

VECHICLE ACCIDENT PREVENTION BY USING EYE BLINKING MONITORING SYSTEM

A Project Report Phase - II

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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SCHOOL OF ELECTRICAL AND ELECTRONICS

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

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BONAFIDE CERTIFICATE

This is to certify that this Final Year Project Report is the bonafide work of S. SIRIYESU (39130431) and S.GANESH REDDY (39130455) who carried out of the project title "VEHICLE ACCIDENT PREVENTION BY USING EYE BLINKING MONITORING SYSTEM" under my supervision from Jan 2023 to April 2023.

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DECLARATION

We SIRIGINEEDI SIRIYESU (39130431) and SURE GANESH REDDY(39130455) hereby declare that the Project Report entitled " **VEHICLE ACCIDENT PREVENTION BY USING EYE BLINKING MONITORING SYSTEM** " done by us under the guidance of Dr. POONGUZHALI S, M.E, Ph.D., Assistant professor, Department of Electronics and Communication Engineering at Sathyabama Institute of Science and Technology is submitted in partial fulfilment of the requirements of the award of Bachelor of Engineering degree in **Electronics and Communication Engineering**.

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I would like to express my sincere and deep sense of gratitude to my Project Guide **Dr. POONGUZHALI S, M.E., Ph.D.**, for her valuable guidance, suggestions and constant encouragement paved way for the successful completion of my phase-2 project work.

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Abstract

Now a days most road accidents occur due to careless driving of drivers because of sleepy and lethargic. This paper provides Eye Blink Monitoring System (EBM) that will help to alert the driver in when they are in sleepy mode. A system for monitoring eye movements would be useful in warning drivers when they fall in sleep. This sleepy or lethargic mode affects mental altered and reduces a persons ability to drive a vehicle safely and increase the risky of human errors that could be lead to an accident. The driver's eye is continuously monitored using an IR sensor. The normal eye blink rate will have no effect on the output of the system. If Driver fell asleep, then IR sensor receives abnormal blinking rate & an alarm will ring, to wake driver up.

In this paper, mishaps because of languor are frequently controlled and forestalled with the help of squinting sensor utilizing IR beams. It include of IR transmitter and an IR recipient. The transmitter transmits IR beams into the consideration. This yield is interfaced with a caution all around of entryways the vehicle. In the event that the intention power can't require control of the vehicle along these lines specified measure of your time, at that point the caution outside the vehicle will continue to caution and advise others to help the intention power. Interruption, laziness, and weakness are the most factors of fender benders as of late to disentangle such issues, an Eye-following framework upheld camera is proposed during this paper.

The framework recognizes the rationale power's Interruption or tiredness and offers a mindful to the driver as a help framework. a spread of studies have suggested that around 20% of all street mishaps are on account of sleepiness of the thought process power. The improvements of innovations for recognizing or forestalling tiredness while driving might be a significant go up against in mishap avoidance frameworks. At whatever point the framework identifies the interruption or drowsiness of the rationale power, the thought process power are alarmed through a showed message on a screen and a discernible sound for more consideration.

TABLE OF CONTENT

CHAPTER NO	CHAPTER NAME	PAGE NO
	Abstract	
	List of Figures	
1	INTRODUCTION	1
2	LITERATURE SURVEY	2
	2.1 Existing System	5
3	PROPOSED SYSTEM	6
	3.1 Block Diagram	6
	3.2 IOT	7
4	HARDWARE DISCRIPTION	19
	4.1 Node Mcu	19
	4.2 Eye Blink Sensor	24
	4.3 MQ3 Alcohol Senso	29
	4.4 IR Sensor	36
5	RESULT, DISCUSSION AND PERFORMANCE ANALYSIS	46
	5.1 Result And Discussion	46
	5.2 Performance Nalysis	47
6	CONCLUSION AND FUTURE SCOPE	49
	6.1 Conclusion	49
	6.2 Future Scope	49
	REFERENCE	

LIST OF FIGURES

Fig No	Fig Name	Page no
3.1.1	Block diagram of eye blinking monitoring system	6
4.1	Node MCU chip	22
4.2	Node MCU Development Board v1.0	22
4.3	Eye blink sensor	25
4.4	Fixing Arduino nano onto glasses	26
4.5	Fixing buzzer onto glasses	26
4.6	Fixing the 9v battery on the other side of glasses	27
4.7	MQ3 alcohol sensor	29
4.8	Internal structure of MQ3 Alcohol sensor	31
4.9	Internal structure of MQ3 Alcohol sensor	31
4.10	Internal structure of MQ3 Alcohol sensor	32
4.11	Tubular sensing element	32
4.12	Hardware view of the MQ3 Alcohol sensor	33
4.13	The relation between the alcohol concentration and output voltage	34
4.14	LM393 High precision Comparator	34
4.15	MQ3 alcohol sensor module Pinpoint	35
4.16	IR sensor	36
4.17	IR sensor circuit Diagram	42
4.18	IR imaging devices	44

Fig No	Fig Name	Page No
5.1	Connections of the proposed system	46
5.2	Connections of the proposed system	46
5.3	Driver wearing the glasses which are connected with eye blink sensor	47
5.4	Shows the notification that the driver is sleeping during the driving	47
5.5	Shows the notification that the driver is alcohol taken during the driving	48

CHAPTER – 1

INTRODUCTION

We can't watch out of ours whereas in running by less acutely aware If we tend to done all the vehicles with automatic security system that has high security to driver, conjointly offers alarm. All vehicles should be equipped with eye blink sensor and alcohol sensor in future avoids these types of accidents Vehicle accidents are most common if the driving is inadequate. These happen on most factors if the motive force is drowsy or if he's alcoholic. Driver sleepiness is recognized as a very important think about the vehicle accidents. Advanced technology offers some hope avoid the up to some extent.

This project involves live and controls the attention blink mistreatment IR sensing element. The IR transmitter is employed to transmit the infrared rays in our eye. The IR receiver is employed to receive the mirrored infrared rays of eye. If the attention is closed means that the output of IR receiver is high otherwise the IR receiver output is low. This to grasp the attention is closing or gap Position. This output is provide to logic circuit to point the alarm. This project involves dominant accident thanks to unconscious through nictitation. A from PIC and other necessary elements as per our design requirement results as output.

As chip styles get quicker, the cost of manufacturing a chip (with smaller components built on a semiconductor chip the same size) generally stays the same. Before microprocessors, small computers had been implemented using racks of circuit boards with many medium and small- scale integrated circuits. Microprocessors integrated this into one or some large-scale ICs. Continued will increase in chip capability have since rendered alternative varieties of computers nearly fully obsolete with one or a lot of microprocessors utilized in everything from the littlest embedded systems and Handheld devices to the largest mainframes and supercomputers.

CHAPTER - 2

LITERATURE SURVEY

Electric Vehicle Intelligent Control System-Hardware modules configurations

Author: Gan Yu Han; Leong Chee Ken; Chew Kuew Wai

The Electric Vehicle Intelligent Control System(EVICS) project where the EVICS is a 2-in-1 system for an Electric Vehicle(EV) which consist of Monitoring System for the front seat driver and Infotainment System for the rear seat passengers. The Monitoring system consist of battery voltage, current and temperature monitoring modules, battery energy status(%), distance left(km), km/h and rpm meter, offline and online Global Positioning System(GPS) and Contour Positioning System(CPS). The Monitoring system consist of battery voltage, current and temperature monitoring modules, battery energy status(%), distance left(km), km/h and rpm meter, offline and online Global Positioning System(GPS) and Contour Positioning System(CPS).

An intelligent automotive climate control system Author: K.C. Wei; G.A. Dage

An intelligent automotive climate control system based on human-sensory response is developed and described in this paper. The system uses the skin temperature of the vehicle occupant, measured by a passive remote infrared sensor, and an intelligent controller to improve the perceived thermal comfort of the occupant. Thermal comfort is characterized in terms of a set of comfortable skin temperatures for different climate conditions. The controller monitors and regulates the skin temperature and air temperature to maintain the desired thermal comfort level. The new system not only increases the robustness of the controller, also renders a structure for a fully automatic (with minimal human intervention) climate control system.

Smart temperature-controlled infant car seat using thermoelectric devices Author: Roshni Senthilkumar, Mohamed Al Musleh

The thermal comfort for children and adults inside the car is a crucial issue to improve as the hot environmental conditions can be irritable and uncomfortable. Being inside an extremely hot car for a prolonged time can lead to major health problems. This paper focuses on the thermal comfort of infants. Traditionally air conditioning systems are used to cool down an infant car seat which is not effective due to the portability and cooling duration. In this paper, heat relief for the child is researched using a thermoelectric cooling system. This paper reviews various factors concerning the development of a temperature-controlled infant car seat.

This study focuses on the health and safety of children inside the cars, the subjective needs of the parent, heat management in the car cabin environment, thermoelectric modeling, and the methods for precise temperature control for effective

thermoelectric cooling. In-depth research has been conducted on the contributions of other researchers on the thermoelectric cooling system in a car.

IoT based Smart Vehicle Ignition and Monitoring System Author: Fathima Jabeen; Sudhir Rao Rupanagudi; Varsha G Bhat

With the advancements in technology, several smart innovations are being introduced by automobile manufacturers across the world to enhance their product portfolio. These can vary from implementing simple solutions such as navigation systems, to more complex ones such as driver assistance systems, which in turn could monitor multiple parameters of the vehicle in order to assist the driver. This paper focuses on one such driver assistance solution which not only intimates the driver on the well-being of his or her car but also adds additional layers of security to that can prevent vehicular theft. Keeping in mind driver safety, the paper also proposes an idea to prevent the vehicle from starting in case of alcohol consumption by the driver and also incorporates an emergency alert system in case of accidents.

Eye Blinking Monitoring System for Vehicle Accident Prevention AUTHOR: Jayamala K. Patil and Lego G. Mathew.

Most road accidents occur due to careless driving of drivers because of drowsiness. This paper provides Eye Blink Monitoring System (EBM) that will alert the driver in drowsiness. A system for monitoring eye movements would be useful in warning drivers when they fall asleep. The driver's eye is continuously monitored using an IR sensor. The normal eye blink rate will have no effect on the output of the system. If Driver fell asleep, then IR sensor receives abnormal blinking rate & an alarm will ring, to wake him/her up. The sensor part of the EBM system is implemented as a goggle. This goggle is to be worn by the driver while driving the vehicle.

Design And Construction OF Vehicle Accident Prevention System Using Eye Blink Sensor Author: Mohammed Okoe Alhassan, Stephen Eduku.

Vehicle accidents are recently increasing at a fast rate and diverse technologies are being introduced to minimized vehicular accidents. This paper relate to systems for determining a driver's state of alertness and drowsiness, hence the need for design and construction of vehicle accident prevention system using eye blink sensor with an automatic braking system for alertness monitoring and drowsiness detection. This paper provide means of accident prevention system using eye blink sensor and automatic braking system to ensure that the vehicle gradually comes to a halt when drowsiness is detected and the driver fails to respond to the warning signal from the buzzer within the stipulated time.

