

SMART CAR PARKING SYSTEM USING IOT

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering degree in
Electronics and Communication Engineering

by

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(DEEMED TO BE UNIVERSITY)

Accredited with Grade "A" by NAAC

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **CH.MOULI** (37130084), **D.SAI KRISHNA** (37130092) who carried out the project entitled “**SMART CAR PARKING SYSTEM USING IOT**” under our supervision from December 2021 to April 2021.

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DECLARATION

We **CH.MOULI (Reg. No: 37130084)** and **D.SAI KRISHNA(Reg. No: 37130092)** hereby declare that the Project Report entitled “**SMART CAR PARKING SYSTEM USING IOT**” done by us under guidance of **Mrs. F. V. Jayasudha,M.E.,(Ph.D)** at Sathyabama Institute of Science and Technology is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering.

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ABSTRACT

Internet of Things (IOT) plays a significant role in connecting the encompassing environmental things to the network and created straightforward to access those un-internet things from any remote location.

And generally folks face issues on parking vehicles in parking slots in a very town. during this study we have a tendency to style a wise Parking System (SPS) that allows the user to search out the closest park and provides convenience of parking slots therein individual park.

And it chiefly target reducing the time find the parking tons and conjointly it avoids the uncalled-for travel through crammed parking tons in a very park. therefore it reduces the fuel consumption that successively reduces carbon footprints in an environment.

Internet of Things (IOT) plays a significant role in connecting the encompassing environmental things to network and makes it straightforward to access these non-internet things from any distant place. It's inevitable for folks update with the growing technology. and typically folks ar manage parking issues in town automotive parks. during this study, we have a tendency to style Associate in Nursing intelligent parking system (SPS) permits the user to search out the closest park convenience of parking areas during this individual park. And he focuses chiefly on reducing the time to search out the parking and conjointly avoids uncalled-for travel because of complete parking in a very car parking zone.

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CHAPTER-1

INTRODUCTION:

Road congestion caused by vehicles is alarming problem on a global scale and is growing exponentially. The problem of parking is an important factor and it was still a big problem with confined car parks urban cities. Searching for a parking space is a routine often frustrating activities for many people in the cities around the world. This search burns about a million barrels the oil of the world every single day.

These problems will get worse with the world's population continues to urbanize without removed from the car well planned, based on convenience. According to a report, Smart Parking could involve 2, 20,000 lots of fuel until 2030 and approx. 3, 00,000 loads fuels by 2050 if fulfilled properly as stated in Figure. Smart Parking systems get information about availability parking in a particular geographical area. This process is in real time to position the vehicles in the available positions. Involved Real-time data collection with low-cost sensors automatic payment systems activated on the mobile phone allows people to book early parking. The importance of smart parking is: Detects and accurately preaches the occupation of premises / vehicles by real time. Guide residents and visitors to available parking. Optimize the use of the parking space. Simplify the parking experience and add value parking parties, such as dealers and drivers. Help the free flow of traffic in the city by exploiting the IOT technology. Enables smart decisions using data, including real data temporary status applications and historical analysis reports. Smart parking plays an important role in the creation of urban environment by reducing CO2 emissions and other pollutants. Smart Parking allows better tracking in real time and manage the resulting free parking space significant revenue generation. Provides tools to optimize the management of the workforce.

CHAPTER-2

LITERATURE SURVEY:

Smart automotive Parking Management System victimisation Iot Aniket Gupta*, Sujata Kulkarni* , Vaibhavi Jathar, Ved Sharma, Naman Jain

Proliferation within the range of vehicles is resulting in issues of vehicles parking at associate degree applicable place particularly the automotive parking. This indirectly ends up in tie up. this can be due to the actual fact that current transportation infrastructure and area unit a lot facility are unable to address the arrival of huge range of vehicles on the road. To alleviate the same drawback, authors planned a sensible Parking Management System that helps users to mechanically realize a free parking lot with a smaller quantity. sensible Parking involves use of unhearable detector, Arduino Uno, ESP8266-01 Wi-Fi Module, Cloud server. IOT based mostly new parking platform alter to attach, analyze and alter information gathered from devices and execute sensible parking potential. sensible parking would alter vehicle occupancy, observance and managing of accessible parking lot in time period that reducing the environmental pollution. planned system provides optimize usage of parking lot and acquire extended revenue generation.

Smart automotive Parking System supported Iot idea Vrushali D. Ichake.1, 2, 3, Priya D. Shitole. 1, 2, three and Mohsina Momin.1, 2, three Kanchan S. Thakare, professor two, 3

A major drawback in day to day life is parking of vehicles particularly the automotive parking at associate degree applicable place. And this issue indirectly ends up in tie up. This paper presents the fundamental idea of victimisation server or cloud based mostly sensible parking services in sensible cities as a vital application of the web of Things (Iot) paradigm. this method are going to be accessible through a mobile app or through the webpage provided

and might be accustomed monitor or realize the empty slots in this space.

Survey paper on sensible Parking System supported net of Things Vishwanath Y1 , Aishwarya D Kuchalli2 , Debarupa Rakshit3

This paper proposes a sensible Parking system that provides associate degree optimum answer for parking drawback in metropolitan cities. thanks to fast increase in vehicle density particularly throughout the height hours of the day, it's a troublesome task for the drivers to seek out a parking lot to park their vehicles. The aim of the paper is to resolve the on top of mentioned issue that provides the sensible Parking system. this method uses cloud computing and net of Things (IOT) technology.

A suitable shortest path algorithmic program is employed to seek out the minimum distance between the user and every parking area within the system. Thus, the waiting time of the user is reduced .The paper conjointly introduces the usage of golem application victimisation sensible phone for the interaction between the sensible Parking system and therefore the user. RFID technology is employed during this system to avoid the human intervention that minimizes the value

2.2 OBJECTIVE OF THE PROJECT

1. No have to be compelled to waste time on searching for parking.
2. Reduction in time and fuel spent by road user checking out parking.
3. Less queues as motorists are going to be guided to parking areas.
4. correct choice of auto in step with the provision of parking lot.
5. on-line parking ends up in higher revenues and profit for parking facilities.

CHAPTER – 3

EXISTING SYSTEM AND PROPOSED SYSTEM

3.1 EXISTING SYSTEM

This document provides a singular algorithmic program that will increase the capability of the present cloud intelligent parking system and is additionally developing a spec supported the web of Things technology. this method helps users realize a free parking lot with new minimum prices automatic performance mensuration. This metric calculates user areas in every parking lot. to boost parking management, a sensible parking system has been developed to cut back purpose of hiring individuals to keep up the parking system. during this article, we have a tendency to propose a cloud-based Internet-based intelligent parking system. Things. information as well as the GPS position of the vehicle and therefore the distance between the automotive parks and therefore the range free parking within the automotive parks are going to be sent to the information center. Here the info} center is given as cloud server that calculates the prices of a user parking request and this information is regular updated and created out there to vehicles on the network at any time. during this planned system, every {parking lot|parking zone|automobile parking lot|car parking zone} is associate degree IOT network and operates severally as a traditional parking space.

DRAWBACKS:

The vehicles could thieving by others

Man power is required.

It is not appropriate for big no {of vehicle|of auto|of automotive} car parking

Maintenance price is high

Not machine-controlled

3.2 PROPOSED SYSTEM:

The planned system encompass the automotive parking system and street light-weight management victimisation the Raspberry pi.

The automotive parking system having the IR detector to observe the vehicles count and send it to the mail within the entrance of the automotive parking zone.

Whenever the vehicle is detected, the empty house are going to be displayed within the mail and therefore the automotive parking availableness are going to be shown victimisation LED's intimation.

When the vehicle is moving, we are {able to} able to turn on the sunshine mechanically then once deed the vehicle we will switch of the vehicle.

At the day time, LDR detector observe mechanically, it'll switch of the sunshine, then at the evening time, we are {able to} able to turn on the sunshine.

When light-weight area unit having any hassle, we are {able to} sent the message to the management of the several places and conjointly we will able to monitor the gap between backside of the vehicle and parking place.

ADVANTAGES:

NO man power

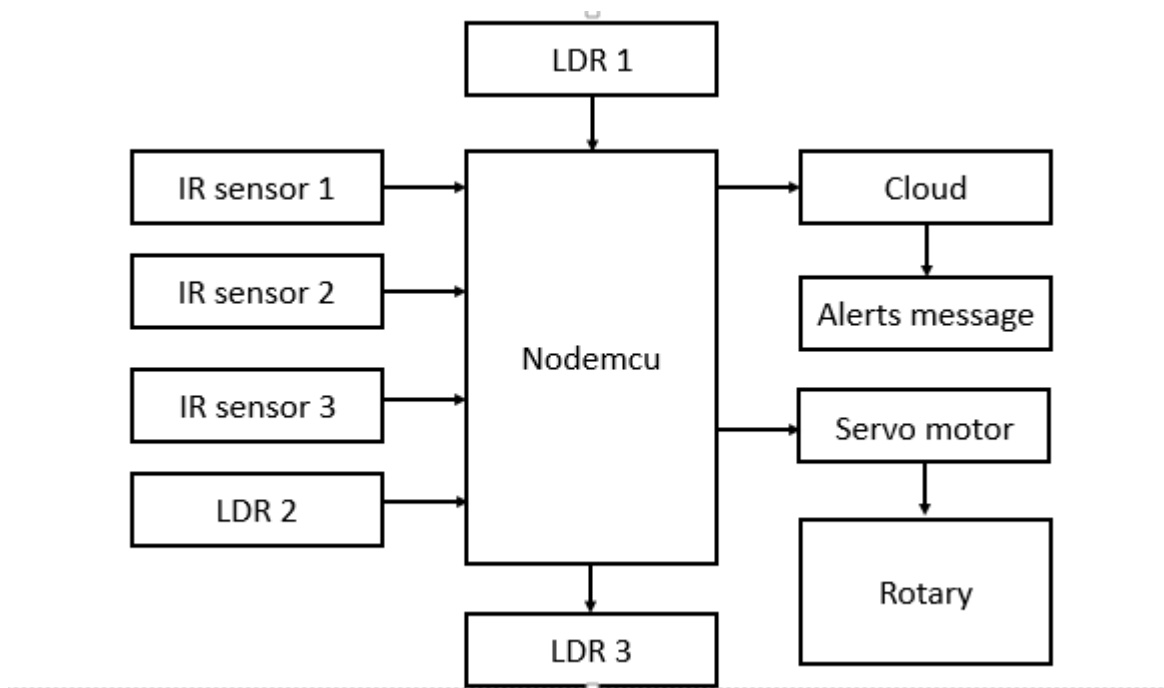
Automated

More security than existing system

Less maintenance

More comfy.

