

Advanced Vehicle Monitoring System And Automatic Vehicle Dim And Brightness Controlled Using Nrf24l01 Module

Students: Yarrachinnaiahgari Karunakar, Chitrالا Venkata Sandeep, Chamarthi Rohith Kumar Raju, Godina Uma Venkateswarulu,

Annamacharya Institute of Technology and Sciences, Rajampet
Corresponding Author: M.Sai Sandeep, M.Tech (Assistant Professor)

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ABSTRACT:

Vehicle to vehicle data transmission, we present initial designs and results of a small-scale prototype using NRF24L01 technology, a new technology that was developed in the last few years, which still needs more systematic inquiry on its sustainability for outdoor vehicular networks. Vehicle to vehicle communication is the most effective solution we have used in order to reduce vehicle's accidents. In this technology for vehicle-to-Vehicle data transmission we use NRF24L01 Transceiver. In this technology there is elimination protocols use so in this technology complexity get reduce. The aim of designing this system is highly reliable which give desired data transmission between vehicle to-Vehicle by using transmitter and receiver mounted on vehicle.

KEY WORDS: Arduino uno, Ultrasonic sensor, MEMS sensor, LDR sensor, NRF24L01 module, Relay, Buzzer, LCD, power supply.

I. INTRODUCTION:

Now a days it is very evident that the volume of the traffic is rapidly growing on roads. This results in huge traffic congestion Presently Traffic Management System work under fixed varying parameterization, inefficiencies are likely under high traffic conditions. More important is there is no interaction between traffic light and vehicles.

The recent advances in sensors and wireless technologies in vehicles are bringing the paradigm of connected vehicles nearby. Vehicular community and coordinating with each other will increase passengers safety and also manages the

traffic and reduces the waiting time of the vehicle in traffic. Focusing in safety, the global status report an road safety published an 2013 shows that about 1.24 millions death on road were recorded in 2011 and the number might increase up to 1.9 million in 2020 if no precautionary step been taken with the help of improved wireless technologies. With advanced technologies helping the mankind most of these accidents could be avoided and many lives will be saved. Recently connection between the vehicles has been identified as the most potential elucidation to improve the road traffic conditions and achieve the goal for more efficient and sustainable traffic management solutions.

It demotes to the wireless technology connecting enabled vehicles that can communicate with their external environments such as V2V (Vehicle to Vehicle)[1] and V2I (Vehicle to Infrastructure). Vehicles are enhanced the surrounding situation by communicating with other vehicles and with other objects such as Traffic Management System. Based on the advanced sensor and wireless technologies we propose a new solution for controlling the traffic management at the intersections as well as reducing the waiting time in case of high traffic. Arduino Mega board with ultrasonic sensor connected to the wireless module in all the vehicles. When the ultrasonic sensor sense the vehicles. Within its range, the wireless modules connected will sent a signal to the driver the distance between the vehicles, its speed and its priority of the vehicles (in case of ambulance (or) any other emergency vehicles). The proposed Intelligent Transportation System (ITS) will be an integrated solutions to the vehicles to drive with

improved in safety and increased driver convenience.

II. LITERATURE SURVEY:

AslamMusthafa R (2017) built up an automatic headlight beam controller. It will sense the light intensity value of opposite vehicles and automatically switches the high beam into low beam and it will reduce the glare effect [1].

Abdul Kader Riyaz .M (2017) proposed an graphene coated LED based automatic street lighting system using arduino microcontroller. In this the author introduced GaN based LED which acts as a heat sink. They have used arduino uno microcontroller [2].

Williams. E.A (2016) proposed a design and implementation of automatic headlight dimmer for vehicles using light dependent resistor (LDR) sensor .The device is able to automatically switch the headlight low when it is sensed by the light dependent resistor [3].

Mali P.S (2016) describes about automatic headlight dipper with respect to upcoming vehicles response. In this author uses LDR for sensing weather the light is low or high beam. The circuits will intimate the LDR which the light is in upper mode it will changes to dipper mode[4].

SanalMalhotra (2014) designs an automatic brightness control using LDR sensor. In this system they used LED and LDR. LED is a diode which works based on the concept of Electroluminescence.

According to the programming the LED will glow. If in day time they don't need light the LED will off automatically [5].

Kavita A. Bajaj worked on Intelligent Street Lightening System LDR is used for save power and energy. Control system is used for on and off the

street lights. Zigbee module is used to check the state of the street lights and also the information is transferred point to point [6].

B. K. Subramanyam worked on Design and Development of Intelligent Wireless Street Light Control and Monitoring System Along With GUI in this for automatic mode operation they using LDR sensor. Its main principle is to when the light intensity is low, light will ON automatically and if light intensity is high ,light will OFF automatically [7].

Chitradeep Sarma in their work on limitations of probable vehicle headlight technologies they have give methods for controlling the intensity of lights during night times [8].