The hazard warning lights of the vehicle are also activated to alert other road users especially drivers behind during the stipulated time before the vehicle comes to a

halt. Software package (Proteus) and programming language c + + were used to validate the model of the vehicle accidents prevention system using eye blink sensor and live wire software was used in the circuit design. Microsoft Excel was the statistical tool used in analyzing the experimental results. It was observed from the results that the vehicle accidents prevention system using eye blink sensor with automatic braking system is an effective technology for vehicle accidents prevention due to drowsiness. The design and construction of the vehicle accident prevention using eye blink sensor and automatic breaking system with the aim of solving the problem of inability of the existing system (technology) to come to a halt when drowsiness is detected was successfully implemented.

Accident Prevention System Using Eye Blink Sensor AUTHOR: Mahesh M A N I K Kumbhar.

This system designs the scene of the accident alarm system based on ARM and GPS. When the accident occurred, the manual and automatic alarm can be realized. Vehicles state and user information as well as alarm locations will be transmitted to the Pre-set of treatment centre; after receiving related alarming information, the treatment centre will display this information on its map. After receiving alarm information, the treatment Centre staffs who are on duty will notice the handler who is the nearest to the scene of the accident in time, in order to reach the scene of accident in the first time, and gain more treatment time for the accident injured, and lower the accident mortality, as well as reduce incidents impacting time on the traffic.

Arduino Based Accident Prevention System Using Eye Blink Sensor.

Author: C.K. Shejwal, Mr. V.V. Mhaske, Mr. S.C Thorat, Miss. J.D. Chavhan.

This paper aims to create a framework to keep the car safe and secure through critical activity. When we run in ignorance we cannot take care of our own. If we make all vehicles with an automatic safety system that gives the driver a high level of protection, an alarm will also be issued. The device has an installed a eye blink sensor. Once the driver has started the engine, the sensors automatically detect the blink of eye. On this device the output of the sensor is provided for comparison with ARDUINO. When the value reaches the set level, the buzzer automatically vibrates, the LED glows, and the car stops automatically when eye blink sensor receives a signal from the transmission module

Accident Prevention Using Eye Blinking and Head Movement AUTHOR: Abhi R. Varma, Seema V. Arote, Chetna Bharti, Kuldeep Singh.

This paper describes a real-time online prototype driverfatigue monitor. It uses remotely located charge-coupleddevice cameras equipped with active infrared illuminators to acquire video images of the driver. Various visual cues that can be vary typically characterize the level of alertness of a person are extracted in real time and

systematically combined to infer the fatigue level of the driver. The visual cues employed characterize eyelid movement, gaze movement, head movement, and facial expression. A probabilistic model is developed to model human fatigue and to predict fatigue based on the visual cues obtained. The simultaneous use of multiple visual cues and their systematic combination yields a much more robust and accurate fatigue characterization than using a single visual cue. This system was validated under real-life conditions with human subjects of different ethnic backgrounds, genders, and ages; with/without glasses; and under different illumination conditions. It was found to be reasonably robust, reliable, and accurate in fatigue characterization.

An innovative prototype to prevent accidents using eye blink sensors and accelerometer ADXL330. AUTHOR: Madhumanti Maiti; Tanaya Banerjee; Kalyan Chatterjee .

Driver operation can be best studied from changes in physiological signals like heartbeat, brainwave, eye blink etc. This paper describes a prototype of a driver fatigue monitor. A low cost charge-coupled-device camera equipped with active infrared illuminators which acquires video images of the driver. Image is divided into blocks by image processing technique to detect blinks and according to the condition prevailing the alarm buzz is generated and vehicle is halted by the auto-brake system. Similarly, head movement of the driver is monitored with an accelerometer headgear to detect drowsiness in the driver. On detecting so, the speed of the vehicle is controlled, alert is raised through audio speakers, and messages are sent to the driver's mobile. We, the authors want to propose the idea of implementing speed control in the car, when drowsiness is detected in the driver by the eye blink sensor, recording the blinking of eye, and accelerometer, detecting head movements of the driver.

2.1 EXISTING SYSTEM

The normal blinking rate of eye is 20 closures per minutes. It will not have any effect on the performance of the system . When the driver falls asleep, his/her eyes will be closed; hence less light will be reflected from the skin part of the eye (as it is opaque). This produces maximum output of op-Amp. The op-amp output is given to micro-controller, which treats it as logic 1. The Arduino UNO controller will wait for 3 seconds. Then if it finds that the eyes are still closed, Arduino UNO controller sounds the buzzer. The status of operation will be using liquid crystal display (LCD).

Disadvantages

- Difficult to calibrate using common units of eye blink measurement. (e.g. mm of eyelid displacement) .
- The signal is proportional to the exposed area of the eyeball. Independent measurements of the individual eyelids are not possible.

CHAPTER - 3

PROPOSED SYSTEM

The eye-blink detector works by illuminating the attention and/or lid space with infrared, then monitoring the changes in the reflected light using a phototransistor and differentiator circuit. The exact functionality depends greatly on the positioning and aiming of the emitter and detector with respect to the eye. To test detector simply want power the detector by connect 2 wires +5V and GND. You can leave the output wire because it is. When Eye closed LED is off the output is at 0V. Put Eye blink sensor glass on the face within 15mm distance, and you can view the LED blinking on each Eye blink. The output is active high for Eye shut and may incline on to Nodemcu controller for interfacing applications.

Advantages:

- Simple setup.
- Remote detection - no mechanical contact with eye.
- Stray visible and IR light not affected.
- Our system does not require the restraint of the external eyelids.
- Head movement not affected.
- Excellent frequency characteristics (DC to more than 500 Hz). Excellent working distance (15-25 mm).

BLOCK DIAGRAM

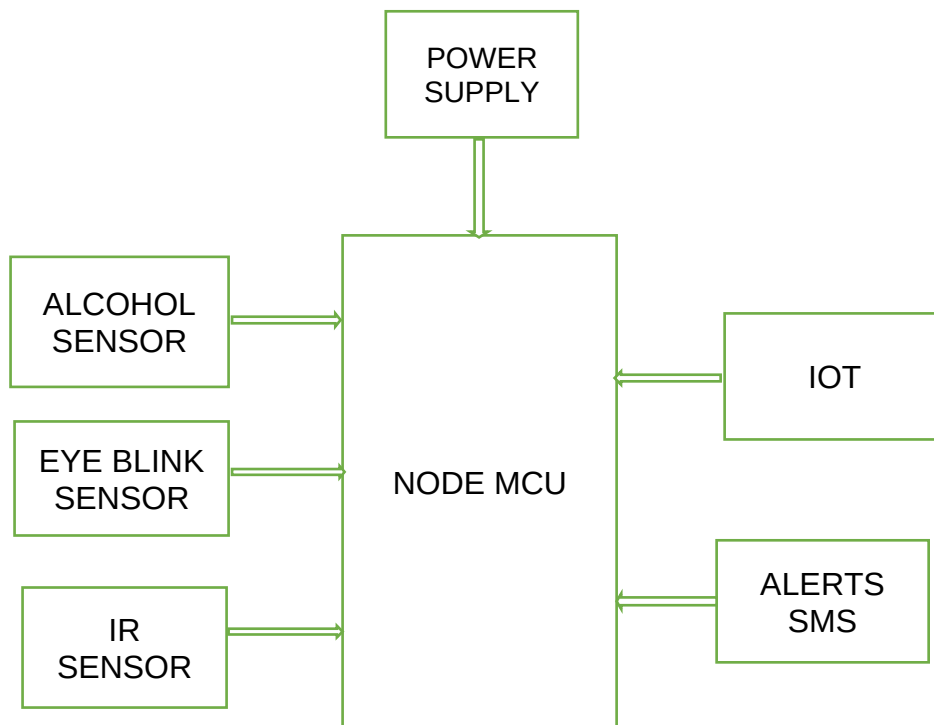


Fig no 3.1.1 Block diagram of eye blinking monitoring system

The eye-blink detector works by illuminating the attention and/or lid space with infrared, then monitoring the changes in the reflected light using a phototransistor and differentiator circuit. The exact functionality depends greatly on the positioning and aiming of the emitter and detector with respect to the eye. To test detector simply want power the detector by connect 2 wires +5V and GND. You can leave the output wire because it is. When Eye closed LED is off the output is at 0V. Put Eye blink sensor glass on the face within 15mm distance, and you can view the LED blinking on each Eye blink. The output is active high for Eye shut and may incline on to Nodemcu controller for interfacing applications.

IOT

The Future Internet goal is to provide an infrastructure to have an immediate access to information about the physical world and its objects. Physical objects can be applicable to different application domains, such as e-health, warehouse management, etc. Each application domain may have different types of physical devices. Each physical device can have its own specifications, which is required to use in order to interact with it. To achieve the future Internet goal, a layered vision is required that can facilitate data access. Internet of Things (IoT) is a vision that aims to integrate the virtual world of information to the real world of devices through a layered architecture.

The term „Internet of Things“ consists of two words, namely Internet and Things. Internet refers to the global network infrastructure with scalable, configurable capabilities based on interoperable and standard communication protocols. Things are physical objects or devices, or virtual objects, devices or information, which have identities, physical attributes and virtual personalities, and use intelligent interfaces [1]. For instance, a virtual object can represent an abstract unit of sensor nodes that contains metadata to identify and discover its corresponding sensor nodes. Therefore, IoT refers to the things that can provide information from the physical environment through the Internet.

Middleware is as an interface between the hardware layer and the application layer, which is responsible for interacting with devices and information management [2]. The role of a middleware is to present a unified programming model to interact with devices. A middleware is in charge of masking the heterogeneity and distribution problems that we face when interacting with devices [3].

IoT-based system is in charge of providing knowledge from an environment to an non-expert user. IoT-based system can be used in different environments, so it needs to be able to address many heterogeneous devices. Thus, a major concern within developing an IoT- based system is how to handle the interaction with the heterogeneous devices for non-expert users. This concern can be addressed by a middleware layer between devices and non-expert users. This layer is responsible to

hide the diversity of devices from the user perspective, and provides access transparency to the devices for the end users.

3.1. IoT definition

In this section, we explain some of the IoT definitions. Also, we explain the layered architecture for IoT. Internet of Things (IoT) has increasingly gained attention in industry to interact with different types of devices. IoT can have influence on industry and society by integrating physical devices into information networks [8]. IoT impacts can be on different perspectives, namely for private and business users. From the perspective of a private user, IoT has effect on both working and personal fields, such as smart homes and offices, e-health and assisted living.

From the aspect of a business user the impacts would be in fields such as automation and industrial manufacturing, logistics, business process management, intelligent transportation of people and goods [9] IoT integrates physical things into information networks. IoT covers the overall infrastructure, including software, hardware and services, which is used to support these information networks.

The integrated physical things can exchange data about the physical properties and information that they sense in their environment. To identify devices, we can use identification technologies like for example RFID, which allow each device be uniquely identified.

Telecommunication Union (ITU) 1 defines IoT as “A global infrastructure for the Information Society, enabling advanced services by interconnecting (physical and virtual) things based on, existing and evolving, interoperable information and communication technologies”.

Internet of Things-Architecture 2 (IoT-A) defines it as “The idea of a globally interconnected continuum of devices, objects and things in general emerged with the RFID technology, and this concept has considerably been extended to the current vision that envisages a plethora of heterogeneous objects interacting with the physical environment.”

IoT has a layered architecture designed to answer the demands of various industries, enterprises and society. Fig. 2.1 shows a generic layered architecture for IoT that consist of five layers, which are discussed, in the following.

Edge Technology layer

This is a hardware layer that consists of embedded systems, RFID tags, sensor networks and all of the other sensors in different forms. This hardware layer can perform

several functions, such as collecting information from a system or an environment, processing information and supporting communication.

