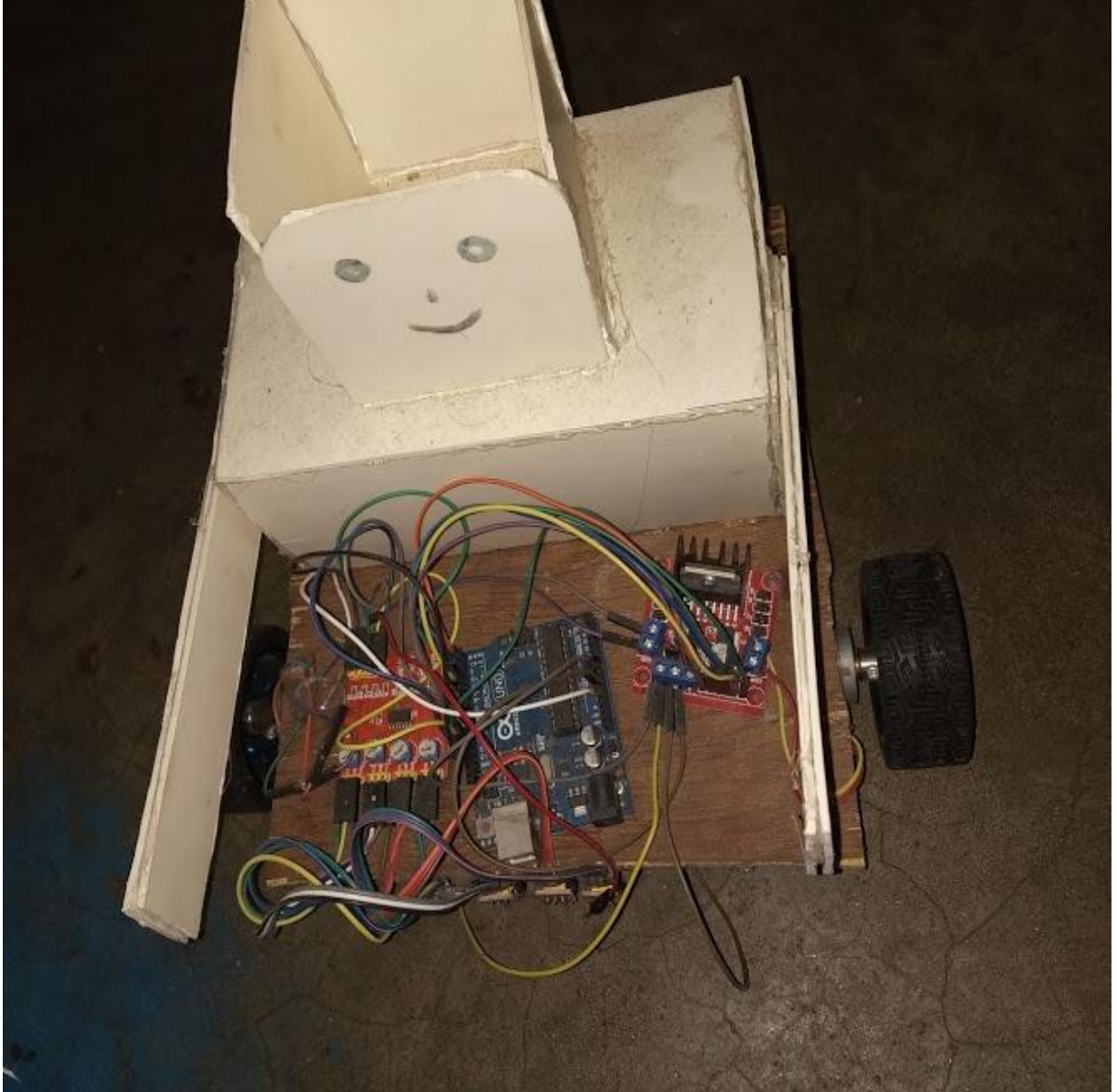


Fig 5.5: Digital Hospital Management system of the Whole projects.

*Note:* All setup is very easy and it ready to service for Digital Hospital Management system. But it is Demo Version of our Thesis Project.

# CHAPTER 6

## CONCLUSION&FUTURE SCOPE

### 6.1 Conclusion

The presentation of the machine inside the business sectors of East Pakistan can rouse a commanding correction inside the typical of our nation to its neighboring nations. Not exclusively that, it'll moreover get a worldwide innovative acknowledgment. Inside the express field and business, this undertaking is that the first and ought to have a high opportunity to end up a strong aspect towards a financial lift. East Pakistan business could be a quick expanding business sector in its very own methodology. On the off chance that, with a ground-breaking tolerance, this task is tried on the area straightforwardly for a couple of months and furthermore the outcomes available situation and furthermore the business standing is examined, at that point a phenomenal higher end is additionally determined from its consequences for moving technique. It's justified that an explicit eating house with a programmed representatives can draw in stores of purchasers inside its area. People can appear to effectively like that explicit eating house just to discover the machine-controlled workers in real life. With drudge and power, an explicit eating house like this could be changed over into a holidaymaker spot for a few nonnatives. Stacks of viewpoint business could take a hold inside the market on account of the impact of machine-controlled eateries inside the near future. On the off chance that consequently as extra and extra eateries progress toward becoming machine-controlled the fundamental income from everything about eateries can for certain offer an outrageous financial lift to the state. Other than the business and moving advantages, there's extra to the robot than what it sounds like. The use of the machine can curtail human exertion and make a comfortable mode for the occupants of East Pakistan. Ne'er the less, it'll touch off the vision of finish robot inaction inside the near future if the offspring of this age and furthermore the following territory unit acquainted with the current unequivocal simple anyway new innovative execution.