3.3 BLOCK DIAGRAM:



3.4 REQUIREMENTS:

3.4.1 HARDWARE REQUIREMENTS:

Nodemcu

IR sensor

Camera

LDR

Dc motor

3.4.2 SOFTWARE REQUIREMENTS:

Embedded C

Arduino ide

CHAPTER-4

IOT:INTERNET OF THINGS

4.1 Background

The Future net goal is to produce AN infrastructure to possess an on the spot access to info regarding the physical world and its objects. Physical objects are often applicable to totally different application domains, like e-health, warehouse management, etc. every application domain might have differing types of physical devices. every physical device will have its own specifications, that is needed to use so as to act with it. to attain the longer term net goal, a stratified vision is needed which will facilitate information access. net of Things (IoT) could be a vision that aims to integrate the virtual world of data to the important world of devices through a stratified design.

The term „Internet of Things“ consists of 2 words, specifically net and Things. net refers to the world network infrastructure with scalable , configurable capabilities supported practical and commonplace communication protocols. Things ar physical objects or procedures, or virtual objects, devices or info, that have identities, physical qualities and virtual characters, and use intelligent interfaces [1]. for example, a virtual object will represent AN abstract unit of device nodes that contains data to spot and find out its corresponding device nodes. Therefore, IoT refers to the items which will give info from the physical atmosphere through the net.

Middleware is as AN interface between the hardware layer and also the application layer, that is answerable for interacting with devices and knowledge management [2]. The role of a middleware is to gift a unified programming model to act with devices. A middleware is to blame of masking the

nonuniformity and distribution issues that we have a tendency to face once interacting with devices [3].

4.2 Motivation

IoT-based system is to blame of providing information from AN atmosphere to AN non-expert user. IoT-based system are often utilized in totally different environments, thus it has to be ready to address several heterogeneous devices. Thus, a serious concern among developing AN IoT-based system is the way to handle the interaction with the heterogeneous devices for non-expert users. This concern are often addressed by a middleware layer between devices and non-expert users. This layer is accountable to cover the range of devices from the user perspective, and provides access transparency to the devices for the tip users.

The idea of making abstractions of devices been addressed within the literature. The middleware we have a tendency to found within the literature will give satisfaction by facilitating the interaction with devices, however they are doing not support low-level device configuration [4].

4.3. IoT definition

In this section, we have a tendency to make a case for a number of the IoT definitions. Also, we have a tendency to make a case for the stratified design for IoT.

Internet of Things (IoT) has progressively gained attention in trade to act with differing types of devices. IoT will have influence on trade and society by integration physical devices into info networks [8]. IoT impacts are often on totally different views, specifically for personal and business users. From the angle of a personal user, IoT has impact on each operating and private fields,

like sensible homes and offices, e-health and aided living. From the side of a business user the impacts would be in fields like automation and industrial producing, logistics, business method management, intelligent transportation of individuals and product [9]

IoT integrates physical things into info networks. IoT covers the general infrastructure, together with software package, hardware and services, that is employed to support these info networks. The integrated physical things will exchange information regarding the physical properties and knowledge that they sense in their atmosphere. to spot devices, we are able to use identification technologies like as an example RFID, which permit every device be unambiguously known [10].

International Telecommunication Union (ITU)¹ defines IoT as “A world infrastructure for the data Society, sanctioning advanced services by interconnecting (physical and virtual) things supported, existing and evolving, practical info and communication technologies”[11]

Internet of Things-Architecture two (IoT-A) defines it as “The plan of a globally interconnected time of devices, objects and things generally emerged with the RFID technology, and this idea has significantly been extended to this vision that envisages a embarrassment of heterogeneous objects interacting with the physical atmosphere.”[12]

IoT encompasses a stratified design designed to answer the stress of assorted industries, enterprises and society. Fig. 2.1 shows a generic stratified design for IoT that carries with it 5 layers, that ar mentioned, within the following:[13]

- Edge Technology layer

This is a hardware layer that consists of embedded systems, RFID tags, device networks and every one of the opposite sensors in numerous forms. This

hardware layer will perform many functions, like collection info from a system or AN atmosphere, process info and supporting communication.

□ Access entree layer

This layer worries with information handling, and is answerable for business enterprise and subscribing the services that ar provided by the items, message routing, and hovelling the communication between platforms.

□ Middleware layer

This layer has some essential functionalities, like combining and filtering the gathered information from the hardware devices, playacting info discovery and providing access management to the devices for applications.

□ Application layer

This layer is answerable for delivering numerous application services. These services ar provided through the middleware layer to totally different applications and users in IoT-based systems. the appliance services are often utilized in totally different industries like, logistics, retail, healthcare, etc.

4.4 Challenges

IoT-based systems are often used for various functions and areas, so that, we've to face totally different challenges. during this section, we have a tendency to make a case for a number of the challenges that require to be thought of in analysis activities [10]:

□ Edge technology

At the hardware level, additional analysis efforts ar needed to develop the technology of embedded devices, sensors, actuators and (passive and active) identification, since AN IoT-based system should be ready to gather enough info regarding the important world by using an outsized type of devices and

environments. Thus, there additional work continues to be needed to attach heterogeneous devices and deploy them in IoT applications, and to produce support for brand spanking new devices.

□ Networking technologies

In IoT, things area unit connected through completely different sorts of networks, i.e. mobile, wired and wireless network. These networks support bi-directional communication at completely different levels among the \$64000 world objects, applications and services that area unit utilized by the IoT applications. This extremely distributed structure ought to offer interconnection with low energy consumption, whereas distributed knowledge will cause privacy problems.

□ Middleware system

In IoT, we've heterogeneous devices and networks. Their heterogeneousness will doubtless increase with new technologies. To facilitate the utilization of those devices by IoT applications, we should always defend their heterogeneousness. Therefore, we want to develop a secure, scalable and semantically enriched service-oriented middleware to address the heterogeneousness of devices.

□ Platform services

They support a superior management of all concerned devices in associate degree integrated means, guaranteeing quantifiability, high convenience, and therefore the safe and secure execution of the requested practicality from devices.

In continue, we have a tendency to specialise in the middleware challenges, as a result of we have a tendency to area unit searching for the functionalities that a

middleware will offer for the appliance layer within the IoT-based systems.

4.5 IoT_based Middlewar

Bandyopadhyay, S. et. al. have studied the middleware systems that are applied in IoT-based systems [1]. They classify the specified practicality of middleware to manage interaction with a spread of devices in four purposeful elements, particularly (1) interface protocols, (2) device abstraction, (3) central management, context detection & management, and (4) application abstraction (shown in Fig. 2.2). within the following, we have a tendency to make a case for these elements in details.

4.5.1 Interface protocols

This element is answerable of providing technical ability. ability within the context of Interface protocols means: the power of 2 systems to interoperate by victimisation an equivalent communication protocols. in step with ETSI (European Telecommunications Standards Institute) [14] technical ability is outlined because the association of hardware or package elements, systems and platforms that alter machine-to-machine communication to require place. this type of ability is usually targeted protocols and therefore the infrastructure mandatory for those protocols to function[14].

The Interface Protocol element defines protocols for exchanging data among {different|totally completely different|completely different} networks which will work supported different communication protocols, so as to permit technical ability. This element is answerable for handling basic property within the physical and electric circuit, network, transport, and typically the appliance layer of the TCP/IP stack.

To address the heterogeneousness of devices, we are able to use a wrapper for every device to translate the protocol supported by the device to a standard

protocol. This wrapper is placed either on the device aspect or the middleware aspect. If we wish to own direct interaction with devices, we should always place the wrapper within the middleware aspect. Devices sometimes have restricted capability of machine method, therefore this may be a reason to implement wrapper on the middleware aspect. In distinction, just in case of indirect interaction with devices we are able to develop associate degree negotiant wrapper between the middleware and therefore the devices. The interface protocol element is accountable to permit the middleware to support each direct and indirect interactions.

4.5.2 Device Abstraction (DA):

This element is answerable for providing associate degree abstract format to facilitate the interaction of the appliance elements with devices. This abstraction provides syntactical and linguistics ability, that area unit outlined by ETSI [14] as follows:

- Syntactic ability is related to knowledge formats. The messages transferred by communication protocols should have a well-defined syntax and encryption format, which might be delineate by victimisation high-level transfer syntaxes like, HTML and XML.

- Semantic ability is typically related to the which means of the content of message that is apprehensible for human. Thus, ability on this level means there's a standard understanding among folks on the which means of the content (information) being changed among them. However, since district attorney doesn't communicate directly with human, linguistics ability within the context of district attorney is answerable of providing this common understanding for applications.

Semantic ability depends on linguistics models that tends to be domain specific.

as an example, a method to supply linguistics ability in commission bound (SOA) [15] primarily based middleware is by victimisation Devices Profile for internet Services (DPWS) [16] . during this context, every device sort refers to a distinguished service sort

DA element offer 2 general functionalities: (1) to raise devices to perform some practicality and (2) to outline and tack together devices DPWS uses the XML format that's shown in Code a pair of.1.

4.5.3 Central management, Context detection & Management (CCM)

Context characterizes matters of associate degree entity, which might be an area, someone or associate degree object that's relevant to the user, applications and their interactions [1]. The CCM purposeful element is accountable to support context-aware computation that's a machine vogue that go for account the context of the entities that move with the system. A middleware for IoT-based systems should be context-aware to figure in sensible environments [1]. sensible environments talk over with a physical world that's richly and invisibly interlocking with devices, actuators, shows the machine components, embedded seamlessly within the everyday matters of our lives, and connected through a continual network [17]. Context-awareness includes 2 functionalities:

- 1) Context detection, that consists of assembling knowledge from resources, and choosing the knowledge which will have an effect on the computation.
- 2) Context process, to use the gathered data to perform a task or create a choice.

4.5.4 Application Abstraction

This purposeful element provides associate degree interface for each high-level applications and end-users to move with devices. for example, this interface is a quiet interface or is enforced with some query-based language.

4.6 Conclusion

In this chapter, we have a tendency to outlined IoT and known common IoT layers. moreover, we have a tendency to mentioned a reference middleware design for IoT-based systems. This design has been planned by Bandyopadhyay, S. et. al supported a study on the present middleware frameworks for IoT-based systems [1].