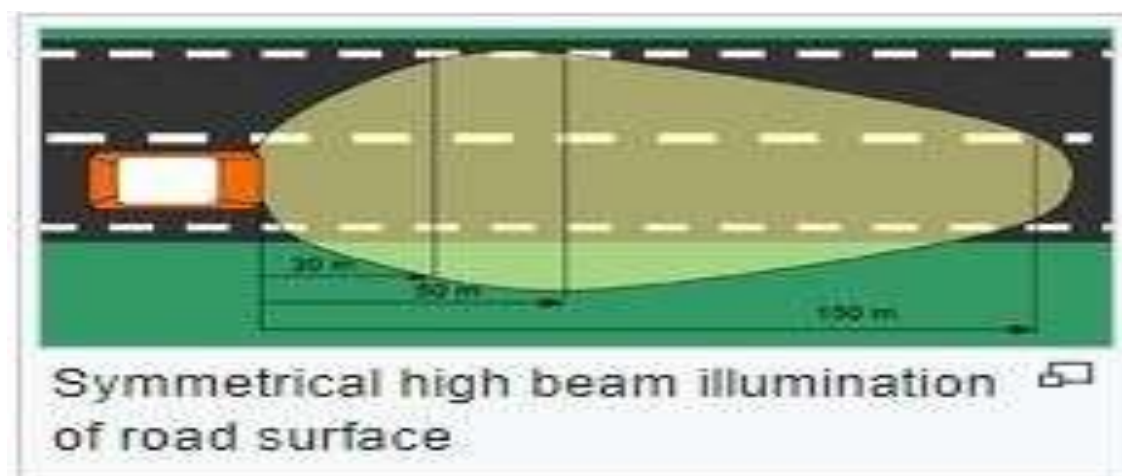
Ghassan Maan Sali proposed a Optimal Light Power Consumption Using LDR Sensor based on the intensity of light present on the environment, intensity of light in the room will be adjusted sing LDR sensor [9].

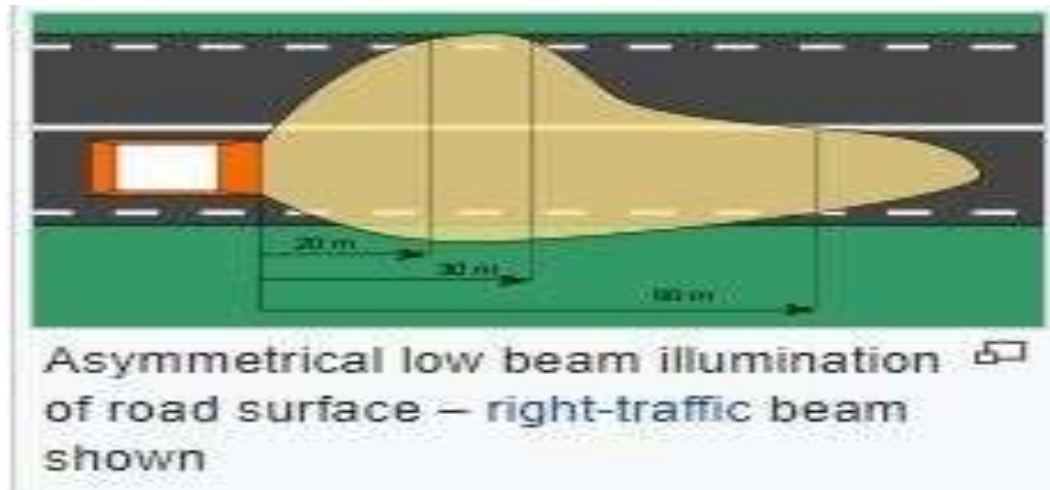
Rodrigo Cassio de Barros worked on the low-Cost Solar Irradiance Meter using LDR Sensors when the amount of solar irradiance reaches beyond the desired value the solar panel stop receiving the sunlight [10].

III. EXISTING SYSTEM :

Automatic Vehicle Headlight Management System to Prevent Accidents Due To Headlight Glare:

Most of the accidents during night occur due to the high amount of light falling on the vehicle. It cause glaring and troxler fading that leads to accident. To overcome this problem, automatic adjustment of light is needed which is described in this paper. LDR is used to measure the amount of intensity of light falling on the vehicle.





Light Dependent Resistor (LDR):

LDR is a sensor that changes its resistance according to the amount of intensity of light falling on it. Increasing the intensity of light decreases the resistance and increases the conductivity of LDR. The output of LDR is an analog output.

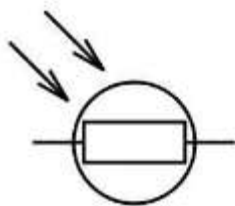


fig. Symbol of LDR

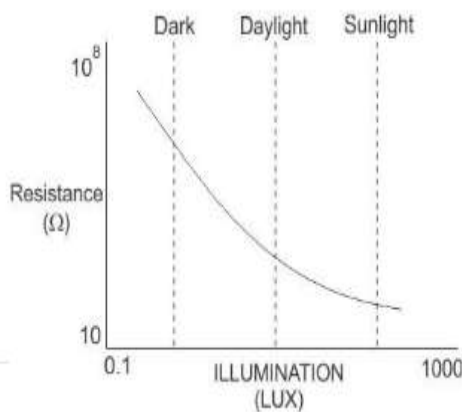


fig. Characteristics LDR

Scotopic vision:

Scotopic vision plays a major role in night vision. Human eye consist of two types of photoreceptor cells-rod cells and cone cells.Scotopic vision occurs due to rod cells. Rod cells can function in less intense of light. There are approximately about 90 million rod cells are present in a human eye. Rod cells are usually present at an outer edge of the human eye.