Access Gateway layer

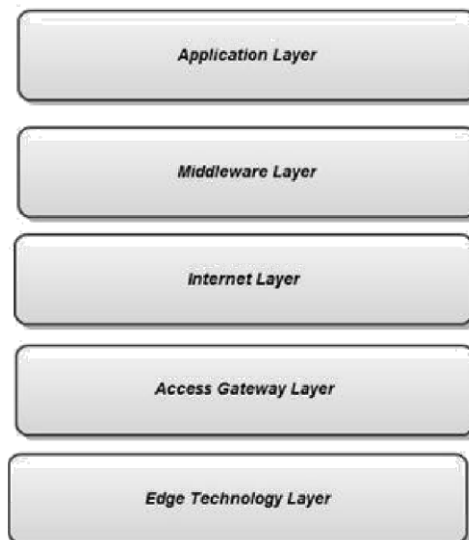
This layer is concerned with data handling, and is responsible for publishing and subscribing the services that are provided by the Things, message routing, and hovelling the communication between platforms.

Middleware layer

This layer has some critical functionalities, such as aggregating and filtering the received data from the hardware devices, performing information discovery and providing access control to the devices for applications.

Application layer

This layer is responsible for delivering various application services. These services are provided through the middleware layer to different applications and users in IoT-based systems. The application services can be used in different industries such as, logistics, retail, healthcare, etc.



3.2. Industrial IoT

Industrial IoT (IIoT) refers to the application of IoT technology in industrial settings, especially with respect to instrumentation and control of sensors and devices that engage cloud technologies. Refer to thisTitanusecasePDFfora goodexample of IIoT. Recently, industries have used machine-to-machine communication (M2M) to achieve wireless automation and control. But with the emergence of cloud and allied technologies (such as analytics and machine learning), industries can achieve a new

automation layer and with it create new revenue and business models. IIoT is sometimes called the fourth wave of the industrial revolution, or Industry 4.0.

The following are some common uses for IoT:

1. Smart manufacturing
2. Connected assets and preventive and predictive maintenance
3. Smart power grids
4. Smart cities
5. Connected logistics
6. Smart digital supply chains.

3.3. Industries that can benefit from IoT

Organizations best suited for IoT are those that would benefit from using devices.

Manufacturing

Manufacturers can gain a competitive advantage by using production-line monitoring to enable proactive maintenance on equipment when sensors detect an impending failure. Sensors can actually measure when production output is compromised. With the help of sensor alerts, manufacturers can quickly check equipment for accuracy or remove it from production until it is repaired. This allows companies to reduce operating costs, get better uptime, and improve asset performance management.

Automotive

The automotive industry stands to realize significant advantages from the use of IoT applications. In addition to the benefits of applying IoT to production lines, sensors can detect impending equipment failure in vehicles already on the road and can alert the driver with details and recommendations.

Thanks to aggregated information gathered by IoT-based applications, automotive manufacturers and suppliers can learn more about how to keep cars running and car owners informed.

Transportation and Logistics

Transportation and logistics systems benefit from a variety of IoT applications. Fleets of cars, trucks, ships, and trains that carry inventory can be rerouted based on weather conditions, vehicle availability, or driver availability, thanks to IoT sensor data. The inventory itself could also be equipped with sensors for track-and-trace and temperature-control monitoring.

The food and beverage, flower, and pharmaceutical industries often carry temperature-sensitive inventory that would benefit greatly from IoT monitoring

applications that send alerts when temperatures rise or fall to a level that threatens the product.

Retail

IoT applications allow retail companies to manage inventory, improve customer experience, optimize supply chain, and reduce operational costs. For example, smart shelves fitted with weight sensors can collect RFID-based information and send the data to the IoT platform to automatically monitor inventory and trigger alerts if items are running low. Beacons can push targeted offers and promotions to customers to provide an engaging experience.

Public Sector

The benefits of IoT in the public sector and other service-related environments are similarly wide-ranging. For example, government-owned utilities can use IoT-based applications to notify their users of mass outages and even of smaller interruptions of water, power, or sewer services. IoT applications can collect data concerning the scope of an outage and deploy resources to help utilities recover from outages with greater speed.

Healthcare

IoT asset monitoring provides multiple benefits to the healthcare industry. Doctors, nurses, and orderlies often need to know the exact location of patient assistance assets such as wheelchairs.

When a hospital's wheelchairs are equipped with IoT sensors, they can be tracked from the IoT asset-monitoring application so that anyone looking for one can quickly find the nearest available wheelchair. Many hospital assets can be tracked this way to ensure proper usage as well as financial accounting for the physical assets in each department.

General Safety Across All Industries

In addition to tracking physical assets, IoT can be used to improve worker safety. Employees in hazardous environments such as mines, oil and gas fields, and chemical and power plants, for example, need to know about the occurrence of a hazardous event that might affect them.

When they are connected to IoT sensor-based applications, they can be notified of accidents or rescued from them as swiftly as possible. IoT applications are also used for wearables that can monitor human health and environmental conditions. Not only do these types of applications help people better understand their own health, they also permit physicians to monitor patients remotely. . Many hospital assets can be

tracked this way to ensure proper usage as well as financial accounting for the physical assets in each department.

3.4. IoT Applications

Business-ready, SaaS IoT Applications

IoT Intelligent Applications are prebuilt software-as-a-service (SaaS) applications that can analyze and present captured IoT sensor data to business users via dashboards. We have a full set of IoTIntelligentApplications. IoTapplications use machine learning algorithms to analyze massive amounts of connected sensor data in the cloud. When a hospital's wheelchairs are equipped with IoT sensors, they can be tracked from the IoT asset-monitoring application so that anyone looking for one can quickly find the nearest available wheelchair.

With cloud-based IoT applications, business users can quickly enhance existing processes for supply chains, customer service, human resources, and financial services. There's no need to recreate entire business processes.

IoT Applications in Agriculture

For indoor planting, IoT makes monitoring and management of microclimate conditions a reality, which in turn increases production. For outside planting, devices using IoT technology can sense soil moisture and nutrients, in conjunction with weather data, better control smart irrigation and fertilizer systems.

If the sprinkler systems dispense water only when needed, for example, this prevents wasting a precious resource. conditions a reality, which in turn increases production. For outside planting, devices using IoT technology can sense soil moisture and nutrients, in conjunction with weather data, better control smart irrigation and fertilizer systems. If the sprinkler systems dispense water only when needed, for example, this prevents wasting a precious resource.

IoT Applications in Consumer Use

For the private citizen, IoT devices in the form of wearables and smart homes make life easier. Wearables cover accessories such as Fitbit, smartphones, Apple watches, health monitors, to name a few. These devices improve entertainment, network connectivity, health, and fitness.

Smart homes take care of things like activating environmental controls so that your house is at peak comfort when you come home. Dinner that requires either an oven or a crockpot can be started remotely, so the food is ready when you arrive.

Security is made more accessible as well, with the consumer having the ability to control appliances and lights remotely, as well as activating a smart lock to allow the appropriate people to enter the house even if they don't have a key.

IoT Applications in Healthcare

First and foremost, wearable IoT devices let hospitals monitor their patients' health at home, thereby reducing hospital stays while still providing up to the minute real-time information that could save lives. In hospitals, smart beds keep the staff informed as to the availability, thereby cutting wait time for free space. Putting

IoT sensors on critical equipment means fewer breakdowns and increased reliability, which can mean the difference between life and death. Elderly care becomes significantly more comfortable with IoT. In addition to the above-mentioned real-time home monitoring, sensors can also determine if a patient has fallen or is suffering a heart attack.

IoT Applications in Insurance

Even the insurance industry can benefit from the IoT revolution. Insurance companies can offer their policyholders discounts for IoT wearables such as Fitbit. By employing fitness tracking, the insurer can offer customized policies and encourage healthier habits, which in the long run, benefits everyone, insurer, and customer alike.

IoT Applications in Manufacturing

The world of manufacturing and industrial automation is another big winner in the IoT sweepstakes. RFID and GPS technology can help a manufacturer track a product from its start on the factory floor to its placement in the destination store, the whole supply chain from start to finish. These sensors can gather information on travel time, product condition, and environmental conditions that the product was subjected to.

Sensors attached to factory equipment can help identify bottlenecks in the production line, thereby reducing lost time and waste. Other sensors mounted on those same machines can also track the performance of the machine, predicting when the unit will require maintenance, thereby preventing costly breakdowns.

IoT Applications in Retail

IoT technology has a lot to offer the world of retail. Online and in-store shopping sales figures can control warehouse automation and robotics, information gleaned from IoT sensors. Much of this relies on RFIDs, which are already in heavy use worldwide.

Mall locations are iffy things; business tends to fluctuate, and the advent of online shopping has driven down the demand for brick and mortar establishments.

However, IoT can help analyze mall traffic so that stores located in malls can make the necessary adjustments that enhance the customer's shopping experience while reducing overhead.

Speaking of customer engagement, IoT helps retailers target customers based on past purchases. Equipped with the information provided through IoT, a retailer could craft a personalized promotion for their loyal customers, thereby eliminating the need for costly mass-marketing promotions that don't stand as much of a chance of success.

Much of these promotions can be conducted through the customers' smartphones, especially if they have an app for the appropriate store

IoT Applications in Transportation

By this time, most people have heard about the progress being made with self-driving cars. But that's just one bit of the vast potential in the field of transportation. The GPS, which, if you think of it, is another example of IoT, is being utilized to help transportation companies plot faster and more efficient routes for trucks hauling freight, thereby speeding up delivery times.

There's already significant progress made in navigation, once again alluding to a phone or car's GPS. But city planners can also use that data to help determine traffic patterns, parking space demand, and road construction and maintenance.

IoT Applications in Utilities/Energy

IoT sensors can be employed to monitor environmental conditions such as humidity, temperature, and lighting. The information provided by IoT sensors can aid in the creation of algorithms that regulate energy usage and make the appropriate adjustments, eliminating the human equation (and let's face it, who of us hasn't forgotten?). On a larger scale, data gathered by the Internet of Things can be used to run municipal power grids more efficiently, analyzing factors such as usage.

Also, the sensors can help pinpoint outages faster, thereby increasing the response time of repair crews and decreasing blackout times to switch off lights in a room or turn down the thermostat?). With IoT-driven environmental control, businesses and private residences can experience significant energy savings, which in the long run, benefits everyone, including the environment!

IoT Applications in Wearables

From medical to fitness to GPS tracking, wearables serve a wide range of purposes. These IoT have more than doubled in the last three years.

The fitness bands monitor calorie expenditure, meters of distance covered, heartbeats per minute, blood oxygen level, and more. These IoT mostly come in the form of wristbands/watches. However, they can also appear as earbuds, clip-on devices, or smart fabric.

Other wearables include virtual glasses and GPS tracking belts. These small and energy-efficient devices equipped with sensors and software collect and organize data about users. Top companies like Apple, Google, Fitbit, and Samsung, are behind the introduction of the Internet of Things.

IoT Applications in Traffic Monitoring

A major contributor to the concept of smart cities, the Internet of Things is beneficial in vehicular traffic management in large cities. Using mobile phones as sensors to collect and share data from our vehicles via applications like Google Maps or Waze is an example of using IoT. It informs about the traffic conditions of the different routes, estimated arrival time, and the distance from the destination while contributing to traffic monitoring.