4.7 Review of IoT-based Middleware

The term net of Things (IoT) refers to a large set of applications and analysis areas like, distributed computing and information management. abundant of the IoT analysis we have a tendency to found within the literature is said to the sphere of pervasive computing. World Wide internet syndicate (W3C)³ defines pervasive computing as a vision concerning our future computing life vogue. during this vision, pc systems are going to be seamlessly integrated into our daily life, associateticipating our desires and providing relevant services and data for America in an anytime-and-any-where fashion. Pervasive Computing is all concerning creating the human's life easier by exploiting the offered computing technologies [20]. This motivates scientists to develop new technologies for the everyday people"s lives.

Since the vision of IoT is sort of just like Pervasive computing, we have a

tendency to reviewed the literatures that address each IoT and Pervasive systems. to pick out the middleware to debate we have a tendency to had the subsequent approaches:

1) We checked out typical IoT middleware like ISMP [21], be after [22] GSN [23]. we have a tendency to designated HYDRA [24] to review, as a result of it's the foremost widespread and well-documented middleware in comparer to the mentioned middleware. Also, supported the study of Bandyopadhyay, S. et. al [3], those middleware doesn't support the mentioned useful parts in Chapter three, whereas HYDRA supports them.

2) We checked out typical Pervasive system middleware like [25], [26], [27]. we have a tendency to designated the subsequent middleware to review:

- AURA [28] as a result of this middleware specialize in elaboration and manipulation of the gathered information from devices. we have a tendency to aim to produce simple configuration and readying for user and developer. Since to fulfill this goal, we have a tendency to need to facilitate the gathered information manipulation, we have a tendency to reviewed AURA that was the sole middleware among the reviewed paper that thought of the information manipulation.

- TinyDB [19] specialize in gathering information from devices. Since in associate IoT-based system we'd like to collect information from surroundings through totally different devices, we have a tendency to reviewed TinyDB that's a well-liked middleware.

- WiseMID [29] is that the solely middleware among the reviewed middleware that's specific for energy saving purpose. As saving the energy of devices is very important issue, we have a tendency to reviewed this middleware.

In this chapter, we have a tendency to the mentioned middleware in additional detail. Also, we have a tendency to analyze the mentioned middleware with regard to the useful parts

4.8 IR (Infrared) sensing element

An infrared sensing element is associate means that produces so as to sense some features of the environment. associate IR sensing element will live the warmth of associate object further as detects the motion. These styles of sensors measures solely actinic ray, instead of emitting it that's known as as a passive IR sensing element. typically within the spectrum, all the objects radiate some style of thermal radiations. These styles of radiations ar invisible to our eyes which will be detected by associate infrared sensing element. The electrode is just associate IR diode (Light Emitting Diode) and also the detector is just associate IR photodiode that is sensitive to IR lightweight of a similar wavelength as that emitted by the IR diode. once IR lightweight falls on the photodiode, the conflicts and these output voltages, modification in quantity to the magnitude of the IR lightweight received.

IR sensing element Circuit Diagram and dealing Principle

An infrared sensing element circuit is one amongst the essential associated widespread sensing element module in an device. This sensing element is analogous to human's visionary senses, which might be wont to observe obstacles and it's one amongst the common applications in real time. This circuit

contains of the subsequent parts

- LM358 IC combine of } IR transmitter and receiver pair
- Resistors of the vary of weight unit ohms.
- Variable resistors.
- LED (Light Emitting Diode).

In this project, the transmitter section includes associate IR sensing element, that transmits continuous IR rays to be received by associate IR receiver module. associate IR output terminal of the receiver varies relying upon its receiving of IR rays. Since this variation can not be analyzed intrinsically, so this output are often fed to a comparator circuit. Here associate operational electronic equipment (op-amp) of luminous flux unit 339 is employed as comparator circuit. once the IR receiver doesn't receive an indication, the possible at the inverting input goes outside that non-inverting effort of the comparator IC (LM339). so the output of the comparator deacreses, however the diode doesn't glow. once the IR receiver module gets signal to the possible at the inverting input goes to the low. so the output of the comparator (LM 339) goes to the high and also the diode jumps glowing.

IR Sensor circuit

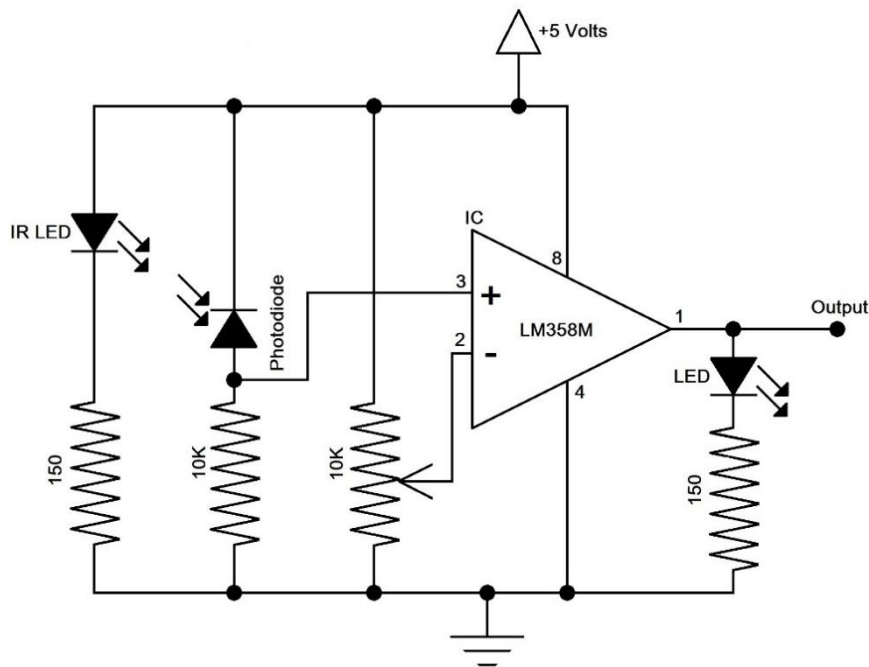


Fig. IR Sensor Circuit diagram

Resistor R1 (100 Ω), R2 (10k Ω) and R3 (330 Ω) are used to confirm that minimum 10 mA current passes through the IR LED Devices and usual LEDs respectively. Resistor VR2 (preset=5k) is used to regulate the output terminals. Resistor VR1 (preset= 10k) is recycled set to the understanding of the circuit Diagram.

Different Types of IR Sensors and Their Applications

IR sensors are classified into differing types looking on the applications. The speed detector is employed for synchronizing the speed of multiple motors. The temperature detector is employed for industrial temperature management. PIR detector is employed for automatic door gap system and supersonic detector are used for distance measurement.

IR detector Applications

IR sensors are employed in numerous detector based mostly comes and additionally in numerous electronic devices that measures the temperature that are mentioned within the below.

Radiation Thermometers

IR sensors are employed in radiation thermometers to live the temperature rely on the temperature and therefore the material of the item and these the

Flame Monitors

These styles of devices are used for police investigation the sunshine emitted from the flames and to watch however the flames are burning. the sunshine emitted from flames extend from ultraviolet illumination to IR region varieties. PbS, PbSe, Two-color detector, pyro electrical detector are a number of the unremarkably used detector employed in flame monitors.

Moisture Analyzers

Moisture analyzers use wavelengths that are absorbed by the wet within the IR region. Objects are exposed with lightweight taking these wavelengths (1.1 μm , 1.4 μm , 1.9 μm , and 2.7 μm) and additionally with reference wavelengths. The Lights mirrored from the objects rely on the wet content and is detected by instrument to live wet (ratio of mirrored lightweight at these wavelengths to the mirrored lightweight at reference wavelength). In GaAs PIN photodiodes, Pbs electrical conduction detectors are used in wet instrument circuits.

IR Imaging Devices

IR image device is one among the key applications of IR waves, primarily by

virtue of its property that's not visible. it's used for current imagers, sight devices, etc.



For examples Water, rocks, soil, vegetation, and animal tissue all options emit IR radiation. The Thermal infrared detectors live these rays in IR vary and map the spatial temperature distributions of the object on a picture. Thermal imagers sometimes composed of a Sb (indium antimonite), and Gd Hg (mercury-doped germanium), and the Hg Cd Te (mercury-cadmium-telluride) sensors.

An electronic detector is cooled to low temperatures victimisation liquid He or liquid nitrogen's. Then the Cooling the detectors ensures that the energy (photons) recorded by the detectors comes from the parcel of land Associate in Nursind not from the close temperature of objects at intervals the scanner itself an IR imaging electronic devices.

Thus, this is often all concerning IR sensing element circuit with operating and applications. These sensing elements ar utilized in several sensor primarily based natural philosophy comes.

4.9 LDR- light-weight DEPENDENT electrical device

What is a lightweight Dependent electrical device or a photograph Resistor?

A Light Dependent electrical device (LDR) or a photograph electrical device

may be a device whose impedance may be a operate of the incident radiation. Hence, they're light-weight sensitive devices. they're conjointly referred to as as pic conductors, pic conductive cells or just photocells. they're created from semiconductor materials having high resistance. There ar many alternative symbols wont to indicate a LDR, one among the foremost normally used image is shown within the figure below. The arrow indicates light-weight falling thereon.