Rod cells are usually more sensitive than cone cells so it plays a very little role in color vision. This is the main reason that the colors are not so obvious in the dim light.Scotopic vision is also called as night vision. The intensity of light is measured in lumens per steradian(lm/sr) or candela (cd). The luminance level of scotopic vision is 10^{-3} to 10^{-6} cd/m² .It distinguishes shapes and not the colors. Photopic vision is also known as day vision or bright light vision.

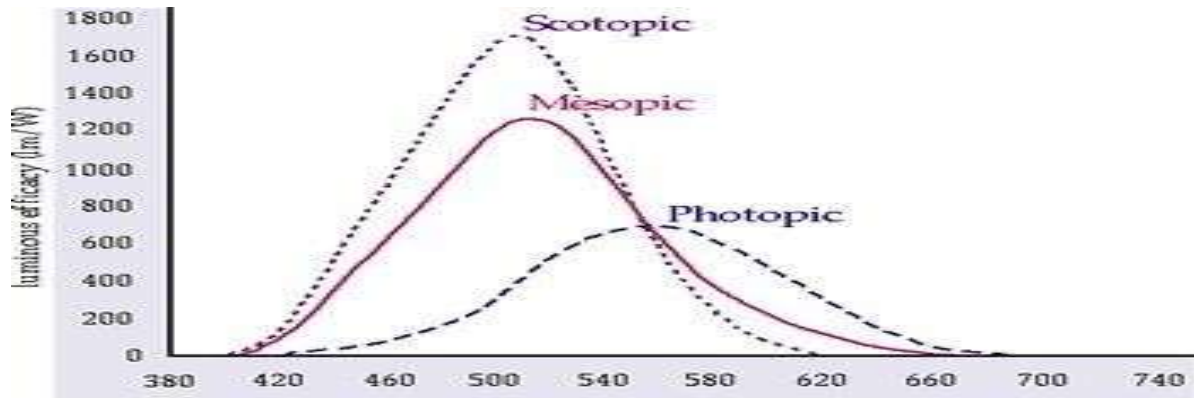
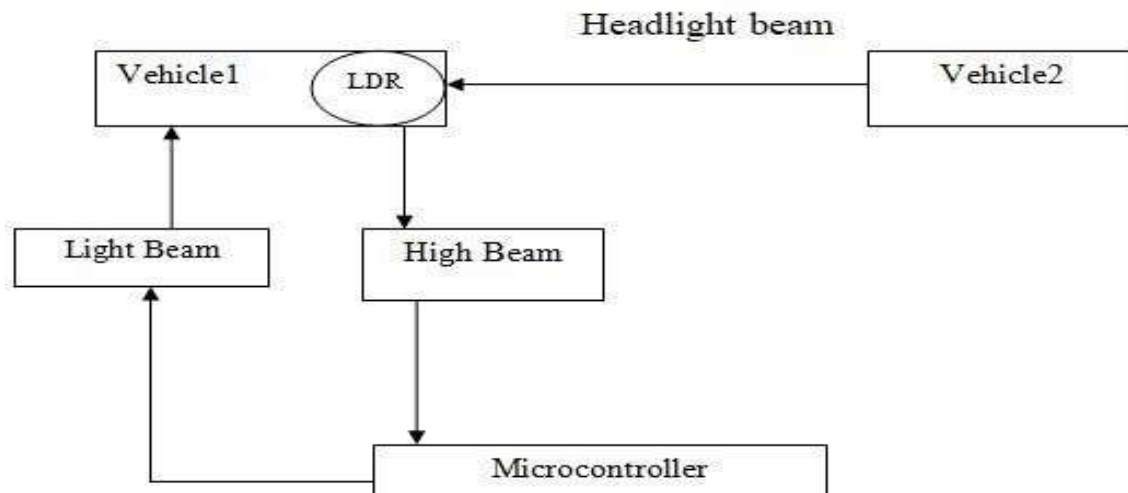


fig.Differentvisionsofeye

Block diagram of Vehicle headlight management system:



High Beam is also called as main beam, driving beam, full beam that provides a bright, centre-weighted distribution of light and it does not possess any control of light that are directed towards the other road user's. High beam is only suitable for road with no other users, as the glare from the high beam may dazzle the other drivers.

The Light Dependent resistor works on the principle of Photo conductivity i.e. the conductivity of the LDR increases by increasing the intensity of light falling on it. When the LDR is kept in dark, the resistance of it is very high that is up to 10 12 Ω. At the same time, when the LDR is placed in sunlight, there is a drastic fall in the resistance of LDR.

Arduino is a most commonly used physical computing platform and an interactive developing environment. It is a standalone platform

that interacts with Arduino software on the computer. The Arduino software consist of an Arduino IDE(Integrated Development Environment).

PROPOSED METHOD

In this, a vehicle (Vehicle-A) which is having ultrasonic sensor gives the information about distance between target vehicle (Vehicle-B). However, in this system, communication between only two vehicles is done, we can also design number of target Communication and ranging technologies for communication between vehicles by Using Spread Spectrum Technique. In this project we can send messages to the receiving vehicle one by one depending on condition. We are also using buzzer output and LCD to display message on both transmitter and receiver side.