Traffic pattern analysis gives commuters a perfect idea of what might happen during peak hours. Thus, they will be better prepared to avoid traffic by being aware of possible alternatives.

IoT Applications in Fleet Management

The installation of IoT sensors in fleet vehicles has been a boon for geolocation, performance analysis, fuel savings, telemetry control, pollution reduction, and information to improve the driving of vehicles.

They help establish effective interconnectivity between the vehicles, managers, and drivers. They assure that both drivers and owners know all details about vehicle status, operation, and requirements. The introduction of maintenance alarms in real-time help skip the dependence on the drivers for their detection.

IoT Applications in Hospitality

Interesting improvements to the service quality have found their way with the application of the IoT to the hotel industry. The hassle-free automation of various

interactions, such as electronic keys sent directly to each guest's mobile devices, has brought about a transformation.

It provides easy check-out processes, immediate information on the availability of rooms, and quicker assignment of housekeeping tasks while disabling the operation of doors.

The guests' location, sending offers on activities of interest, the realization of orders to the room, the automatic charge of accounts to the room, and more can easily be handled via integrated applications using IoT technology.

The hassle-free automation of various interactions, such as electronic keys sent directly to each guest's mobile devices, has brought about a transformation.

IoT Applications in Smart Grid and Energy Saving

From intelligent energy meters to the installation of sensors at strategic places from the production plants to the distribution points, IoT technology is behind better monitoring and effective control of the electrical network.

A smart grid is a holistic solution employing Information Technology to reduce electricity waste and cost, improving electricity efficiency, economics, and reliability. .

IoT Applications in Water Supply

When incorporated externally into water meters, a sensor connected to the Internet accompanied by software helps in the seamless collection, processing, and analysis of data, allowing a better understanding of consumer patterns, fault detection in the supply service, and result reporting.

Simultaneously, they offer end users to track their consumption information via app or web page in real-time. Automatic alerts that detect consumption out of the average range record, indicating the presence of a leak, have immensely contributed to water saving.

IoT Applications in Maintenance Management

Maintenance management is one of those areas where the application of IoT technology is most extensive. Sensors and software specialized in EAM/CMMS maintenance management provide a multifunctional tool applicable to many disciplines. It helps extend the functional life of physical assets, guaranteeing availability and reliability.

Real-time monitoring of physical assets enables the determination of instances when a measurement gets out of range and demands condition-based maintenance (CBM) or AI application to predict a failure.

IoT Applications in Smart Home

Every second there are 127 new smart home devices connected to the Internet. Some popular ones include Google Home, Philips Hue Lighting System, and Amazon Echo Plus.

IoT allows you to connect all your home applications like air conditioners, lighting, locks, thermostat, theft alarm systems, and whatnot into a single system and have the control at your fingertips with a smartphone.

It is predicted that by 2023, 309M homes worldwide will have smart systems installed. Their popularity is on the rise as they provide the complete freedom to personalize a home.

IoT Applications in Smart Pollution Control

IoT has helped address the major issue of pollution. It enables controlling the pollution levels to more breathable standards. Data related to city pollution such as vehicular emissions, pollen levels, weather, airflow direction, traffic levels, and more are collected using sensors in combination with IoT. This data is then used with Machine Learning algorithms to forecast pollution in various areas and inform city officials of the potential problems beforehand. Green Horizons project by IBM's China Research Lab is an example of an IoT application for pollution control.

IoT Applications in Smart Cities

IoT has already made several cities more efficient such that they need fewer resources and have increased energy efficiency.

A combination of sensors in different capacities throughout the city for various tasks such as managing the traffic, handling waste management, optimizing streetlights, saving water, monitoring energy expenditure, creating smart buildings, and more. Some best examples of cities working on becoming smarter with IoT include Singapore, Oslo, Geneva, and Zurich. A combination of sensors in different capacities throughout the city for various tasks such as managing the traffic, handling waste management, optimizing streetlights, saving water, monitoring energy expenditure, creating smart buildings, and more.

IoT Applications in Water and Waste Management

Water treatment units for water recycling have helped immensely in water management. The use of IoT makes them more efficient as one can see how much wastewater is being produced, the consumption of water in a specific area, and changes in waste production over time.

With a smart waste management system, it gets handy to predict waste quantities in a specific location. Consequently, authorities can plan how to process it, when to clear it, and how to interpret the data for future planning. City upgrade projects will pick up the pace when analytics solutions and data obtained are combined, which would bring about transformations.

CHAPTER - 4

HARDWARE DISCRIPTION

NODE MCU

The NodeMCU (*Node MicroController Unit*) is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Espressif Systems, contains the crucial elements of a computer: CPU, RAM, networking (WiFi), and even a modern operating system and SDK. That makes it an excellent choice for Internet of Things (IoT) projects of all kinds. However, as a chip, the ESP8266 is also hard to access and use. You must solder wires, with the appropriate analog voltage, to its pins for the simplest tasks such as powering it on or sending a keystroke to the “computer” on the chip. You also have to program it in low-level machine instructions that can be interpreted by the chip hardware.

This level of integration is not a problem using the ESP8266 as an embedded controller chip in mass-produced electronics. It is a huge burden for hobbyists, hackers, or students who want to experiment with it in their own IoT projects. But, what about Arduino? The Arduino project created an open-source hardware design and software SDK for their versatile IoT controller. Similar to NodeMCU, the Arduino hardware is a microcontroller board with a USB connector, LED lights, and standard data pins. It also defines standard interfaces to interact with sensors or other boards. But unlike NodeMCU, the Arduino board can have different types of CPU chips (typically an ARM or Intel x86 chip) with memory chips, and a variety of programming environments.

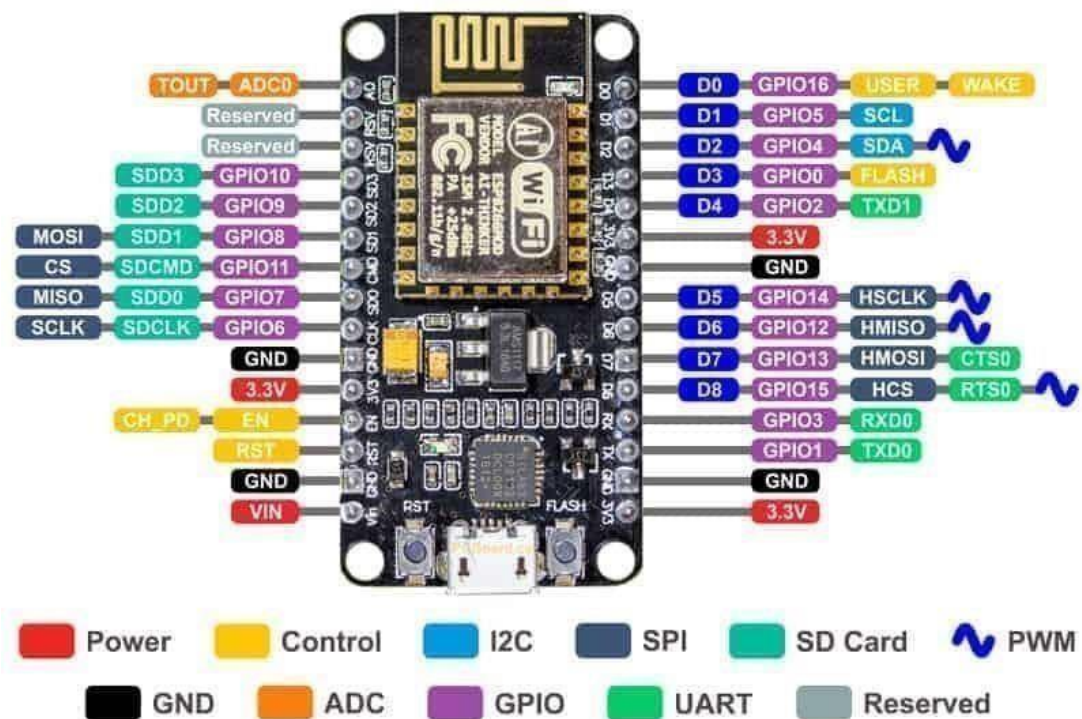
There is an Arduino reference design for the ESP8266 chip as well. However, the flexibility of Arduino also means significant variations across different vendors. For example, most Arduino boards do not have WiFi capabilities, and some even have a serial data port instead of a USB port. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term “Node MCU” by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson and SPIFFS.

Node MCU was created shortly after the ESP8266 came out. On December 30, 2013, Espressif Systems [6] began production of the ESP8266. The ESP8266 is a WiFi SoC integrated with a Tensilica Xtensa LX106 core, [citation needed] widely used in IoT applications (see related projects). NodeMCU started on 13 Oct 2014, when Hong committed the first file of nodemcu-firmware to GitHub.

The project expanded to include an open-hardware platform when developer Huang R committed the gerber file of an ESP8266 board, named devkit v0.9. Later that month, Tuan PM ported MQTT client library from Contiki to the ESP8266 SoC platform, and committed to NodeMCU project, then Node MCU was able to support the MQTT IoT protocol, using Lua to access the MQTT broker. Another important update was made on 30 Jan 2015, when Devsaurus ported the u8glib to Node MCU project, enabling Node MCU to easily drive LCD, Screen, OLED, even VGA displays.

In summer 2015 the creators abandoned the firmware project and a group of independent contributors took over. By summer 2016 the NodeMCU included more than 40 different modules. Due to resource constraints users need to select the modules relevant for their project and build a firmware tailored to their needs.

NodeMCU Pinout and Functions Explained



POWER PINS: There are four power pins. VIN pin and three 3.3V pins.

- **VIN** can be used to directly supply the NodeMCU/ESP8266 and its peripherals.
- Power delivered on **VIN** is regulated through the onboard regulator on the Node
- **3.3V** pins are the output of the onboard voltage regulator and can be used to supply power to external components.

GND : are the ground pins of NodeMCU/ESP8266 are used to connect I2C.

I2C PINS : sensors and peripherals. Both I2C Master and 12C I2C Slave are supported.

GPIO PINS : Node MCU/ESP8266 has 17 GPIO pins which can be assigned to functions such as I2C, I2S, UART, IR Remote Control, LED Light and Button programmatically. Each digital enabled GPIO can be configured to internal pull-up or pull-down, or set to high impedance. When configured as an input, it can also be set to edge-trigger or level trigger to generate CPU interrupts.

ADC CHANNEL : The NODE MCU is embedded with a 10-bit precision SAR ADC. The two functions can be implemented using ADC. Testing power supply voltage of VDD3P3 pin and testing input voltage of TOUT pin. However, they cannot be implemented at the same time.

UART PINS : NodeMCU/ESP8266 has 2 UART interfaces (UART0 and UART1) which provide asynchronous communication (RS232 and RS485), and can communicate at up to 4.5 Mbps. UART0 (TXD0, RXD0, RST0 & CTS0 pins) can be used for communication. However, UART1 (TXD1 pin) features only data transmit signal so, it is usually used for printing log.

ESP8266 Arduino Core

As Arduino.cc began developing new MCU boards based on non-AVR processors like the ARM/SAM MCU and used in the Arduino Due, they needed to modify the Arduino IDE so that it would be relatively easy to change the IDE to support alternate toolchains to allow Arduino C/C++ to be compiled for these new processors. They did this with the introduction of the Board Manager and the SAM Core.