Working Principle of LDR

A light dependent electrical device works on the standard of pic conduction. pic conduction is Associate in Nursing physical phenomenon within which the fabrics conduction (Hence resistivity) reduces once light-weight is absorbed by the material. once light-weight falls i.e. once the photons drop on the device, the electrons with the valence band of the semiconductor sensible ar excited to the physical phenomenon band. These photons within the incident light-weight ought to have energy bigger than the band gap of the semiconductor material to form the electrons jump from the valence band to the physical phenomenon band. thence once light-weight have the enough energy is to the incident on the device a lot of the electrons ar excited to the physical phenomenon band which finishes up in sizable amount of charge carriers. The results of this method is a lot of and a lot of current starts flowing and thence it's same that the resistance of the device has attenuate. this is often the foremost common rule of LDR

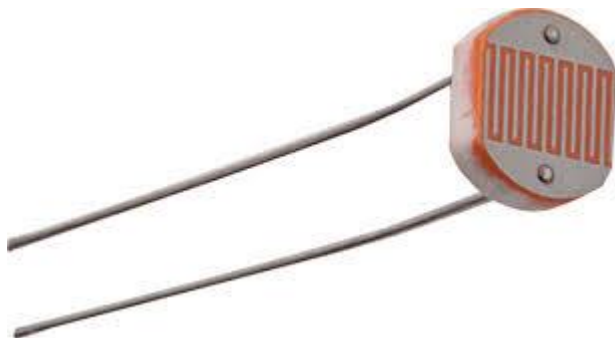
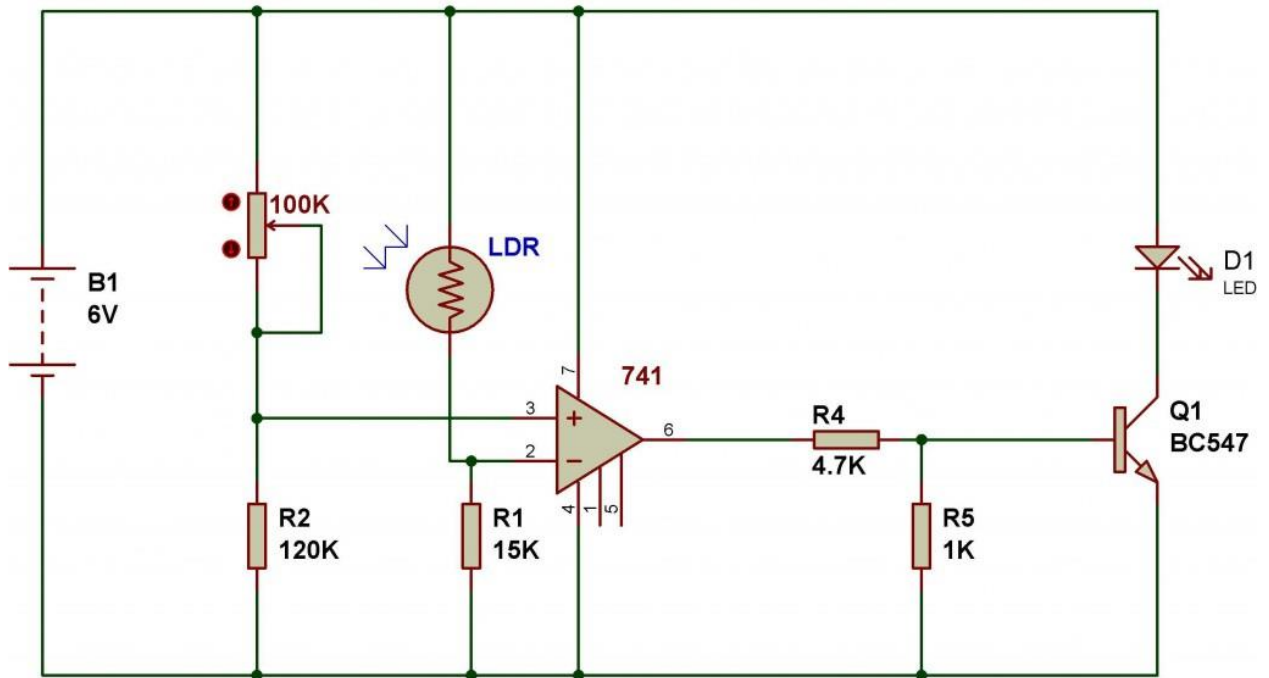


Diagram of LDR Sensor

Characteristics of LDR

LDR's are light dependent devices whose resistance decreases once light falls on them and will increase within the dark. Once a light dependent resistance is unbroken in dark, its resistance is extremely high. This resistance is termed as dark resistance. It may be as high as $10^{12} \Omega$. And if the device is allowed to soak up light its resistance can decrease drastically. If a continuing voltage is applied thereto and intensity of sunshine is accumulated this starts increasing. Figure below shows resistance vs. illumination curve for a specific LDR. Photocells or LDR's are non linear devices. Their sensitivity varies with the wavelength of sunshine incident on them. Some photocells may not in the least response to an explicit vary of wavelengths. supported the fabric used totally {different|completely different} cells have different spectral response curves.



Circuit diagram of LDR device

When light is incident on a sensing element it always takes concerning eight to 12ms for the amendment in resistance to require place, whereas it takes seconds for the resistance to rise back once more to its initial worth when removal of sunshine. This development is termed as resistance recovery rate. This property is employed in audio compressors. Also, LDR's square measure less sensitive than image diodes and image semiconductor. (A image diode and a sensing element (LDR) don't seem to be a similar, a photo-diode may be a contact semiconductor that converts light to electricity, whereas a sensing element may be a passive device, there's no contact during this nor it "converts" light to electricity).

4.9.3 sorts of light Dependent Resistors:

Based on the materials used {they square measure|they're} classified as: i) intrinsic image resistors (Un doped semiconductor): These are pure semiconductor materials like element or Ge. Electrons get excited from framing band to conductivity band once photons of enough energy falls thereon and variety charge carriers will increase.

ii) extraneous image resistors: These square measure semiconductor materials doped with impurities that square measure referred to as as dopants. Theses dopants produce new energy bands higher than the valence band that square measure full of electrons. thus this reduces the band gap and fewer energy is needed in exciting them. extraneous image resistors square measure typically used for long wavelengths.

Construction of α sensing element

The structure of a light-weight dependent resistance consists of a light-weight sensitive material that is deposited on associate insulating substrate like ceramic. the fabric is deposited in zigzag pattern so as to get the specified resistance & power rating. This zigzag space separates the metal deposited areas into 2 regions. Then the resistance unit contacts square measure created on the either sides of the realm. The resistances of those contacts ought to be as less as attainable to form certain that the resistance principally changes because of the impact of sunshine solely. Materials usually used square measure mineral, Cd selenide, metallic element antimonide and Cd sulphonide. the employment of lead and Cd is avoided as they're harmful to the surroundings.

4.9.4 Applications of LDR

LDR's have low price and easy structure. they're usually used as lightweight sensors. they're used once there's a requirement to observe absences or presences of sunshine like during a camera exposure meter. employed in street lamps, timepiece, stealer alarm circuits, candlepower meters, for investigating the packages moving on a transporter, etc.

4.10 NODE MCU

NodeMCU is associate open supply IoT platform.[4][5] It includes microcode that runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware that is predicated on the ESP-12 module.[6][7] The term "NodeMCU" by default refers to the microcode instead of the event kits. The microcode uses the Lua scripting verbal. it's supported the eLua plan, and designed on the Espressif Non-OS SDK for ESP8266. It usages several open supply comes, like lua-cjson[8] and SPIFFS

NodeMCU was created just when the ESP8266 came out. On Dec thirty, 2013, Espressif Systems[6] started production of the ESP8266.[10] The ESP8266 may be a Wi-Fi SoC integrated by a Tensilica Xtensa LX106 core,[citation needed] wide employed in IoT applications (see connected projects). NodeMCU started on thirteen October 2014, once Hong committed the primary file of nodemcu-firmware to GitHub.[11] 2 months later, the project enlarged to incorporate associate open-hardware platform once developer Huang R committed the gerber file of associate ESP8266 board, named devkit v0.9.[12] Later that month, Tuan PM ported MQTT consumer library from Contiki to the ESP8266 SoC platform,[13] and committed to NodeMCU project, then NodeMCU was ready to support the MQTT IoT protocol, victimization Lua to access the MQTT

broker. Another necessary update was created on thirty Jan 2015, once Devsaurus ported the u8glib[14] to NodeMCU project,[15] sanctioning NodeMCU to simply drive alphanumeric display, Screen, OLED, even VGA displays.

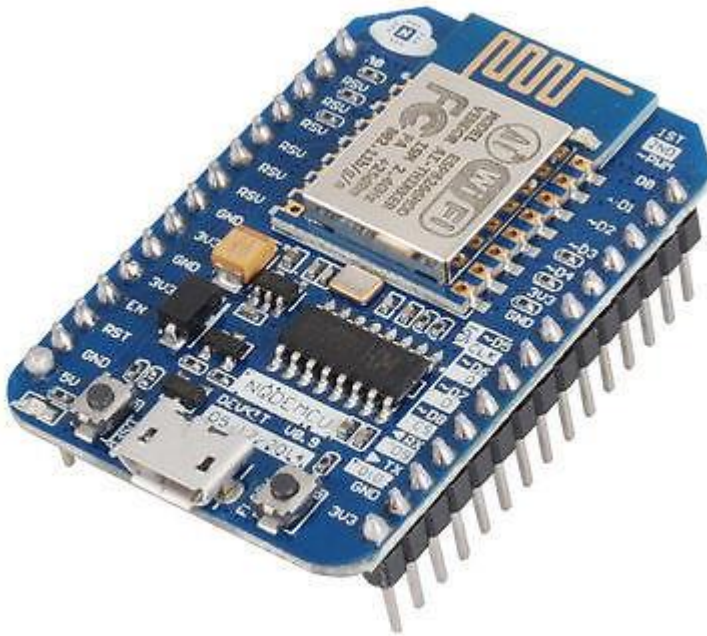
In summer 2015 the creators abandoned the microcode project and a bunch of freelance contributors took over. By summer 2016 the NodeMCU enclosed over forty totally different modules. because of resource constraints users ought to choose the modules relevant for his or her project and build a microcode tailored to their wants.

4.11 ESP8266 Arduino Core[edit]

As Arduino.cc began developing new MCU boards supported non-AVR processors just like the ARM/SAM MCU and employed in the Arduino Due, they required to switch the Arduino IDE in order that it might be comparatively straightforward to alter the IDE to support alternate toolchains to permit Arduino C/C++ to be gathered for those new processors. They did this with the outline of the Board Manager and also SAM Core. A "core" is that the assortment of software package parts needed by the Board Manager and also the Arduino IDE to compile associate Arduino C/C++ supply file for the target MCU's machine language. Some ESP8266 aficionados developed associate Arduino core for the ESP8266 wireless fidelity SoC, popularly referred to as the "ESP8266 Core for the Arduino IDE".[16] This has become a number one software package development platform for the varied ESP8266-based modules and development boards, together with NodeMCUs.

4.11.1 Introduction

NodeMCU is an open source supply Lua based microcontroller developed for ESP8266 wireless fidelity chip. By exploring practicality with ESP8266 chip, NodeMCU microcontroller comes with ESP8266 Development board/kit i.e. NodeMCU Development board/kit i.e. NodeMCU Development board.