BLOCK DIAGRAM FOR PROPOSED METHOD

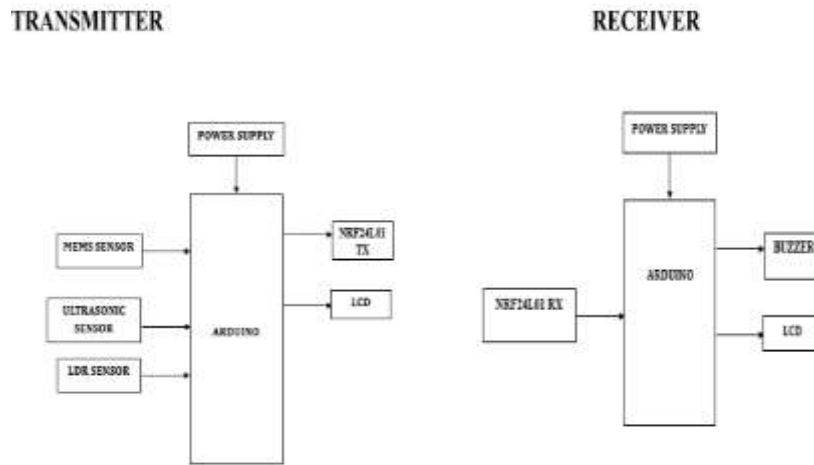


Fig: block diagram of proposed method

ADVANTAGES AND APPLICATIONS

ADVANTAGES

- ▶ Reduces the number of accidents
- ▶ It will warn the vehicles in case of any chances of collision
- ▶ It will be used for large number of vehicles

APPLICATIONS

- ▶ Collecting tolls without stopping; managing traffic
- ▶ Gaining entrance to buildings; automating parking
- ▶ Controlling access of vehicles to gated communities, corporate campuses and airports
- ▶ Dispensing goods

HARDWARE AND SOFTWARE REQUIREMENTS

HARDWARE REQUIREMENTS

ARDUINO UNO

The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open-source, which means hardware is reasonably priced and development software is free. This guide is for students in ME 2011, or students anywhere who are confronting the Arduino for the first time. For advanced Arduino users, prowl the web; there are lots of resources.

This is what the Arduino board looks like.



The Arduino programming language is a simplified version of C/C++. If you know C, programming the Arduino will be familiar. If you do not know C, no need to worry as only a few commands are needed to perform useful functions.

MEMS Sensor:

The term MEMS stands for micro-electro-mechanical systems. These are a set of devices, and the characterization of these devices can be done by their tiny size & the designing mode. The designing of these sensors can be done with the 1- 100-micrometer components. These devices can differ from small structures to very difficult electromechanical systems with numerous moving elements beneath the control of incorporated micro-electronics. Usually, these sensors include mechanical micro-actuators, micro-structures, micro-electronics, and micro-sensors in one package. This article discusses what is a MEMS sensor, working principle, advantages and it's

applications

What is a MEMS Sensor?

MEMS are low-cost, and high accuracy inertial sensors and these are used to serve an extensive range of industrial applications. This sensor uses a chip-based technology namely micro-electro-mechanical-system. These sensors are used to detect as well as measure the external stimulus like pressure, after that it responds to the pressure which is measured pressure with the help of some mechanical actions. The best examples of this mainly include revolving of a motor for compensating the pressure change.

The MEMS accelerometers can be divided into two important micro system architectures: piezo resistive and capacitive. Even though both of these two types of accelerometers possess internal proof masses which are excited by acceleration, the differences of these two architectures lie in the transduction mechanism which is used to the movement correlation of the internal proof mass to accelerate.

The Capacitive accelerometers possess a differential capacitor whose balance is disrupted by the proof mass movement. Piezo resistive accelerometers commonly rely on inducing, which attach the proof mass to the sensor which is used for identification of the movement of the mass. Fujitsu successfully developed the 'FAR-S2AB' series, 3-axis Accelerometer, using state-of-the-art MEMS technology. This small and highly sensitive accelerometer can detect acceleration, inclination and vibration by measuring the motion in the x-, y-, and z-axis simultaneously. The MEMS 3-axis accelerometer consists of a Mass at the centre of the sensor's chip, which is suspended by 4 Beams with Piezo resistive material.

By sensing the mounting angle, the sensor can assist in compensating for the devices mounting angle, and therefore makes it possible to use ACCELEROMETER FACTSHEET MEMS 3-AXIS ACCELEROMETER normal SMD technology in high density boards, and also to realise the precise detection of the inclination angle. An interface IC within the sensor package also has temperature sensing and self-diagnosis functions.

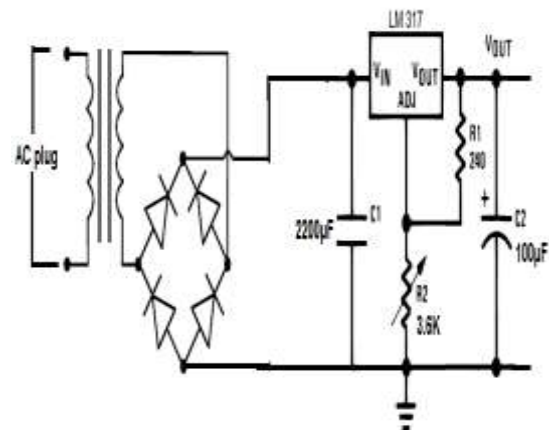


Power supply:

A power supply is a component that

provides at least one electrical charge with power. It typically converts one type of electrical power to another, but it can also convert a different Energy form in electrical energy, such as solar, mechanical, or chemical. A power supply provides electrical power to components. Usually the term refers to devices built into the powered component. Computer power supplies, for example, convert AC current to DC current and are generally located along with at least one fan at the back of the computer case.