Introduction

Node MCU is an open source LUA based firmware developed for ESP8266 wifi chip. By exploring functionality with ESP8266 chip, Node MCU firmware comes with ESP8266 Development board/kit i.e. Node MCU Development board. NodeMCU is an open source firmware for which open source prototyping board designs are available. The name "NodeMCU" combines "node" and "MCU" (micro-controller unit).^[8] Strictly speaking, the term "NodeMCU" refers to the firmware rather than the associated development kits.

The firmware uses the Lua scripting language. The firmware is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson^[9] and SPIFFS.^[10] Due to resource constraints, users need to select the modules relevant for their project and build a firmware tailored to their needs. Support for the 32-bit ESP32 has also been implemented.

. NodeMCU is an open source firmware for which open source prototyping board designs are available. The name "NodeMCU" combines "node" and "MCU" (micro-controller unit).^[8] Strictly speaking, the term "NodeMCU" refers to the firmware rather than the associated development kits

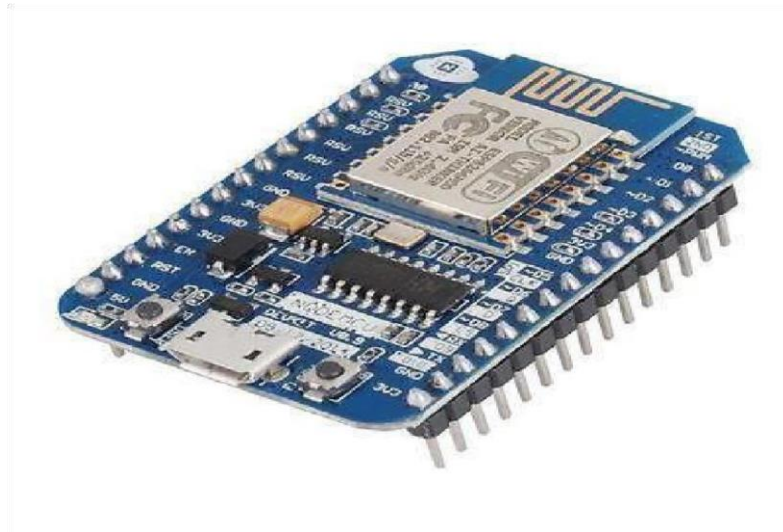


Fig no 4.1 Node MCU chip

NodeMCU Development Board/kit v0.9 (Version1)

Since Node MCU is open source platform, their hardware design is open at for edit/modify/build. Node MCU Dev Kit/board consist of ESP8266 wifi enabled chip. The **ESP8266** is a low-cost Wi-Fi chip developed by Espressif Systems with TCP/IP protocol. For more information about ESP8266, you can refer ESP8266 IS WIFIModule.



Fig no 4.2 Node MCU Development Board v1.0

NodeMCU Development Board/kit v1.0 (Version2)

For more information about NodeMCU Boards available 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 can connect it with serial devices like I2C enabled LCD display, Magnetometer HMC5883, MPU-6050 Gyro meter + Accelerometer, RTC chips, GPS modules, touch screen displays, SD cards etc.

How to start with NodeMCU?

NodeMCU Development board is featured with wifi capability, analog pin, digital pins and serial communication protocols. To get start with using NodeMCU for IoT applications first we need to know about how to write/download NodeMCU firmware in NodeMCU

Development Boards. And before that where this NodeMCU firmware will get as per our requirement. There is online NodeMCU custom builds available using which we can easily get our custom NodeMCU firmware as per our requirement. To know more about how to build custom NodeMCU firmware online and download it refer Getting started with NodeMCU.

How to write codes for NodeMCU?

After setting up ESP8266 with Node-MCU firmware, let's see the IDE (Integrated Development Environment) required for development of Node MCU

Node MCU with ESPlorer IDE

Lua scripts are generally used to code the Node MCU. Lua is an open source, lightweight, embeddable scripting language built on top of C programming language. For more information about how to write Lua script for Node MCU refer Getting started with Node MCU using ESPlorer IDE Node MCU with Arduino IDE

Here is another way of developing Node MCU with a well-known IDE i.e. Arduino IDE. We can also develop applications on Node MCU using Arduino development environment. This makes easy for Arduino developers than learning new language and IDE for Node MCU. For more information about how to write Arduino sketch for Node MCU refer Getting started with Node MCU using Arduino IDE

Difference in using ESPlorer and Arduino IDE

Well, there is a programming language difference we can say while developing application for Node MCU using ESPlorer IDE and Arduino IDE.

We need to code in C\C++ programming language if we are using Arduino IDE for developing NodeMCU applications and Lua language if we are using ESPlorer IDE.

Basically, the NodeMCU is Lua Interpreter, so it can understand Lua script easily. When we write Lua scripts for NodeMCU and send/upload it to NodeMCU, then they will get executes sequentially. It will not build binary firmware file of code for NodeMCU to write. It will send Lua script as it is to NodeMCU to get execute.

In Arduino IDE when we write and compile code, ESP8266 toolchain in background creates binary firmware file of code we wrote. And when we upload it to NodeMCU then it will flash all NodeMCU firmware with newly generated binary firmware code. In fact, it writes the complete firmware.

That's the reason why NodeMCU not accept further Lua scripts/code after it is getting flashed by Arduino IDE. After getting flashed by Arduino sketch/code it will be no more Lua interpreter and we got error if we try to upload Lua scripts. To again start with Lua script, we need to flash it with NodeMCU firmware.

Since Arduino IDE compile and upload/writes complete firmware, it takes more time than ESPlorer IDE.

Eyeblink Sensor

The eye blink sensor is an infrared sensor. It contains two parts. A transmitter and a receiver. The transmitter continuously emits infrared waves onto the eye.

While the receiver continuously looks for variations in the reflected waves which indicates that the eye has blinked. If the eye is closed that means it will give high output. If the eye is open then it will give a low output. This sensor can be used in a very different variety of robotics and mechatronics projects as it provides excellent results and is very economical.

The main component of the Eye Blink Sensor is the infrared sensor. The infrared sensor contains two parts. An IR transmitter and an IR receiver. The IR transmitter emits infrared waves onto the eye. While the receiver continuously searches for variations in the reflected waves which indicates that the eye has blinked or not. If the eye is closed then reflected waves will be received by the IR Receiver and the output of the sensor would be low. If the eye is open then all the IR rays will be absorbed by the eye and the output of the eye blink sensor would be high.

Eyeblink Sensor can be used in a variety of applications including robotics and mechatronics projects as it provides excellent results and is very economic to buy.

Eye Blink Sensor is compatible with Arduino, Raspberry Pi, AVR, PIC and almost all other microcontrollers. The IR Variation Across the eye will vary as per eye blink. If the eye is closed output is low otherwise the output is high.

An infrared sensor includes two parts, the emitter (transmitter) & the receiver (receiver), so this is jointly called an optocoupler or a photo-coupler. Here, IR LED is used as a transmitter whereas the IR photodiode is used as a receiver for reflected IR radiations.

The photodiode we are using here in the eye blink sensor is very sensitive to the infrared light generated through an infrared LED adjacent to the photodiode. The resistance of photodiode & output voltage can be changed in proportion to the infrared light obtained. This is the fundamental IR sensor working principle for the eye blink sensor. The comparator IC we are using here on the eye blink sensor board is LM358. This IC will compare the signal coming from the photodiode or IR receiver and the potentiometer on the board. The range of the eye blink sensor you can set by rotating the blue colour potentiometer on the board.

There are two types of IR sensors, active and passive. Passive IR sensors have only the IR receiver, not the Transmitter. But active have both transmitter and receiver. Here we are using an active IR sensor.



Fig no 4.3 eye blink sensor

While the receiver continuously looks for variations in the reflected waves which indicates that the eye has blinked. If the eye is closed that means it will give high output. If the eye is open then it will give a low output. This sensor can be used in a very different variety of robotics and mechatronics projects as it provides excellent results and is very economical.

Firstly, stick the Arduino Nano onto the glasses with the help of the glue gun. While the receiver continuously looks for variations in the reflected waves which indicates that the eye has blinked. If the eye is closed that means it will give high output. If the eye is open then it will give a low output.

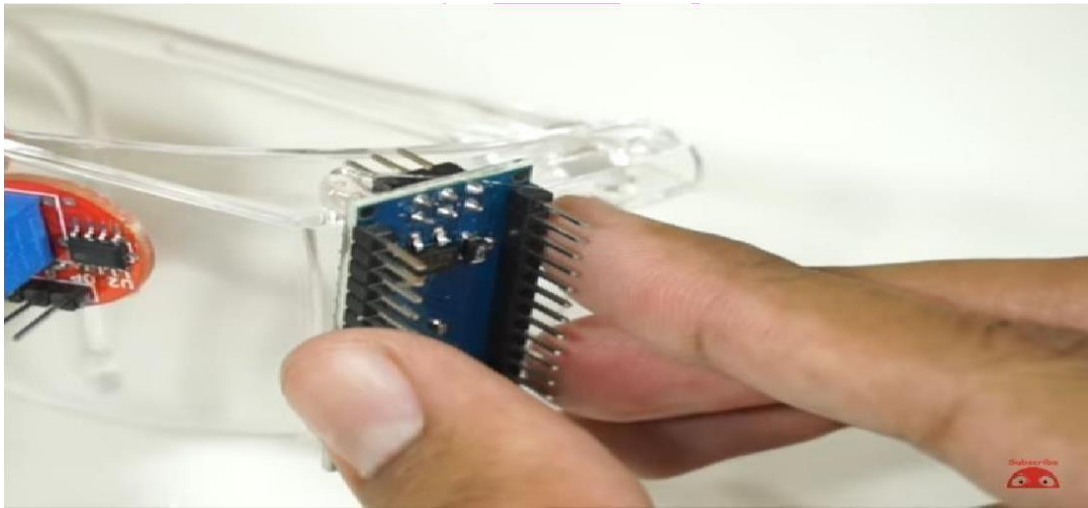


Fig no 4.4 fixing the Arduino Nano on to the glasses

Stick the buzzer onto the glasses.
 Connect the VCC to the Arduino Nano 5V pin.
 Connect the GND pin to the GND pin on Arduino.
 Connect the signal pin of the buzzerto the Arduino digital pin 2.



Fig no 4.5 Fixing the buzzer onto glasses

Stick the 9V battery to the other side of the glasses.
 Connect the negative terminal of the battery to the GND pin on Arduino.
 Connect the positive terminal of the battery to the VCC pin on Arduino.
 Add a switch between the power supply and Arduino.

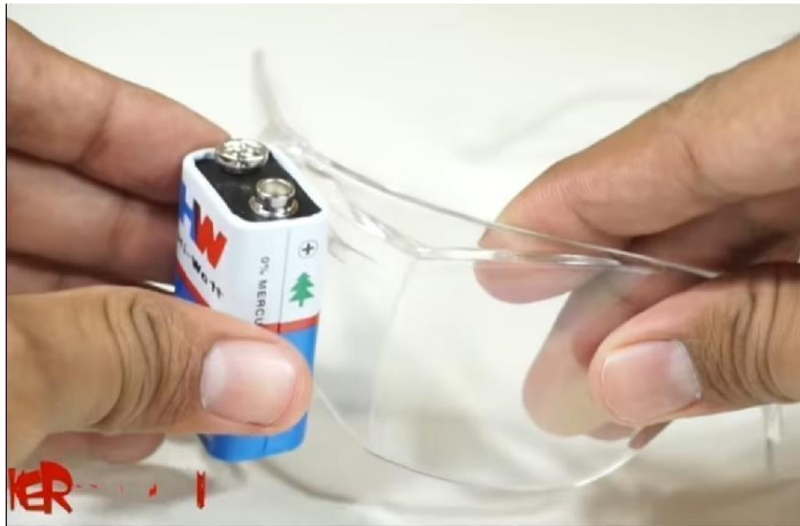


Fig no 4.6 Fixing the 9v battery on the other side of glasses

Working principle of the eye blink sensing system

The eye blinking system can be used for different purposes. First, let's look at the blink sensing system.