## **6.2 Future scope**

Smarter version of line followers area unit accustomed deliver mails inside edifice and deliver medication in an exceedingly hospital. This technology has been suggests for running buses and different mass transit system and should find yourself as a neighborhood of autonomous cars navigating the motorway.

## **6.3 Problems encountered**

A lot of your time and efforts are lost find sensors with its technical datasheet even within the net. the ability and management work operating time is scant taking within the account the lectures time thus but three hours area unit obtainable for North American nation and also the instrumentality and tools needed for the comes is dear to shop for from market.

## **6.4 Advantage**

- Whenever Robot senses any obstacle automatically diverts its position to left or right and follows the path without human guidance.
- The programming is microcontroller is easy.
- It is low cost circuit.
- Robot movement is automatic
- It is used for long distance applications
- Simplicity of building
- Fit and forget system
- Used in home, industrial automations etc.

## 6.5 Disadvantage

- Line supporter robot pursues a dark line around 1 or 2 crawls in width on a white surface.
- Line following robots are straightforward robots with an extra sensors set on them.
- It in every case needs a way to run either white or dark since the IR beams ought to reflect from the specific way.
- Slow speed and insecurity on various line thickness or hard edges.

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# Appendix-A

```
//Enable Pin of the Right Motor (must be PWM)
```

```
int IN1 = 2; //Control Pin
```

```
int IN2 = 3;
```

```
//Enable Pin of the Left Motor (must be PWM)
```

```
int IN3 = 4;
```

```
int IN4 = 5;
```

```
int ENA = 10;
```

```
int ENB = 11;
```

```
int button=8;
```

```
//Speed of the Motors
```

```
int Sensor1 = 0;
```

```
int Sensor2 = 0;
```

```
int Sensor3 = 0;
```

```
int Sensor4 = 0;
```

```
void setup() {
```

```
  Serial.begin(9600);
```

```
  pinMode(ENA, OUTPUT);
```

```
  pinMode(ENB, OUTPUT);
```

```
  pinMode(IN1, OUTPUT);
```

```
  pinMode(IN2, OUTPUT);
```

```
  pinMode(button,INPUT);
```

```
pinMode(IN3, OUTPUT);
pinMode(IN4, OUTPUT);

pinMode(Sensor1, INPUT);
pinMode(Sensor2, INPUT);
pinMode(Sensor3, INPUT);
pinMode(Sensor4, INPUT);
  analogWrite(ENA,150);
analogWrite(ENB,150);

}

void loop(){

  //Use analogWrite to run motor at adjusted speed

  //Read the Sensor if HIGH (BLACK Line) or LOW (WHITE Line)
  Sensor1 = digitalRead(8);
  Sensor2 = digitalRead(9);
  Sensor3 = digitalRead(12);
  Sensor4 = digitalRead(13);

  //Set conditions for FORWARD, LEFT and RIGHT
```

```

Serial.print(digitalRead(Sensor1));

Serial.print(digitalRead( Sensor2));

Serial.print(digitalRead( Sensor3));

Serial.println(digitalRead( Sensor4));

if (Sensor4 == LOW && Sensor3 == HIGH && Sensor2 == HIGH && Sensor1 ==LOW ){

//UP

digitalWrite(IN1, HIGH);

digitalWrite(IN2, LOW);

//motor B Backward

digitalWrite(IN3, HIGH);

digitalWrite(IN4, LOW);

Serial.println("up");
}

else if (Sensor4 == LOW && Sensor3 == LOW && Sensor2 == HIGH && Sensor1 == HIGH){

//LEFT

digitalWrite(IN1, LOW);

digitalWrite(IN2, LOW);

//motor B Backward

```

```

digitalWrite(IN3, HIGH);

digitalWrite(IN4, LOW);

Serial.println("left");
}

else if (Sensor4 == HIGH && Sensor3 == HIGH && Sensor2 == LOW && Sensor1 == LOW)

{ //RIGHT

digitalWrite(IN1, HIGH);

digitalWrite(IN2, LOW);

digitalWrite(IN3, LOW);

digitalWrite(IN4, LOW);

Serial.println("right");

}

else if (Sensor4 == HIGH && Sensor3 == HIGH && Sensor2 == HIGH && Sensor1 == HIGH) ////
HIGH MANY ZERO

{

digitalWrite(IN1, LOW);

digitalWrite(IN2, LOW);

digitalWrite(IN3, LOW);

digitalWrite(IN4, LOW);

Serial.println("stop");

if(digitalRead(button)==HIGH){

digitalWrite(IN1, HIGH);

digitalWrite(IN2, LOW);

```

```

//motor B Backward
digitalWrite(IN3, HIGH);
digitalWrite(IN4, LOW);

delay(100);
}
}

else if (Sensor4 == LOW && Sensor3 == LOW && Sensor2 == LOW && Sensor1 == LOW) ////
HIGH MANY ZERO
{

digitalWrite(IN1, LOW);
digitalWrite(IN2, LOW);
digitalWrite(IN3, LOW);
digitalWrite(IN4, LOW);
Serial.println("stop1");

}

}

```