Most computer power supplies also have an input voltage switch that, depending on the geographic location, can be set to 110v/115v or 220v/240v. Due to the different power voltages supplied by power outlets in different countries, this switch position is crucial.

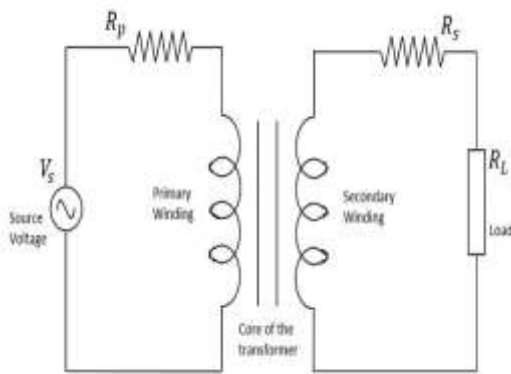


Some basic components used in the supply of power:

Transformer:

A transformer is a static electrical gadget that exchanges control between at least two circuits. A fluctuating current creates a changing attractive motion in one transformer curl, which thus actuates a differing electromotive power over a second loop twisted around a similar center.

Without a metallic association between the two circuits, electrical vitality can be exchanged between the two loops. The enlistment law of Faraday found in 1831 portrayed the impact of prompted voltage in any curl because of the changing attractive flux surrounded by the coil.



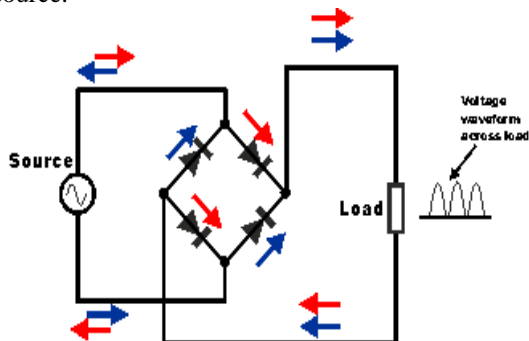
Circuit of transformer



Transformer

Rectifier:

A **rectifier** is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which flows in only one direction. The process is known as rectification, since it "straightens" the direction of current. Rectifiers have many uses, but are often found to serve as components of DC power supplies and direct power transmission systems with high voltage. Rectification can be used in roles other than direct current generation for use as a power source.



Circuit of rectifier



Rectifier

Capacitors:

Capacitors are used to attain from the connector the immaculate and smoothest DC voltage in which the rectifier is used to obtain throbbing DC voltage which is used as part of the light of the present identity. Capacitors are used to acquire square DC from the current AC experience of the current channels so that they can be used as a touch of parallel yield.

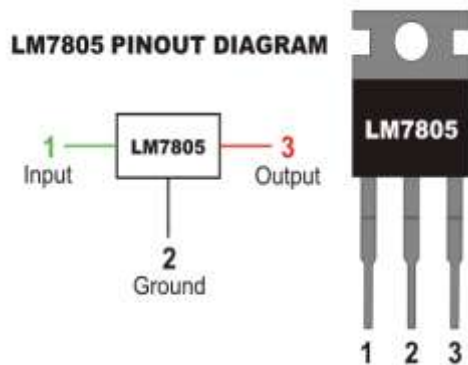


Capacitor

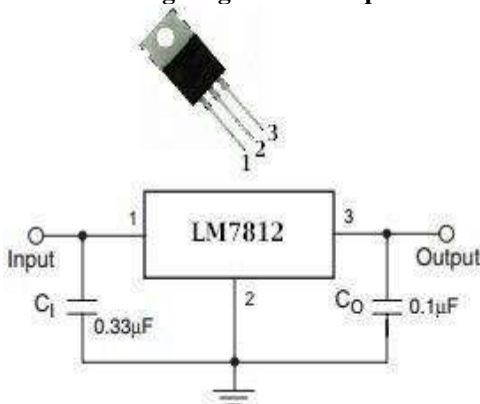
Voltage regulators:

The 78XX voltage controller is mainly used for voltage controllers as a whole. The XX speaks to the voltage delivered to the specific gadget by the voltage controller as the yield. 7805 will supply and control 5v yield voltage and 12v yield voltage will be created by 7812.

The voltage controllers are that their yield voltage as information requires no less than 2 volts. For example, 7805 as sources of information will require no less than 7V, and 7812, no less than 14 volts. This voltage is called Dropout Voltage, which should be given to voltage controllers.



7805 voltage regulator with pinout



7812 voltage regulator with pinout

ULTRASONIC SENSOR

An ultrasonic sensor transmit ultrasonic waves into the air and detects reflected waves from an object. There are many applications for ultrasonic sensors, such as in intrusion alarm systems, automatic door openers and backup sensors for automobiles.