The eye blink sensor constantly sends infrared waves which are reflected and detected by the receiver. As soon as the eye blinks, the output changes, and this can be very useful to avoid accidents.

The Arduino sends the signal to the buzzer to make the noise. In this way, a blink is detected.

Another purpose for which this system can be used is called the driver drowsiness system. This system can be used to check if the driver might sleep during driving. This can be done with some minor changes in the Arduino code.

Instead of detecting blinks, the Arduino should give the command to buzz when the eyes of the driver are closed for more than 2-3 seconds depending upon your preference.

This system can be used with all modes of transports be it trains, ships, planes, cars, etc. This can be very useful to avoid accidents.

Another purpose of this system, it can be used in hospitals to check when patients gain consciousness. A patient when unconscious, has the eyes closed. So whenever they open their eyes, the buzzing sound can inform the nurse that the patient is awake. This can also be done with the help of some minor tweaks in the Arduino code.

The output of the sensor has to be constantly high in this case as the patient is unconscious. When the output goes low i.e. when the eyes of the patient open, that is when the Arduino should command the buzzer to ring. This works best for patients who are in a coma. The nurses can be easily informed with the help of this system.

An infrared sensor includes two parts, the emitter (transmitter) & the receiver (receiver), so this is jointly called an optocoupler or a photo-coupler. Here, IR LED is used as a transmitter whereas the IR photodiode is used as a receiver for reflected IR radiations.

The photodiode we are using here in the eye blink sensor is very sensitive to the infrared light generated through an infrared LED adjacent to the photodiode. The resistance of photodiode & output voltage can be changed in proportion to the infrared light obtained. This is the fundamental IR sensor working principle for the eye blink sensor. The comparator IC we are using here on the eye blink sensor board is LM358. This IC will compare the signal coming from the photodiode or IR receiver and the potentiometer on the board. The range of the eye blink sensor you can set by rotating the blue colour potentiometer on the board.

There are two types of IR sensors, active and passive. Passive IR sensors have only the IR receiver, not the Transmitter. But active have both transmitter and receiver. Here we are using an active IR sensor.

Applications of eye blink sensor

- It can be used to count the blinking of a person.
- It can be used to keep a check on the driver and make sure he/she is not drowsy.
- This can help avoid a lot of accidents.
- It can be used to know when a patient is awake or conscious.

Eye Blink Sensor Specification :

- Vin:12V
- Vout: 0 to 5V
- Iout:75mA
- Sensor: IR
- Sensitivity adjustment: Potentiometer
- Position of iris detected by IR
- Blinking of eye is exactly using comparators.

PRODUCT DESCRIPTION:

Senses eye blink using IR sensor, comparator and potentiometer. Location of iris is detected by one IR

sensor and output is given to one comparator.

- Comparator
- Potentiometer

- IR sensor
- Eyeball movement based Wheel chair for Handicapped persons
- Eye movement based PC control

MQ3 Alcohol Sensor

The MQ3 sensor is one of the most widely used in the MQ sensor series. It is a MOS (Metal Oxide Semiconductor) sensor. Metal oxide sensors are also known as Chemiresistors because sensing is based on the change in resistance of the sensing material when exposed to alcohol.

The MQ3 alcohol sensor operates on 5V DC and consumes approximately 800mW. It can detect alcohol concentrations ranging from 25 to 500 ppm. What does the concentration of 1 ppm mean? Parts-per-million, or ppm for short, is the most commonly used unit for measuring gas concentration. ppm is simply the ratio of one gas to another.



Fig no 4.7 MQ3 Alcohol Sensor

The MQ3 alcohol sensor operates on 5V DC and consumes approximately 800mW. It can detect alcohol concentrations ranging from 25 to 500 ppm. What does the concentration of 1 ppm mean? Parts-per-million, or ppm for short, is the most commonly used unit for measuring gas concentration. ppm is simply the ratio of one gas to another. For example, 500ppm of alcohol means that if you could count a million gas molecules, 500 would be alcohol and the remaining 999500 would be other gases.

An alcohol detector is a sensitive device which is able to detect the presence of alcohol molecules or any similar volatile inflammable element in the air and convert it into equivalent level of electrical output.

The simple alcohol detector circuit discussed here will accurately sense the emanation of alcohol gas from a selected source, such as from the mouth of a drunkard, when used as a breathalyzer. It's cheap and a useful device which can be used by all

authorized personnel such as a cops or traffic police for nabbing drunken drivers or miscreants.

Initially I thought of using an Arduino for the experiment, I uploaded the code in my Arduino Uno, but then realized it was simply not necessary since it could be effectively implemented with a simple LM3915 circuit, and therefore dropped the Arduino idea and proceeded with the design as described below.

Main Modules

The main circuit modules required for the proposed alcohol tester circuit are an LM3915 based LED bar graph circuit and an MQ-3 sensor module.

For my experiment I purchased the entire MQ module, but actually only the sensor is enough, and would do the job efficiently.

Regarding MQ-3 Module

A standard MQ-3 Alcohol Sensor module will basically consist of an orange MQ-3 sensor, and an LM393 based comparator circuit as shown below.

The operation of the module is pretty simple. When the sensor is brought near an alcohol or ethanol source, the voltage level at the input pin#2 of the comparator goes above the reference pin#3, causing the output to go low. The green LED illuminates to confirm the results.

Module Pinouts

The following image elaborately shows the specs and the working details of a standard sensor module pinouts:

LM3915 LED Bar Graph Indicator

In the present design we use the popular LM3915 bar graph LED circuit for detecting the alcohol level from the MQ-3 sensor.

The basic signal detector circuit diagram can be seen below. Now let's see how the MQ-3 sensor could be integrated with the above LED indicator circuit for implementing the proposed alcohol meter circuit.

How the Circuit Works

The working of the alcohol/ethanol detector meter is very straightforward.

When the MQ-3 sensor detects the presence of alcohol molecules, the voltage at its output pin begins rising.

Depending on the concentration of the alcohol or ethanol, the output voltage keeps rising and stabilizes at the highest detected level.

This rise in potential is captured by the input pin#5 of the LM3915 circuit and is appropriately interpreted by sequentially illuminating the attached 10 LED bar-graph meter.

Internal structure of MQ3 Alcohol Sensor

It ensures that the heater element inside the sensor does not cause an explosion because we are sensing flammable gas (alcohol).



Fig no 4.8 Internal structure of MQ3 alcohol sensor

It also protects the sensor and filters out suspended particles, allowing only gaseous elements to pass through the chamber. When the outer mesh is removed, the sensor looks like this. The sensing element and six connecting legs that extend beyond the Bakelite base form the starshaped structure. When the outer mesh is removed, the sensor looks like this.

The sensing element and six connecting legs that extend beyond the Bakelite base form the starshaped structure. The sensing element and six connecting legs that extend beyond the Bakelite base form the starshaped structure. When the outer mesh is removed, the sensor looks like this.

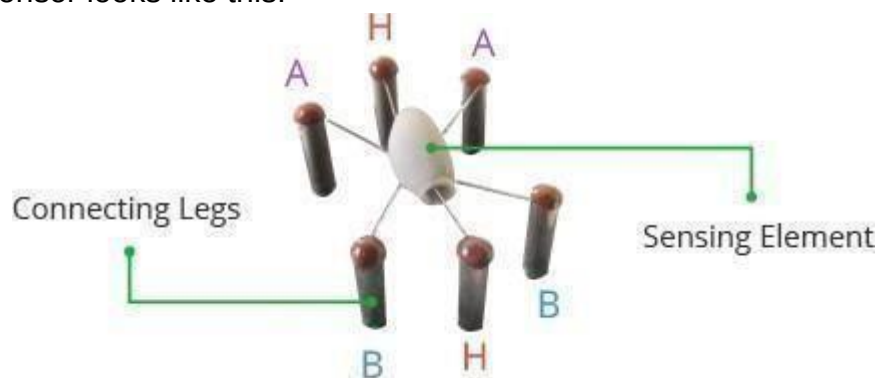


Fig no 4.9 Internal structure of MQ3 alcohol sensor

When the outer mesh is removed, the sensor looks like this. The sensing element and six connecting legs that extend beyond the Bakelite base form the starshaped structure. Two (H) of the six leads are in charge of heating the sensing

element and are linked together by a Nickel- Chromium coil (a well-known conductive alloy).

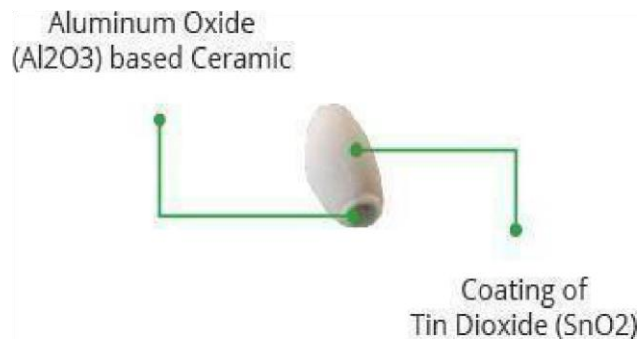


Fig no 4.10 Internal Structure of MQ3 alcohol sensor

The remaining four signal-carrying leads (A and B) are connected with platinum wires. These wires are connected to the body of the sensing element and convey slight variations in the current flowing through the sensing element.

The tubular sensing element is made of Aluminum Oxide (Al_2O_3) based ceramic with a Tin Dioxide coating (SnO_2). Tin Dioxide is the most important material because it is sensitive to alcohol. The ceramic substrate, on the other hand, improves heating efficiency and ensures that the sensor area is continuously heated to the working temperature.

To summarize, the Heating System is composed of a Nickel-Chromium coil and an Aluminum Oxide-based ceramic, while the Sensing System is composed of Platinum wires and a Tin Dioxide coating. Tin Dioxide is the most important material because it is sensitive to alcohol. The ceramic substrate, on the other hand, improves heating efficiency and ensures that the sensor area is continuously heated to the working temperature. These wires are connected to the body of the sensing element and convey slight variations in the current flowing through the sensing element.



Fig no 4.11 Tubular sensing element

How Does the MQ3 Alcohol Sensor Work?

When a SnO₂ semiconductor layer is heated to a high temperature, oxygen is adsorbed on the surface. When the air is clean, electrons from the conduction band of tin dioxide are attracted to oxygen molecules. This creates an electron depletion layer just beneath the surface of the SnO₂ particles, forming a potential barrier.

MQ3 Alcohol Sensor Module Hardware Overview

The MQ3 alcohol sensor is simple to use and has two different outputs. It not only provides a binary indication of the presence of alcohol, but also an analog representation of its concentration in air.