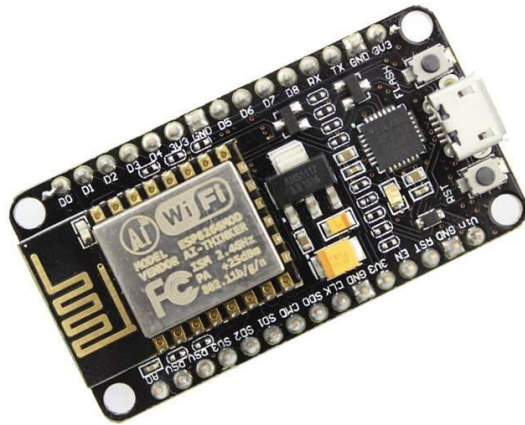


4.11.2 NodeMCU Development Board/kit v0.9 (Version1)

Since NodeMCU is an open source platform, their hardware style is open for edit/modify/build.

NodeMCU Dev Kit/board accommodates ESP8266 WLAN enabled chip. The ESP8266 could be a cheap Wi-Fi chip developed by Espressif Systems with TCP/IP protocol. For additional info regarding ESP8266, you'll be able to refer ESP8266 WLAN Module.

There is Version2 (V2) out there for NodeMCU Dev Kit i.e. NodeMCU Development Board v1.0 (Version2), that sometimes comes in black coloured



NodeMCU Development Board/kit v1.0 (Version2)

For a lot of info concerning NodeMCU Boards out there in market refer NodeMCU Development Boards

NodeMCU Dev Kit has Arduino like Analog (i.e. A0) and Digital (D0-D8) pins on its board.

It supports serial communication protocols i.e. UART, SPI, I2C etc.

Using such serial protocols we are able to connect it with serial devices like I2C enabled liquid crystal {display|LCD|digital display|alphanumeric display} display, gaussmeter HMC5883, MPU-6050 Gyro meter + measuring instrument, RTC chips, GPS modules, bit screen displays, American state cards etc.

How to begin with NodeMCU?

NodeMCU Development board is featured with wireless fidelity capability, analog pin, digital pins and serial communication protocols.

To get begin with victimisation NodeMCU for IoT applications initial we'd like

to understand concerning the way to write/download NodeMCU code in NodeMCU Development Boards. And before that wherever this NodeMCU code can get as per our demand.

There is on-line NodeMCU custom builds out there victimisation that we are able to simply get our custom NodeMCU code as per our demand.

To know a lot of concerning the way to build custom NodeMCU code on-line and transfer it refer obtaining started with NodeMCU

How to write codes for NodeMCU?

After putting in ESP8266 with Node-MCU code, let's see the IDE (Integrated Development Environment) needed for development of NodeMCU.

NodeMCU with ESPlorer IDE

Lua scripts square measure usually wont to code the NodeMCU. Lua is Associate in Nursing open supply, light-weight, embeddable scripting language designed on high of C artificial language.

For a lot of info concerning the way to write Lua script for NodeMCU refer obtaining started with NodeMCU victimisation ESPlorerIDE

NodeMCU with Arduino IDE

Here is in a different way of developing NodeMCU with a well known IDE i.e. Arduino IDE. we are able to conjointly develop applications on NodeMCU victimisation Arduino development setting. This makes simple for Arduino developers than learning new language and IDE for NodeMCU.

For a lot of info concerning the way to write Arduino sketch for NodeMCU refer obtaining started with NodeMCU victimisation ArduinoIDE

Difference in victimisation ESPlorer and Arduino IDE

Well, there's a artificial language distinction we are able to say whereas developing application for NodeMCU victimisation ESPlorer IDE and Arduino

IDE.

We need to code in C\C++ artificial language if we tend to square measure victimisation Arduino IDE for developing NodeMCU applications and Lua language if we tend to square measure victimisation ESPlorer IDE.

Basically, NodeMCU is Lua Interpreter, therefore it will perceive Lua script simply. after we write Lua scripts for NodeMCU and send/upload it to NodeMCU, then they're going to get executes consecutive. it'll not build binary code file of code for NodeMCU to jot down. it'll send Lua script because it is to NodeMCU to induce execute.

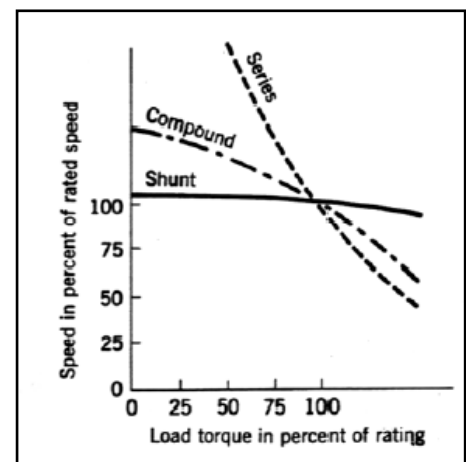
In Arduino IDE after we write and compile code, ESP8266 toolchain in background creates binary code file of code we tend to wrote. And after we transfer it to NodeMCU then it'll flash all NodeMCU code with fresh generated binary code code. In fact, it writes the whole code.

That's the rationale why NodeMCU not settle for additional Lua scripts/code once it's obtaining flashed by Arduino IDE. once obtaining flashed by Arduino sketch/code it'll be no a lot of Lua interpreter {and we tend to|and that we} got error if we attempt to transfer Lua scripts. To once more begin with Lua script, we'd like to flash it with NodeMCU code.

Since Arduino IDE compile and upload/writes complete code, it takes longer than ESPlorer IDE.

4.12 DC MOTORS

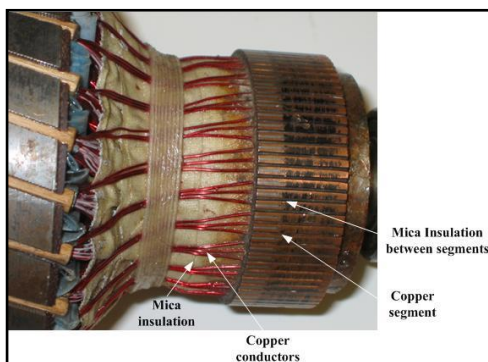
A DC motor is employed to drive a mechanical load. during this work, a severally excited DC generator provides the load. The load on the motor is adjusted by variable the generator field current. By increasing the sector current of the DC



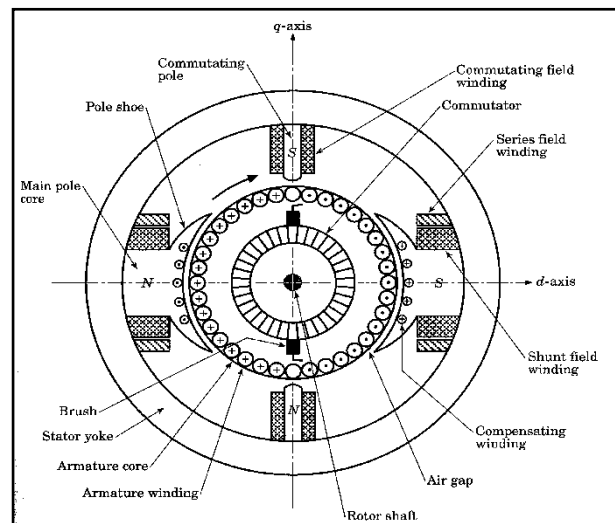
generator, the load on the DC motor will increase and so the coil current will increase. In general, DC motors are a unit characterised by their torque-speed curves as shown in Figure nine.1. Since the activity instrumentality for shaft torsion isn't offered within the work it's necessary to use different means that of characterizing the DC motor. One different is to plot shaft speed versus coil current since torsion is directly proportional to the coil current () with a continuing field current equipped to the motor. Shaft speed is additionally a operate of the sector current in an exceedingly DC motor whereas maintaining a continuing coil voltage () as field current is directly proportional to the direct axis flux made within the machine.

B. Construction

The stator of the dc motor has poles, which are enthusiastic by dc



current to produce magnetic fields



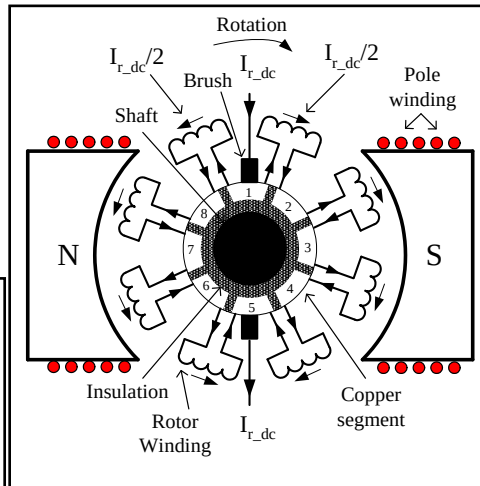
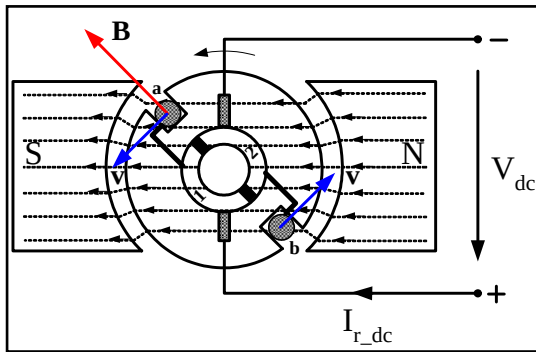
In the neutral zone, within the middle between the poles, commutating poles square measure placed to scale back sparking of the electrical switch. The commutating poles square measure equipped by dc current. Compensating windings square measure mounted on the most poles. These short-circuited windings damp rotor oscillations. The poles square measure mounted on associate iron core that gives a closed magnetic circuit. The motor housing

supports the iron core, the brushes and therefore the bearings. The rotor contains a circular laminated iron core with slots. Coils with many turns square measure placed within the slots. the gap between the 2 legs of the coil is concerning a hundred and eighty electrical degrees. The coils square measure connected serial through the electrical switch segments. The ends of every coil square measure connected to a electrical switch section. The electrical switch consists of insulated copper segments mounted on associate insulated tube. 2 brushes square measure ironed to the electrical switch to allow current flow. The brushes square measure placed within the neutral zone, wherever the force field is near to zero, to scale back arcing. The rotor contains a circular laminated iron core with slots. The electrical switch consists of insulated copper segments mounted on associate insulated tube. 2 brushes square measure ironed to the electrical switch to allow current flow. The brushes square measure placed within the neutral zone, wherever the force field is near to zero, to scale back arcing. The electrical switch switches the present from one armature to the adjacent coil, the change needs the interruption of the coil current. The unforeseen interruption of associate inductive current generates high voltages. The high voltage produces arc and arcing between the electrical switch section and therefore the brush.