Accompanied by the rapid development of information processing technology, new fields of application, such as factory automation equipment and car electronics, are increasing and should continue to do so. Using its unique piezoelectric ceramics manufacturing technology developed over many years, Murata has developed various types of ultrasonic sensors which are compact and yet have very high performance. The information contained in this catalog will help you to make effective use of our ultrasonic sensors.



HC-SR04 Sensor Features

- Operating voltage: +5V

- Theoretical Measuring Distance: 2cm to 450cm
- Practical Measuring Distance: 2cm to 80cm
- Accuracy: 3mm
- Measuring angle covered: $<15^\circ$
- Operating Current: $<15mA$
- Operating Frequency: 40Hz

HC-SR04 Ultrasonic Sensor - Working

As shown above the HC-SR04 Ultrasonic (US) sensor is a 4 pin module, whose pin names are Vcc, Trigger, Echo and Ground respectively. This sensor is a very popular sensor used in many applications where measuring distance or sensing objects are required. The module has two eyes like projects in the front which forms the Ultrasonic transmitter and Receiver. The sensor works with the simple high school formula that

$$\text{Distance} = \text{Speed} \times \text{Time}$$

The Ultrasonic transmitter transmits an ultrasonic wave, this wave travels in air and when it gets objected by any material it gets reflected back toward the sensor this reflected wave is observed by the Ultrasonic receiver module as shown in the picture below



Now, to calculate the distance using the above formulae, we should know the Speed and time. Since we are using the Ultrasonic wave we know the universal speed of US wave at room conditions which is 330m/s. The circuitry inbuilt on the module will calculate the time taken for the US wave to come back and turns on the echo pin high for that same particular amount of time, this way we can also know the time taken. Now simply calculate the distance using a microcontroller or microprocessor.

How to use the HC-SR04 Ultrasonic Sensor

HC-SR04 distance sensor is commonly used with both microcontroller and microprocessor platforms like Arduino, ARM, PIC, Raspberry Pie etc. The following guide is universally since it has to be followed irrespective of the type of computational device used.

Power the Sensor using a regulated +5V through the Vcc and Ground pins of the sensor. The

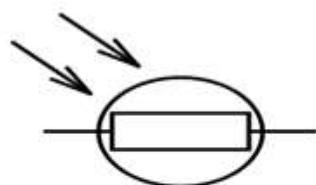
current consumed by the sensor is less than 15mA and hence can be directly powered by the on board 5V pins (If available). The Trigger and the Echo pins are both I/O pins and hence they can be connected to I/O pins of the microcontroller. To start the measurement, the trigger pin has to be made high for 10uS and then turned off. This action will trigger an ultrasonic wave at frequency of 40Hz from the transmitter and the receiver will wait for the wave to return. Once the wave is returned after it getting reflected by any object the Echo pin goes high for a particular amount of time which will be equal to the time taken for the wave to return back to the sensor.

The amount of time during which the Echo pin stays high is measured by the MCU/MPU as it gives the information about the time taken for the wave to return back to the Sensor. Using this information the distance is measured as explained in the above heading.

LDR Sensor:

A **Light Dependent Resistor** (also known as a photoresistor or LDR) is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light-sensitive devices. They are also called as photoconductors, photoconductive cells or simply photocells.

They are made up of semiconductor materials that have high resistance. There are many different symbols used to indicate a photoresistor or LDR, one of the most commonly used symbol is shown in the figure below. The arrow indicates light falling on it.



Symbol of a Photoresistor (or LDR)

Working Principle of Photoresistor (LDR)

So how exactly does a photoresistor (i.e. a light dependent resistor or LDR) work? Photoresistors work based off of the principle of photoconductivity. Photoconductivity is an optical phenomenon in which the material's conductivity is increased when light is absorbed by the material.

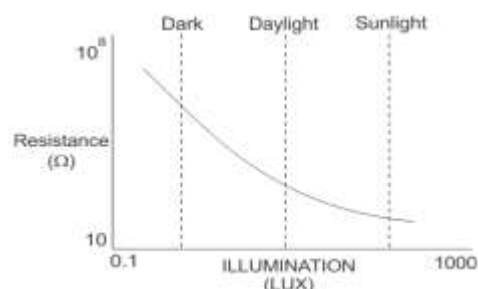
When light falls i.e. when the photons fall on the device, the electrons in the valence band of the semiconductor material are excited to the

conduction band. These photons in the incident light should have energy greater than the bandgap of the semiconductor material to make the electrons jump from the valence band to the conduction band.

Hence when light having enough energy strikes on the device, more and more electrons are excited to the conduction band which results in a large number of charge carriers. The result of this process is more and more current starts flowing through the device when the circuit is closed and hence it is said that the resistance of the device has been decreased. This is the most common **working principle of LDR**.

Characteristics of Photoresistor (LDR)

Photoresistor LDR's are light-dependent devices whose resistance is decreased when light falls on them and that is increased in the dark. When a light dependent resistor is kept in dark, its resistance is very high. This resistance is called as dark resistance. It can be as high as $10^{12} \Omega$ and if the device is allowed to absorb light its resistance will be decreased drastically. If a constant voltage is applied to it and the intensity of light is increased the current starts increasing. The figure below shows the resistance vs. illumination curve for a particular LDR.



Photocells or LDR's are nonlinear devices. Their sensitivity varies with the wavelength of light incident on them. Some photocells might not at all response to a certain range of wavelengths. Based on the material used different cells have different spectral response curves.