The module includes a potentiometer for adjusting the sensitivity of the digital output (D0). You can use it to set a threshold so that when the alcohol concentration exceeds the threshold value, the module outputs LOW otherwise HIGH. Rotating the knob clockwise increases sensitivity and counterclockwise decreases it.



Fig no 4.12 Hardware view of the MQ3 Alcohol Sensor

The sensor's analog output voltage (at the A0 pin) varies in proportion to the alcohol concentration. The higher the concentration of alcohol in the air, the higher the output voltage; the lower the concentration, the lower the output voltage. The animation below shows the relationship between alcohol concentration and output voltage. .

This analog signal is digitized by an LM393 High Precision Comparator and made available at the Digital Output (D0) pin

The module includes a potentiometer for adjusting the sensitivity of the digital output (D0). You can use it to set a threshold so that when the alcohol concentration exceeds the threshold value, the module outputs LOW otherwise HIGH. Rotating the knob clockwise increases sensitivity and counterclockwise decreases it.

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Fig no 4.13 LM393 High Precision Comparator

In addition, the module has two LEDs. The Power LED illuminates when the module is turned on, and the Status LED illuminates when the alcohol concentration exceeds the threshold value.

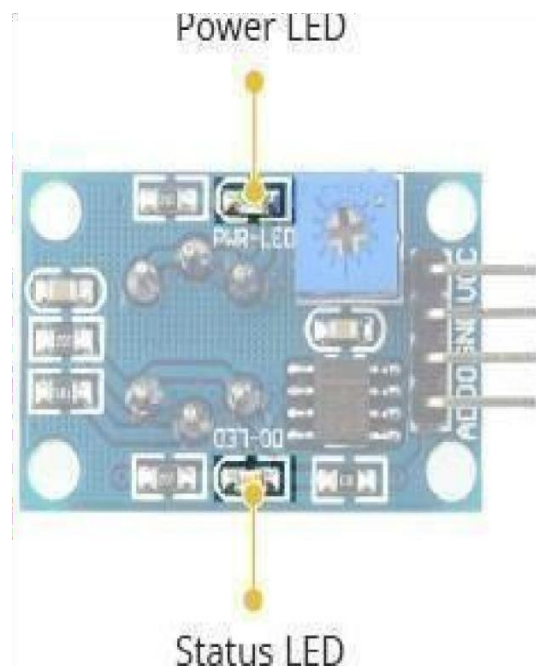


Fig no 4.14 A potentiometer for adjusting the sensitivity of the digital output (D0).

Technical Specifications

Here are the specifications:

- It requires a power supply of 5VDC
- Consumes 150mA current.
- Digital output Do: 0 and 1 TTL digital (0.1V and 5V).
- Analog output Ao: 0.1V to 0.3V (relates to pollution), voltage concentration is maximum of 4V.
- Alcohol Concentration detection: 0.05 mg/L to 10 mg/L.
- Interface: one TTL compatible input (HSW) and one TTL compatible output (ALR).
- Heater consumes: <750mW.
- Resistance of the heater: 33ohms $\pm$ 5%.
- Operating temperature: -10°C to 50°C (14°F to 122°F).
- Storage temperature: 20°C to 70°C.
- Load resistance is 200kilo ohms.
- Sensitivity R_s : ≥ 5 : $R_s(\text{in the air}) / R_s(0.4\text{mg/L Alcohol})$.
- Sensing resistance R_s : 1Mega ohms to 8Mega ohms @ 0.4mg/L alcohol.
- Sensor dimensions: 32x22x16mm.
- Humidity: <95%RH.
- Oxygen concentration: 21%
- Slope rate: ≤ 0.6 .
- Preheating duration: 20seconds.

MQ3 Alcohol Sensor Module Pinout

Let's take a look at the pinout now.

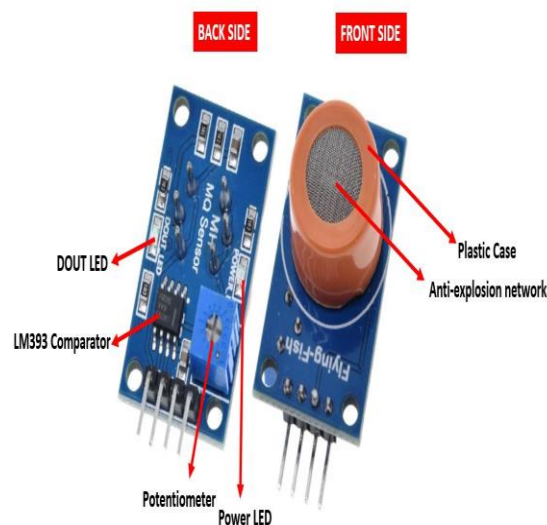


Fig no 4.15 MQ3 Alcohol Sensor Module Pinout

- VCC supplies power to the module. Connect it to the 5V output of your Arduino.
- GND is the ground pin.
- D0 indicates the presence of alcohol. D0 becomes LOW when the alcohol concentration exceeds the threshold value (as set by the potentiometer), and HIGH otherwise

IR Sensor:

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor.

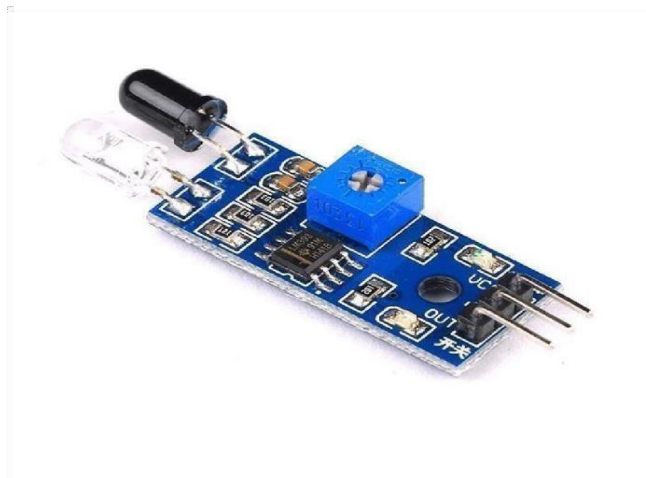


Fig no 4.16 IR Sensor

Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes that can be detected by an infrared sensor.

The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received.

Types of IR Sensor

There are two types of IR sensors are available and they are,

- Active Infrared Sensor
- Passive Infrared Sensor

Active Infrared Sensor

Active infrared sensors consist of two elements: infrared source and infrared detector. Infrared sources include the LED or infrared **laser diode**. Infrared detectors

include photodiodes or phototransistors. The energy emitted by the infrared source is reflected by an object and falls on the infrared detector.

Passive Infrared Sensor

Passive infrared **sensors** are basically Infrared detectors. Passive infrared sensors do not use any infrared source and detector. They are of two types: quantum and thermal. Thermal infrared sensors use infrared energy as the source of heat. **Thermocouples**, pyroelectric detectors and bolometers are the common types of thermal infrared detectors. Quantum type infrared sensors offer higher detection performance. It is faster than thermal type infrared detectors. The photo sensitivity of quantum type detectors is wavelength dependent.

IR Sensor Working Principle

There are different types of infrared transmitters depending on their wavelengths, output power and response time. An IR sensor consists of an IR LED and an IR Photodiode, together they are called as PhotoCoupler or OptoCoupler.

IR Transmitter or IR LED

Infrared Transmitter is a light emitting diode (LED) which emits infrared radiations called as IR LED's. Even though an IR LED looks like a normal LED, the radiation emitted by it is invisible to the human eye.

The picture of an Infrared LED is shown below.

IR Receiver or Photodiode

Infrared receivers or infrared sensors detect the radiation from an IR transmitter. IR receivers come in the form of photodiodes and phototransistors. Infrared Photodiodes are different from normal photo diodes as they detect only infrared radiation. Below image shows the picture of an IR receiver or a photodiode,

Different types of IR receivers exist based on the wavelength, voltage, package, etc. When used in an infrared transmitter – receiver combination, the wavelength of the receiver should match with that of the transmitter.

The emitter is an IR LED and the detector is an IR photodiode. The IR photodiode is sensitive to the IR light emitted by an IR LED. The photo-diode's resistance and output voltage change in proportion to the IR light received. This is the underlying working principle of the IR sensor.

When the IR transmitter emits radiation, it reaches the object and some of the radiation reflects back to the IR receiver. Based on the intensity of the reception by the IR receiver, the output of the **sensor** defines.

Applications of IR Sensor

IR sensors use in various projects and also in various electronic devices. They all are as follow,

Night Vision Devices

An Infrared technology implemented in **night vision equipment** if there is not enough visible light available to see unaided. Night vision devices convert ambient photons of light into electrons and then amplify them using a chemical and electrical process before finally converting them back into visible light.

Radiation Thermometers

IR sensors use in radiation **thermometers** to measure the temperature depend upon the temperature and the material of the object and these thermometers have some of the following features

- Measurement without direct contact with the object
- Faster response
- Easy pattern measurements

Infrared Tracking

An Infrared tracking or Infrared homing, is a missile guidance system which operates using the infrared **electromagnetic radiation** emitted from a target to track it.

IR Imaging Devices

IR image device is one of the major applications of IR waves, primarily by virtue of its property that is not visible. It uses for thermal imagers, **night vision devices** etc.

Other Key Application Areas

Other key application areas that use infrared sensors include:

- Climatology
- Meteorology
- Photobiomodulation
- Flame Monitors
- Gas detectors
- Water analysis
- Moisture Analyzers
- Anesthesiology testing
- Petroleum exploration
- Rail safety
- Gas Analyzers

Hope this article helps you to understand about the working principle of IR sensor and its application. To know more about IR sensor, you can refer the blog **Interfacing of IR Sensor with Arduino**.

IR Sensor Circuit Diagram and Working Principle

An infrared sensor circuit is one of the basic and popular sensor module in an electronic device. This sensor is analogous to human's visionary senses, which can be used to detect obstacles and it is one of the common applications in real time. This circuit comprises of the following components. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received.

LED (Light Emitting Diode).

Light emitting diodes, commonly called LEDs, are real unsung heroes in the electronics world. They do many different jobs in all kinds of devices. They form number on, transmit information from remote controls, light up watches that they are and tell you when your appliances are turned on. Collected together, they can form images or illuminate a traffic light. This energy is completely wasted unless you're using the lamp as a heater, because a huge portion of the available electricity isn't going toward producing visible light. Basically, LEDs are just tiny light bulbs that fit easily into an electrical circuit. But unlike incandescent bulbs, they don't have filaments that burn out, they use less electricity, and they don't get especially hot. They're illuminated solely by the movement of electrons in a semiconductor material, and they last just as long as a standard transistor. The life span of an LED surpasses the short life of an incandescent bulb by thousands of hours. Because of these advantages, tiny LEDs are one of the most popular technologies used to light TVs, LCD

This energy is completely wasted unless you're using the lamp as a heater, because a huge portion of the available electricity isn't going toward producing visible light. LEDs generate very little heat, relatively speaking. A much higher percentage of the electrical energy is going directly to generating light, which cuts down the electricity demands considerably.