C. DC Motor Operation

In a dc motor, the stator coil poles are equipped by dc excitation current, that produces a dc field of force. The rotor is equipped by dc current over the brushes, electrical switch and coils. The interaction of the field of force and rotor current makes a force that drives the motor. The field of force lines arrive into the rotor from the pole (N) and exit toward the pole (S). The poles generate a field of force that is perpendicular to the current carrying conductors. The interaction between the world and so this produces a Hendrik Antoon physicist force; the force is perpendicular to every the sphere of force and conductor. The generated force turns the rotor until the coil reaches the neutral purpose between

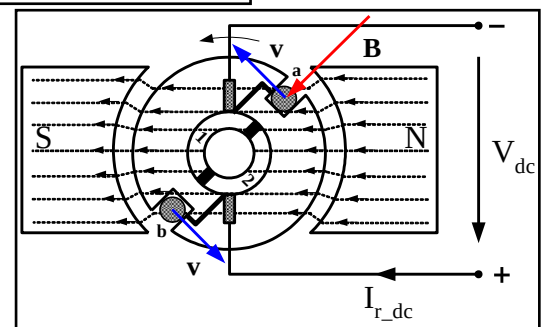
the poles. At now, the sphere of becomes abundant zero at the the force. However, inertia motor on the so much aspect the zone where the direction of the force reverses. To avoid the



force aspect of drives the neutral sphere of reversal of the force direction, the electrical switch

changes this direction, that maintains

the rotation. Before reaching the neutral zone, this enters in part one and exits from part a combine of. Therefore, current enters the coil end at slot a and exits from slot b throughout this stage. once passing the neutral zone, this enters part a combine of and exits from part one, this reverses this direction through the coil, once the coil passes the neutral zone. The results of this current reversal is that the upkeep of the rotation



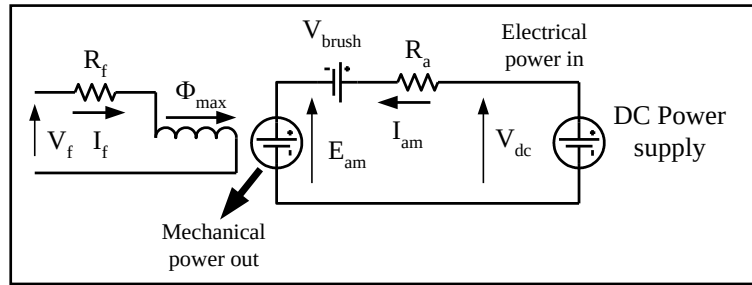
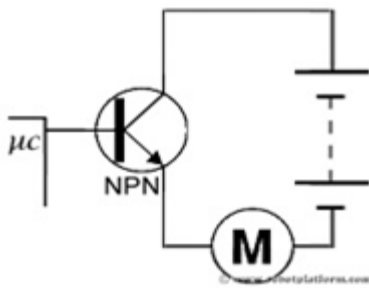
D . DC MOTOR EQUIVALENT CIRCUIT

The following figures show the equivalent circuit of a severally excited dc motor. Equivalent circuit is analogous to the generator solely this directions ar completely different. The elicited voltage and motor speed vs angular frequency The combination of the equations ends up in The current is calculated from this equation. The output power and force are: Generally, even the best golem needs a motor to rotate a wheel or performs specific action. Since motors need additional current then the microcontroller pin will generally generate, you would like some variety of a switch (Transistors, MOSFET, Relay etc.,) which may settle for atiny low current, amplify it and generate a bigger current, that any drives a motor. this whole method is finished by what's referred to as a motor driver. Motor driver is essentially a current electronic equipment that

takes a low-current signal from the microcontroller and offers out a proportionately higher current signal which may management and drive a motor. In most cases, a semiconductor unit will act as a switch and perform this task that drives the motor during a single direction. Turning a motor ON and OFF needs only 1 switch to regulate one motor during a single direction. What if you wish your motor to reverse its direction? the easy answer is to reverse its polarity. this will be achieved by mistreatment four switches that ar organized in associate intelligent manner specified the circuit not solely drives the motor, however additionally controls its direction. Out of the many, {one of|one among|one during all|one amongst|one in every of} the foremost common and clever style could be a H-bridge circuit wherever transistors ar organized in a form that resembles land alphabet "H". As you'll see within the image, the circuit has four switches A, B, C and D. Turning these switches ON and OFF will drive a motor in numerous ways that.

- 1.Turning on Switches A and D makes the motor rotate clockwise
- 2.Turning on Switches B and C makes the motor replace anti-clockwise
- 3.Turning on Switches A and B will stop the motor (Brakes)
- 4.Turning off all the switches provides the motor a free wheel drive
- 5.Lastly turning on A & C at constant time or B & D at constant time shorts your entire circuit. So, don't try this.

H-bridges are often engineered from scratch victimisation relays, mosfets, field impact transistors (FET), bi-polar junction transistors (BJT), etc. however if your current demand isn't too high and every one you wish may be a single package that will the work of driving atiny low DC motor in 2 directions, then all you wish may be a L293D IC. This single cheap package will interface not one, however 2 DC motors. L293, L293B and few alternative versions conjointly will constant job, however decide the L293D version as this one has AN integral fly back diode that protects the driving transistors from voltage spikes that occur once the motor coil is turned off.



Armature voltage equation

$$V_{dc} = E_{am} + I_{am} R_a + V_{brush}$$

The induced voltage and

motor speed vs angular frequency

$$E_{am} = K_m I_f \omega \quad \omega = 2\pi n_m$$

The combination of the equations

$$K_m I_f \omega = E_{am} = V_{dc} - I_{am} R_m \quad \text{results in}$$

The

current is calculated from this

$$P_{out} = E_{am} I_{am}$$

$$T = \frac{P_{out}}{\omega} = K_m I_{am} I_f$$

equation. The output power

and torque are:

Introduction to L293D IC

L293D IC typically comes as a regular 16-pin DIP (dual-in line package). This motor driver IC will at the same time management 2 little motors in either direction; forward and reverse with simply four microcontroller pins (if you are doing not use modify pins). a number of the options (and drawbacks) of this IC are:

1. Output current capability restricted|is restricted|is proscribed} to 600mA per channel with peak output current limited to one.2A (non-repetitive). this suggests you can not drive larger motors with this IC. However, most little motors utilized in hobby artificial intelligence ought to work. If you're unsure whether or not the IC will handle a selected motor, connect the IC to its circuit and run the motor along with your finger on the IC. If it gets very hot, then watch out... conjointly note the words "non-repetitive"; if the present output repeatedly reaches one.2A, it'd destroy the drive transistors.

2. Supply voltage are often as giant as thirty six Volts. this suggests you are doing not need to worry a lot of concerning voltage regulation.

3. L293D has AN modify facility that helps you modify the IC output pins. If AN modify pin is ready to logic high, then state of the inputs match the state of the outputs. If you pull this low, then the outputs are going to be turned off no matter the input states

4. The datasheet conjointly mentions AN "over temperature protection" engineered into the IC. this suggests an inside sensing element senses its internal temperature and stops driving the motors if the temperature crosses a group purpose

5. Another major feature of L293D is its internal clamp diodes. This flyback diode helps shield the driving force IC from voltage spikes that occur once the motor coil is turned on and off (mostly once turned off)

6.The logical low within the IC is ready to one.5V. this suggests the pin is ready high on condition that the voltage across the pin crosses one.5V that makes it appropriate to be used in high frequency applications like change applications (upto 5KHz)

7.Lastly, this microcircuit not solely drives DC motors, however may be wont to drive relay solenoids, stepper motors etc.

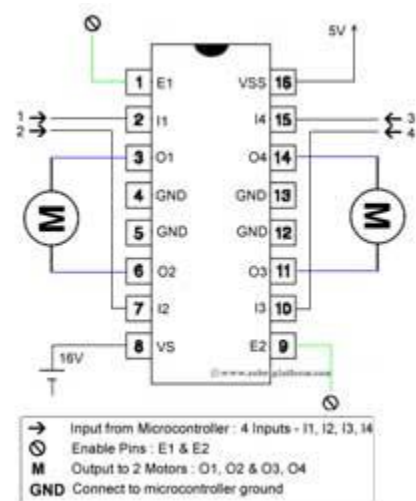
L293D Connections

The circuit shown to the proper is that the most simple implementation of L293D IC. There area unit sixteen pins protruding of this IC and that we need to perceive the practicality of every pin before implementing this in an exceedingly circuit

1.Pin1 and Pin9 area unit "Enable" pins. they ought to be connected to +5V for the drivers to perform. If they force low (GND), then the outputs are going to be turned off no matter the input states, stopping the motors. If you have got 2 spare pins in your microcontroller, connect these pins to the microcontroller, or simply connect them to regulated positive five Volts.

2.Pin4, Pin5, Pin12 and Pin13 area unit ground pins that ought to ideally be connected to microcontroller's ground.

3.Pin2, Pin7, Pin10 and Pin15 area unit logic input pins. These area unit management pins that ought to be connected to microcontroller pins. Pin2 and Pin7 management the primary motor (left); Pin10 and Pin15 management the second motor(right).



4.Pin3, Pin6, Pin11, and Pin14 are unit output pins. Tie Pin3 and Pin6 to the primary motor, Pin11 and Pin14 to second motor

5.Pin16 powers the IC and it ought to be connected to regulated +5Volts

6.Pin8 powers the 2 motors and will be connected to positive lead of a secondary battery. As per the datasheet, offer voltage are often as high as thirty six Volts.

Truth table

I have shown you where to attach the motors, battery and the microcontroller. however however will we management the direction of those motors? allow us to take AN example:

Suppose you wish to manage the left motor that is connected to Pin3 (O1) and Pin6 (O2). As mentioned higher than, we tend to need 3 pins to manage this motor - Pin1 (E1), Pin2 (I1) and Pin7 (I2). Here is that the truth table representing the practicality of this motor driver.