When light is incident on a photocell it usually takes about 8 to 12 ms for the change in resistance to take place, while it takes one or more seconds for the resistance to rise back again to its initial value after removal of light. This phenomenon is called a resistance recovery rate. This property is used in audio compressors.

Also, **LDR's** are less sensitive than photodiodes and phototransistors. (A photo diode

and a photocell (LDR) are not the same, a photodiode is a pn junction semiconductor device that converts light to electricity, whereas a photocell is a passive device, there is no pn junction in this nor it “converts” light to electricity).

LCD:

LCD (Liquid Crystal Display) is the innovation utilized in scratch pad shows and other littler PCs. Like innovation for light-producing diode (LED) and gas-plasma, LCDs permit presentations to be a lot more slender than innovation for cathode beam tube (CRT). LCDs expend considerably less power than LED shows and gas shows since they work as opposed to emanating it on the guideline of blocking light.

A LCD is either made with an uninvolved lattice or a showcase network for dynamic framework show. Likewise alluded to as a meager film transistor (TFT) show is the dynamic framework LCD. The uninvolved LCD lattice has a matrix of conductors at every crossing point of the network with pixels. Two conductors on the lattice send a current to control the light for any pixel. A functioning framework has a transistor situated at every pixel crossing point, requiring less current to control the luminance of a pixel.

Some aloof network LCD's have double filtering, which implies they examine the matrix twice with current in the meantime as the first innovation took one sweep. Dynamic lattice, be that as it may, is as yet a higher innovation.

A 16x2 LCD show is an essential module that is generally utilized in various gadgets and circuits. These modules more than seven sections and other multi fragment LEDs are liked. The reasons being: LCDs are affordable; effectively programmable; have no restriction of showing exceptional and even custom characters (not at all like in seven fragments), movements, etc.

Data/Signals/Execution of LCD

Now that was all about the signals and the hardware. Let us come to data, signals and execution. Two types of signals are accepted by LCD, one is data and one is control. The LCD module recognizes these signals from the RS pin status. By pulling the R / W pin high, data can now also be read from the LCD display. Once the E pin has been pulsed, the LCD display reads and executes data at the falling edge of the pulse, the same for the transmission case. It takes 39-43 μ S for the LCD display to place a character or execute a command. It takes 1.53ms to 1.64ms except for clearing display and searching for cursor to the home position.

Any attempt to send data before this interval may result in failure in some devices to read data or execute the current data. Some devices compensate for the speed by storing some temporary registers with incoming data.

There are two RAMs for LCD displays, namely DDRAM and CGRAM. DDRAM registers the position in which the character would be displayed in the ASCII chart. Each DDRAM byte represents every single position on the display of the LCD.

The DDRAM information is read by the LCD controller and displayed on the LCD screen. CGRAM enables users to define their personalized characters. Address space is reserved for users for the first 16 ASCII characters.

Users can easily display their custom characters on the LCD screen after CGRAM has been set up to display characters.

Images of LCD Display:-



BUZZER:

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke. Buzzer is an integrated structure of electronic transducers, DC power supply, widely used in computers, printers, copiers, alarms, electronic toys, automotive electronic equipment, telephones, timers and other electronic products for sound devices. Active buzzer 5V Rated power can be directly connected to a continuous sound, this section dedicated sensor expansion module and the board in combination, can complete a simple circuit design, to "plug and play".



Buzzer Features and Specifications

- Rated Voltage: 6V DC
- Operating Voltage: 4-8V DC
- Rated current: <30mA
- Sound Type: Continuous Beep
- Resonant Frequency: ~2300 Hz
- Small and neat sealed package
- Breadboard and Perf board friendly

Applications of Buzzer

- Alarming Circuits, where the user has to be alarmed about something
- Communication equipment's
- Automobile electronics
- Portable equipment's, due to its compact size

nRF24L01 Transceiver:

The nRF24L01+ transceiver module is designed to operate in 2.4 GHz worldwide ISM frequency band and uses GFSK modulation for data transmission. The data transfer rate can be one of 250kbps, 1Mbps and 2Mbps.

Power consumption

The operating voltage of the module is from 1.9 to 3.6V, but the good news is that the logic pins are 5-volt tolerant, so we can easily connect it to an Arduino or any 5V logic microcontroller without using any logic level converter.

The module supports programmable output power viz. 0 dBm, -6 dBm, -12 dBm or -18 dBm and consumes unbelievably around 12 mA during transmission at 0 dBm, which is even lower than a single LED. And best of all, it consumes 26 μ A in standby mode and 900 nA at power down mode. That's why they're the go-to wireless device for low-power applications.

SPI Interface

The nRF24L01+ transceiver module communicates over a 4-pin Serial Peripheral Interface (SPI) with a maximum data rate of 10Mbps. All the parameters such as frequency

channel (125 selectable channels), output power (0 dBm, -6 dBm, -12 dBm or -18 dBm), and data rate (250kbps, 1Mbps, or 2Mbps) can be configured through SPI interface.