Pin 1	Pin 2	Pin 7	Function
High	High	Low	Turn Anti-clockwise (Reverse)
High	Low	High	Turn clockwise (Forward)
High	High	High	Stop
High	Low	Low	Stop
Low	X	X	Stop

High $\sim +5V$, Low $\sim 0V$, X=Either high or low (don't care)

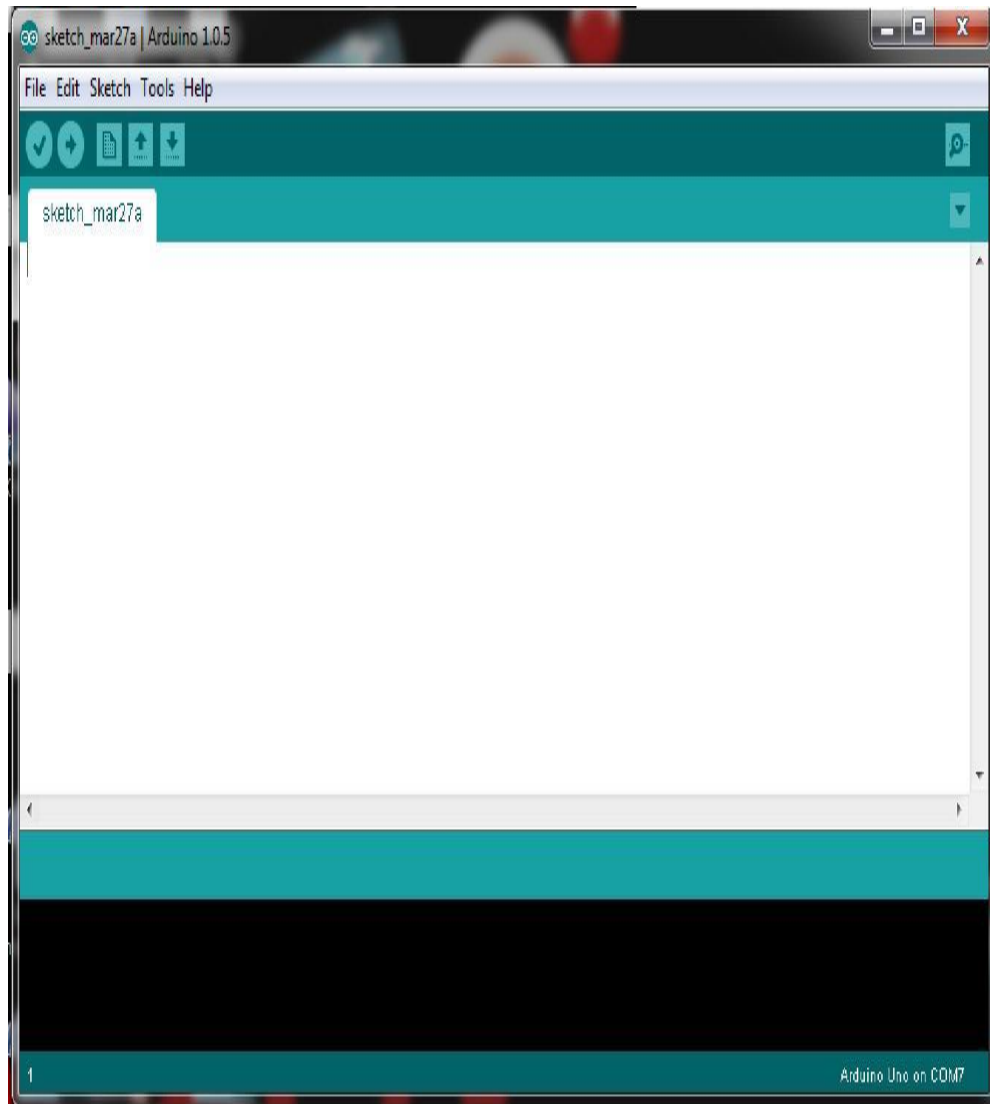
In the higher than truth table you'll be able to observe that if Pin1 (E1) is low then the motor stops, no matter the states on Pin2 and Pin7. thus it's essential to carry E1 high for the driving force to perform, or just connect modify pins to positive five volts.

With Pin1 high, if Pin2 is ready high and Pin7 is force low, then current flows from Pin2 to Pin7 driving the motor in anti-clockwise direction? If the states of Pin2 and Pin7 area unit flipped, then current flows from Pin7 to Pin2 driving the motor in clockwise direction.

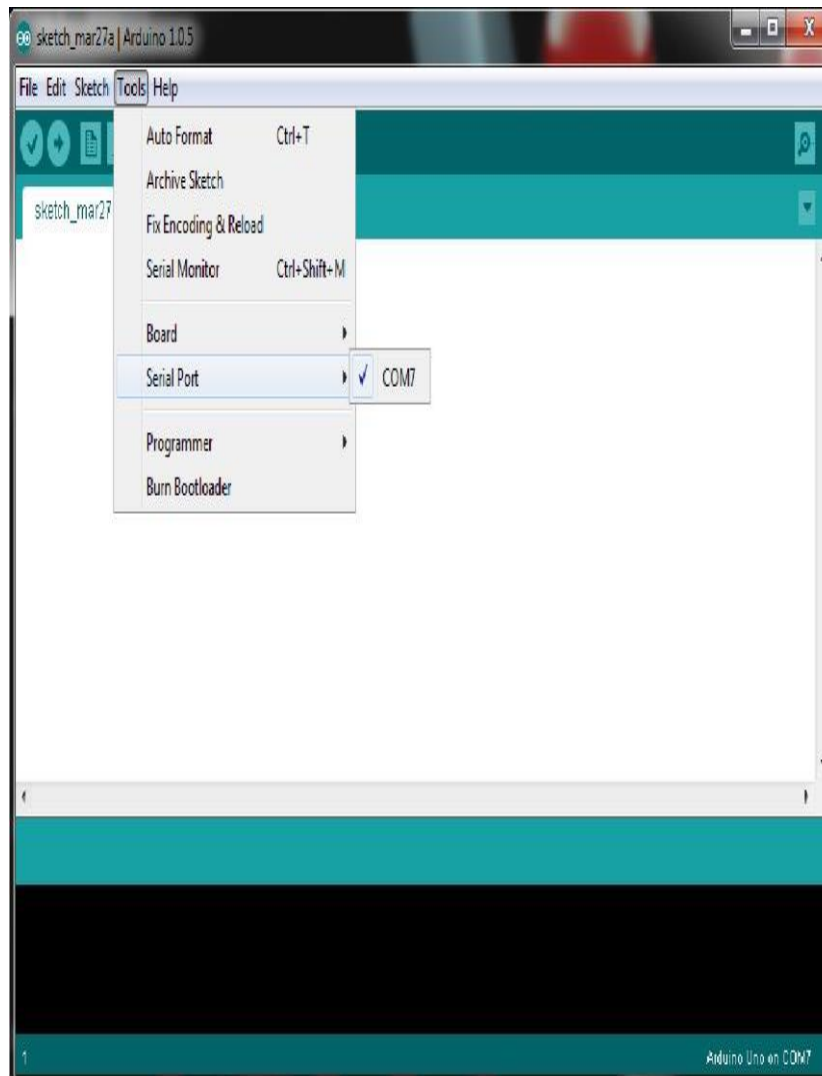
The higher than conception holds true for alternative aspect of the IC too. Connect your motor to Pin11 and Pin14; Pin10 and Pin15 area unit input pins, and Pin9 (E2) permits the driving force.

4.13 ARDUINO SOFTWARE:

1. Open Arduino IDE as shown below
Open Arduino IDE

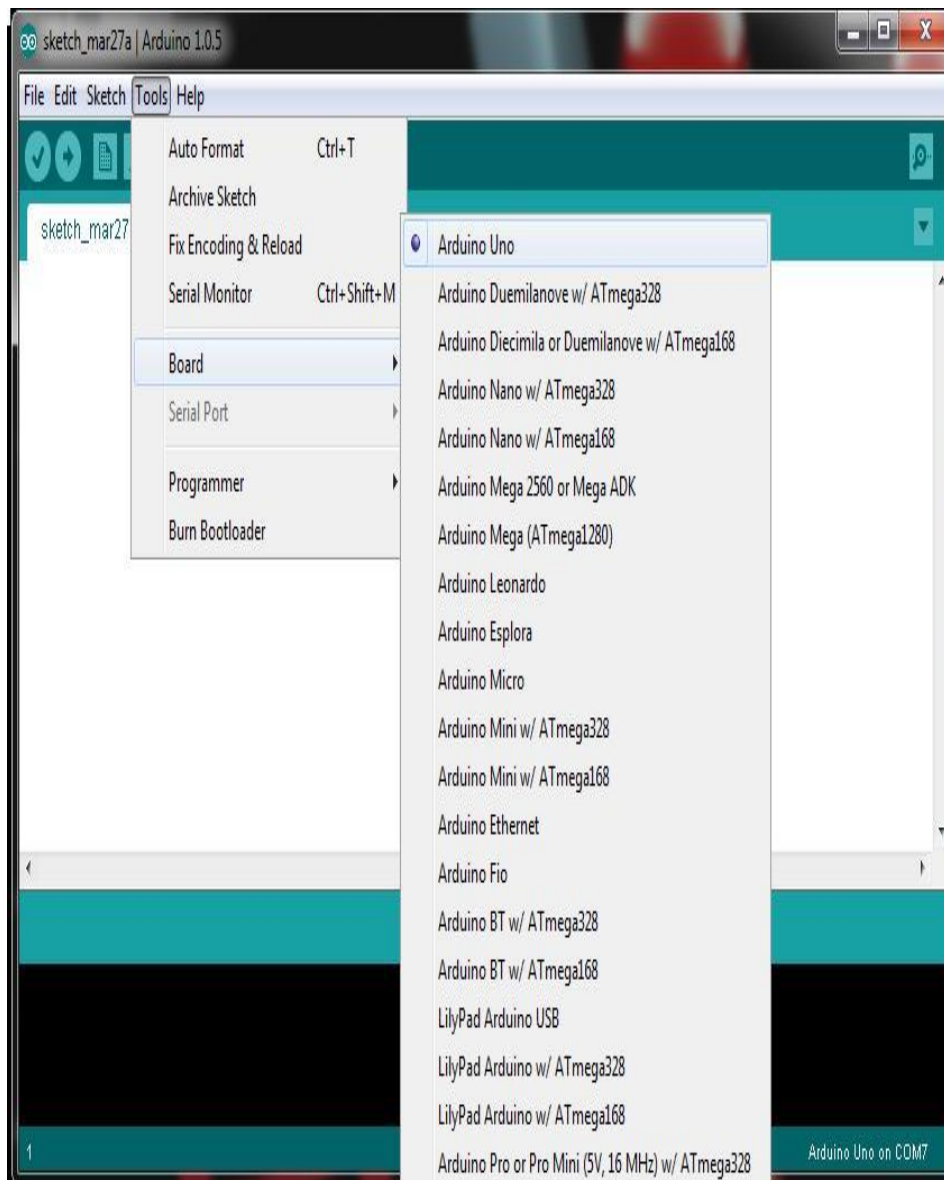


2. Select the COM Port from tool Select the COM Port

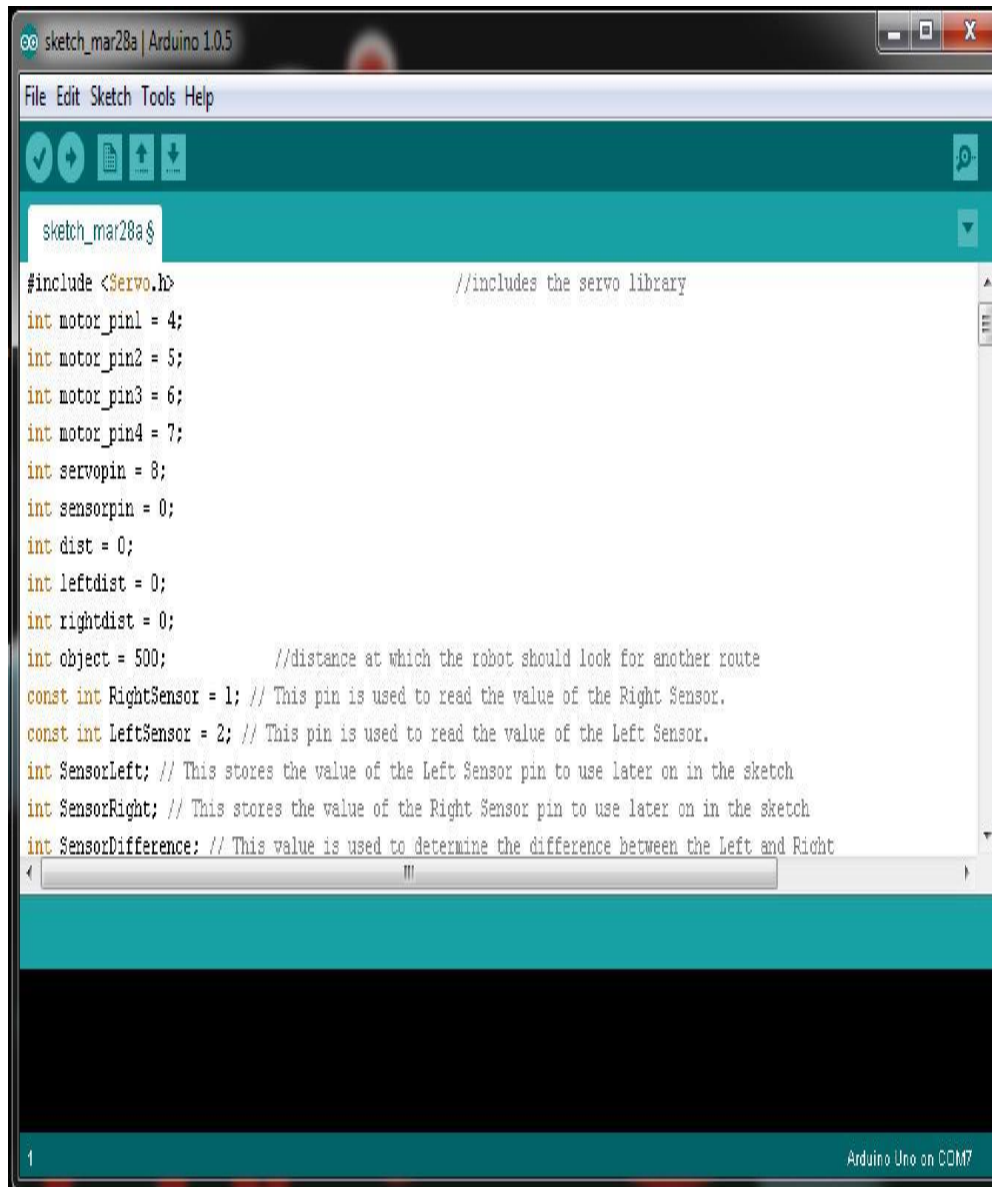


3. Select the required Arduino board from Tools as shown below

Select the required Arduino board



4. Write the sketch in Arduino IDE
Sketch in Arduino IDE



```
sketch_mar28a$  
#include <Servo.h> //includes the servo library  
int motor_pin1 = 4;  
int motor_pin2 = 5;  
int motor_pin3 = 6;  
int motor_pin4 = 7;  
int servopin = 8;  
int sensorpin = 0;  
int dist = 0;  
int leftdist = 0;  
int rightdist = 0;  
int object = 500; //distance at which the robot should look for another route  
const int RightSensor = 1; // This pin is used to read the value of the Right Sensor.  
const int LeftSensor = 2; // This pin is used to read the value of the Left Sensor.  
int SensorLeft; // This stores the value of the Left Sensor pin to use later on in the sketch  
int SensorRight; // This stores the value of the Right Sensor pin to use later on in the sketch  
int SensorDifference; // This value is used to determine the difference between the Left and Right
```

1 Arduino Uno on COM7

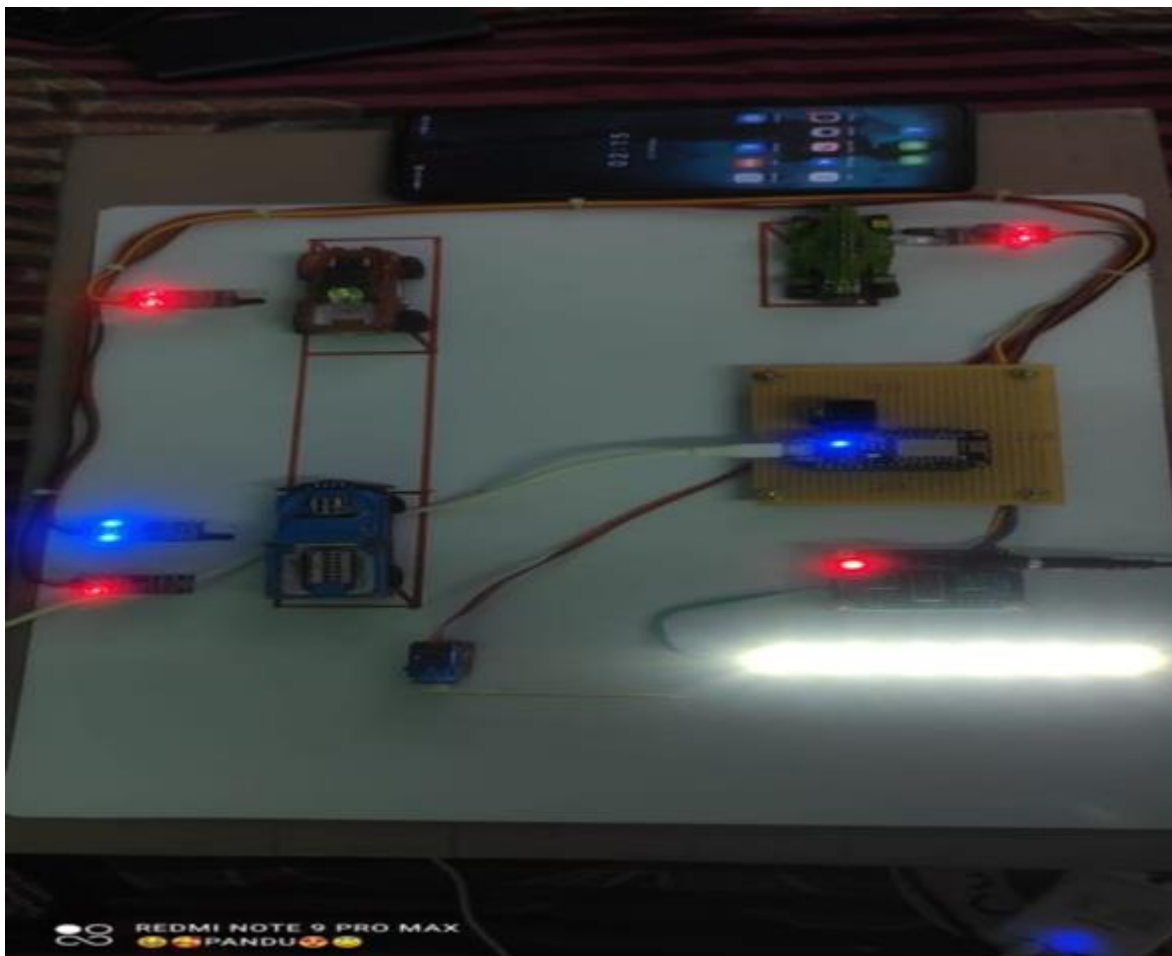
5. Compile and upload the Sketch to Arduino board upload the Sketch to Arduino board



CHAPTER-5

RESULTS AND DISCUSSION

The demand of sensible parking system is increasing considerably. this permits user to involve real time access of the provision of the parking zone. the prevailing system in today's world doesn't contains the facilities of parking reservation and parking slot accessibility checker. the prevailing system was vision-based observation system [7] that estimates the amount of the parking slots accessible within the space by reckoning the amount of incoming and outing cars that consumes ton of your time and efforts. consequent existing system was sensor-based system that uses inaudible sound waves for detection the presence of vehicles and so two-tier parking came into existence that used the thought of parking cars one on top of another. The results of the paper is to create the lot connected with the planet yet as reduces time and might be value effective for the user. The results of this paper is to cut back automotive thieving. This paper reduces overall fuel energy of the vehicle that is consumed within the search of the automotive.



CONCLUSION:

This designed automatic sensible parking system that is straightforward, economic and provides effective answer to cut back carbon footprints within the atmosphere. it's well managed to access and map the standing of parking slots from any remote location through application. so it reduces the chance of finding the parking slots in an exceedinglyny lot and additionally it eliminates needless traveling of vehicles across the stuffed parking slots in a town. thus it reduces time and it's value effective additionally.

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