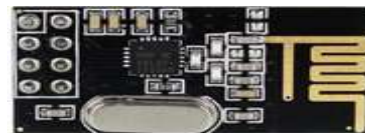
The SPI bus uses a concept of a Master and Slave, in most common applications our Arduino is the Master and the nRF24L01+ transceiver module is the Slave. Unlike the I2C bus the number of slaves on the SPI bus is limited, on the Arduino Uno you can use a maximum of two SPI slaves i.e. two nRF24L01+ transceiver modules.

Here are complete specifications:

Frequency Range	2.4 GHz ISM Band
Maximum Air Data Rate	2 Mb/s
Modulation Format	GFSK
Max. Output Power	0 dBm
Operating Supply Voltage	1.9 V to 3.6 V
Max. Operating Current	13.5mA
Min. Current(Standby Mode)	26 μ A
Logic Inputs	5V Tolerant
Communication Range	800+ m (line of sight)

nRF24L01+ module Vs nRF24L01+ PA/LNA module

There are a variety of modules available based upon the nRF24L01+ chip. Below are the most popular versions.



nRF24L01+ Wireless Module

The first version uses on-board antenna. This allows for a more compact version of the breakout. However, the smaller antenna also means a lower transmission range. With this version, you'll be able to communicate over a distance of 100 meters. Of course that is outdoors in an open space. Your range indoors, especially through walls, will be slightly weakened.

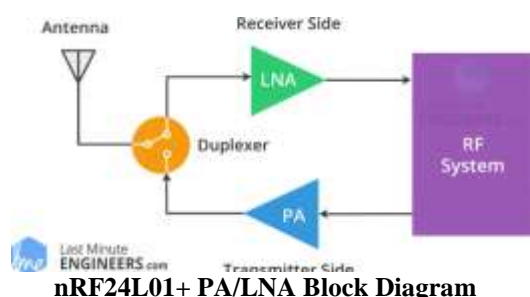


nRF24L01+ PA LNA Wireless Transceiver Module with External Antenna

The second version comes with a SMA connector and a duck-antenna but that's not the real difference. The real difference is that it comes with a special RFX2401C chip which integrates the PA, LNA, and transmit-receive switching circuitry. This range extender chip along with a duck-antenna helps the module achieve a significantly larger transmission range about 1000m.

What is PA LNA?

The PA stands for Power Amplifier. It merely boosts the power of the signal being transmitted from the nRF24L01+ chip. Whereas, LNA stands for Low-Noise Amplifier. The function of the LNA is to take the extremely weak and uncertain signal from the antenna (usually on the order of microvolts or under -100 dBm) and amplify it to a more useful level (usually about 0.5 to 1V)



The low-noise amplifier (LNA) of the receive path and the power amplifier (PA) of the transmit path connect to the antenna via a duplexer, which separates the two signals and prevents the relatively powerful PA output from overloading the sensitive LNA input.

SOFTWARE REQUIREMENTS

ARDUINO IDE

Arduino IDE where IDE stands for Integrated Development Environment – An official software introduced by Arduino.cc, that is mainly used for writing, compiling and uploading the code in the Arduino Device. Almost all Arduino modules are compatible with this software that is an open source and is readily available to install and start compiling the code on the go.

Introduction to Arduino IDE:

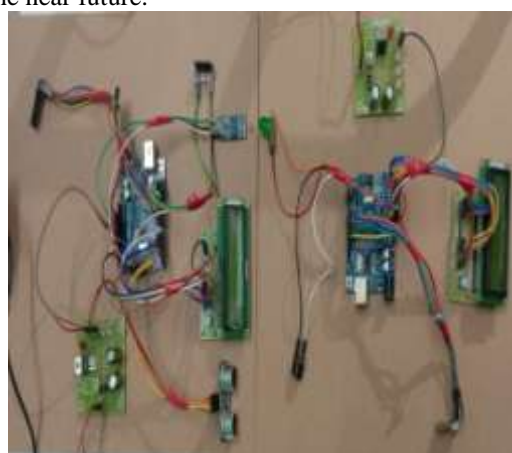
- Arduino IDE is an open source software that is mainly used for writing and compiling the code into the Arduino Module.
- It is an official Arduino software, making code compilation too easy that even a common

person with no prior technical knowledge can get their feet wet with the learning process.

- It is easily available for operating systems like MAC, Windows, and Linux and runs on the Java Platform that comes with inbuilt functions and commands that play a vital role for debugging, editing and compiling the code in the environment.
- A range of Arduino modules available including Arduino Uno, Arduino Mega, Arduino Leonardo, Arduino Micro and many more.
- Each of them contains a microcontroller on the board that is actually programmed and accepts the information in the form of code.
- The main code, also known as a sketch, created on the IDE platform will ultimately generate a Hex File which is then transferred and uploaded in the controller on the board..

IV. CONCLUSION

We have presented an Inter-Vehicle Communication system consisting of a nRF24L01 transmitter and receiver that is targeted at communication between vehicles, nRF24L01 can be used to communicate with the LED lights of the cars and number of accidents can be prevented. nRF24L01 is ideal for high density coverage in a restricted region. It is believed that the technology can yield a speed more than 10Gbps. It is the fastest and cheapest wireless communication systems which is suitable for communication. nRF24L01 will make all our lives more technology driven in the near future.



FUTURE SCOPE

In future this system helps the communication much easier than other system. It involves Li-Fi and LORA communication, we can use these system in places such as Industries, offices etc

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