Per watt, LEDs output more lumens (or quantities of visible light) than regular incandescent bulbs. Light emitting diodes have a higher (how efficiently electricity is converted to visible light) than incandescents – a 60-watt incandescent bulb can generate between 750-900 lumens, but you can get the same output from a LED bulb using only 6-8 watts. And that same LED bulb can last 25,000 hours, but the 60-watt incandescent is only likely to light up for about 1,200 hours. In other words, one LED bulb can last as long as 21 60-watt incandescent bulbs burned consecutively

Until recently, LEDs were too expensive to use for most lighting applications because they're built around advanced semiconductor material. The price of semiconductor devices plummeted after the year 2000, however, making LEDs a more cost-effective lighting option for a wide range of situations. While they may be more expensive than incandescent lights up front, their lower cost in the long run can make

them a better buy. Several companies have begun selling LED light bulbs designed to compete with incandescent and compact fluorescents that promise to deliver long lives of bright light and amazing energy efficiency.

In this project, the transmitter section includes an IR sensor, which transmits continuous IR rays to be received by an IR receiver module. An IR output terminal of the receiver varies depending upon its receiving of IR rays. Since this variation cannot be analyzed as such, therefore this output can be fed to a comparator circuit. Here an operational amplifier (op-amp) of LM 339 is used as comparator circuit. When the IR receiver does not receive a signal, the potential at the inverting input goes higher than that non-inverting input of the comparator IC (LM339). Thus the output of the comparator goes low, but the LED does not glow. When the IR receiver module receives signal to the potential at the inverting input goes low. Thus the output of the comparator (LM 339) goes high and the LED starts glowing. Several companies have begun selling LED light bulbs designed to compete with incandescent and compact fluorescents that promise to deliver long lives of bright light and amazing energy efficiency.

IR Sensor circuit

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called a passive IR sensor. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation.

These types of radiations are invisible to our eyes, which can be detected by an infrared sensor. The emitter is simply an IR LED (LightEmittingDiode) and the detector is simply an IR photodiode that is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and the output voltages will change in proportion to the magnitude of the IR light received.

Working Principle

The working principle of an infrared sensor is similar to the object detection sensor. This sensor includes an IR LED & an IR Photodiode, so by combining these two can be formed as a photo-coupler otherwise optocoupler. The physics laws used in this sensor are planks radiation, Stephan Boltzmann & weins displacement.

IR LED is one kind of transmitter that emits IR radiations. This LED looks similar to a standard LED and the radiation which is generated by this is not visible to the human eye. Infrared receivers mainly detect the radiation using an infrared transmitter. These infrared receivers are available in photodiodes form.

IR Photodiodes are dissimilar as compared with usual photodiodes because they detect simply IR radiation. Different kinds of infrared receivers mainly exist depending on the voltage, wavelength, package, etc.

Once it is used as the combination of an IR transmitter & receiver, then the receiver's wavelength must equal the transmitter. Here, the transmitter is IR LED whereas the receiver is IR photodiode. The infrared photodiode is responsive to the infrared light that is generated through an infrared LED. The resistance of photo-diode & the change in output voltage is in proportion to the infrared light obtained. This is the IR sensor's fundamental working principle. Once the infrared transmitter generates emission, then it arrives at the object & some of the emission will reflect back toward the infrared receiver.

Once the infrared transmitter generates emission, then it arrives at the object & some of the emission will reflect back toward the infrared receiver. The sensor output can be decided by the IR receiver depending on the intensity of the response.

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Resistor R1 (100 Ω), R2 (10k Ω) and R3 (330 Ω) are used to ensure that minimum 10 mA current passes through the IR LED Devices like Photodiode and normal LEDs respectively. Resistor VR2 (preset=5k) is used to adjust the output terminals. Resistor VR1 (preset=10k) is used to set the sensitivity of the circuit Diagram.

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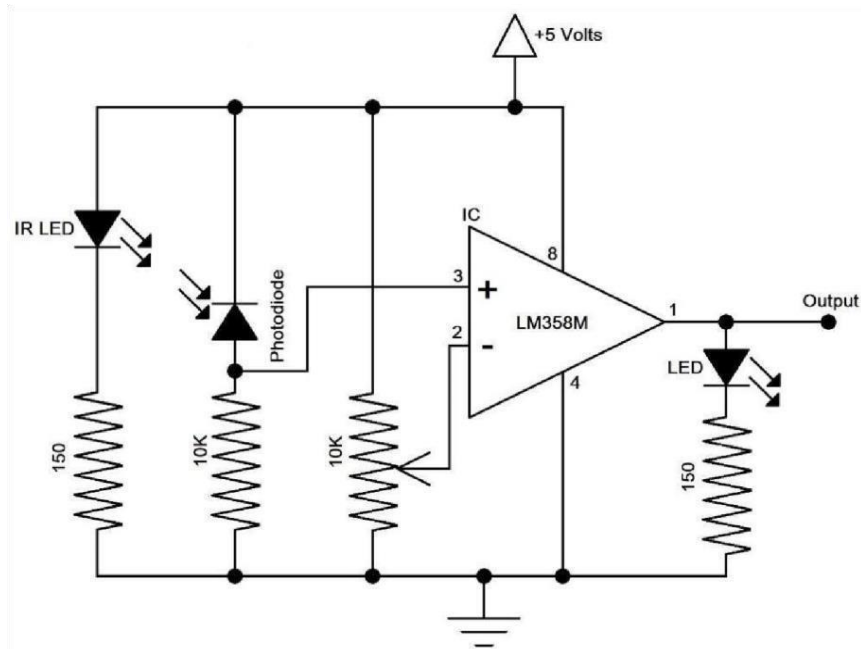


Fig. 4.17 IR Sensor Circuit diagram

Read more about IR sensors. The infrared photodiode is responsive to the infrared light that is generated through an infrared LED. The resistance of photo-diode & the change in output voltage is in proportion to the infrared light obtained. This is the IR sensor's fundamental working principle. Resistor VR2 (preset=5k) is used to adjust the output terminals. Resistor VR1 (preset=10k) is used to set the sensitivity of the circuit Diagram.

Different Types of IR Sensors and Their Applications

IR sensors are classified into different types depending on the applications. The speed sensor is used for synchronizing the speed of multiple motors. The temperature sensor is used for industrial temperature control. PIR sensor is used for automatic door opening system and Ultrasonic sensor are used for distance measurement.

IR sensors are classified into different types depending on the applications. The speed sensor is used for synchronizing the speed of multiple motors. The temperature sensor is used for industrial temperature control. PIR sensor is used for automatic door opening system and Ultrasonic sensor are used for distance measurement.

IR Sensor Applications

IR sensors are used in various Sensor based projects and also in various electronic devices which measures the temperature that are discussed in the below. The temperature sensor is used for industrial temperature control. PIR sensor is used for automatic door opening system and Ultrasonic sensor are used for distance measurement. Once the infrared transmitter generates emission, then it arrives at the

object & some of the emission will reflect back toward the infrared receiver. The sensor output can be decided by the IR receiver depending on the intensity of the response.

Radiation Thermometers

IR sensors are used in radiation thermometers to measure the temperature depend upon the temperature and the material of the object and these thermometers have some of the following features .

- ✦ Measurement without direct contact with the object
- ✦ Faster response
- ✦ Easy pattern measurements

Flame Monitors

These types of devices are used for detecting the light emitted from the flames and to monitor how the flames are burning. The Light emitted from flames extend from UV to IR region types. PbS, PbSe, Two-color detector, pyro electric detector are some of the commonly employed detector used in flame monitors.

A flame detector is a sensor designed to detect and respond to the presence of a flame or fire, allowing flame detection. Responses to a detected flame depend on the installation, but can include sounding an alarm, deactivating a fuel line (such as a propane or natural gas line), and activating a fire suppression system.

When used in applications such as industrial furnaces, their role is to provide confirmation that the furnace is working properly; it can be used to turn off the ignition system though in many cases they take no direct action beyond notifying the operator or control system. A flame detector can often respond faster and more accurately than a smoke or heat detector due to the mechanisms it uses to detect the flame.

Moisture Analyzers

Moisture analyzers use wavelengths which are absorbed by the moisture in the IR region. Objects are irradiated with light having these wavelengths (1.1 μm , 1.4 μm , 1.9 μm , and 2.7 μm) and also with reference wavelengths. The Lights reflected from the objects depend upon the moisture content and is detected by analyzer to measure moisture (ratio of reflected light at these wavelengths to the reflected light at reference wavelength). In GaAs PIN photodiodes, PbS photoconductive detectors are employed in moisture analyzer circuits.

The moisture analyzer consists of two components, a balance unit and a heating unit. In order to measure the moisture content the sample's start weight is recorded.

Afterwards, a halogen lamp or other infrared radiator heats and dries the sample while the integrated balance continually records the sample weight.

Gas Analyzers

IR sensors are used in gas analyzers that use the absorption characteristics of gases in the IR region. Two types of methods are used to measure the density of gas such as dispersive and nondispersive.

This type of configuration is commonly referred to as nondispersive infrared (NDIR) technology. This type of analyzer is used for carbonated drinks, whereas a nondispersive analyzer is used in most of the commercial IR instruments, for automobile exhaust gas fuel leakages.

Most gas analyzers can be used to analyze a regulated gas sample flow, the contents of a gas cylinder, or the flow from a regulator. The flow rate of gas must equal 1-5 L/min. To produce this flow, a Flow Restrictor and Regulator may be required. A faulty Flow Restrictor can lead to a false analyzer reading.

IR Imaging Devices



Fig no 4.18 IR Imaging Devices

IR image device is one of the major applications of IR waves, primarily by virtue of its property that is not visible. It is used for thermal imagers, night vision devices, etc.

For examples Water, rocks, soil, vegetation, an atmosphere, and human tissue all features emit IR radiation. The Thermal infrared detectors measure these radiations in IR range and map the spatial temperature distributions of the object/area on an image. Thermal imagers usually composed of a Sb (indium antimonite), Gd Hg (mercury-doped germanium), Hg Cd Te (mercury-cadmium-telluride) sensors.

This type of configuration is commonly referred to as nondispersive infrared (NDIR) technology. This type of analyzer is used for carbonated drinks, whereas a nondispersive analyzer is used in most of the commercial IR instruments, for automobile exhaust gas fuel leakages.

An electronic detector is cooled to low temperatures using liquid helium or liquid nitrogen's. Then the Cooling the detectors ensures that the radiant energy (photons) recorded by the detectors comes from the terrain and not from the ambient temperature of objects within the scanner itself an IR imaging electronic devices. Thus, this is all about IR sensor circuit with working and applications. These sensors are used in many sensor based electronics projects.

Advantages

The advantages of IR sensor include the following

- It uses less power
- The detection of motion is possible in the presence or absence of light approximately with equal reliability.
- They do not need contact with the object for detection
- There is no data leakage because of the ray direction
- These sensors are not affected by oxidation & corrosion
- Noise immunity is very strong

Disadvantages

The disadvantages of IR sensor include the following

- Line of sight is required
- Range is limited
- These can be affected by fog, rain, dust, etc
- Less data transmission rate

CHAPTER - 5

RESULT, DISCUSSION AND PERFORMANCE ANALYSIS

5.1 RESULT & DISCUSSION

The prototype of proposed system can be seen in Fig 5.1 & 5.2. After connecting all the components according to the block diagram. After giving the power supply the system starts working. When the driver is in sleepy mode with the help of eye blinking monitoring system the sms send to the respective mobile to alert the driver in order to reduce vehicle accidents. When the driver driving the vehicle after taking the alcohol with the help of the alcohol sensor the buzzer will make the sound and the sms send to the respective mobiles to alert the driver in order to reduce the vehicle accidents.



Fig no 5.1 connections of proposed system

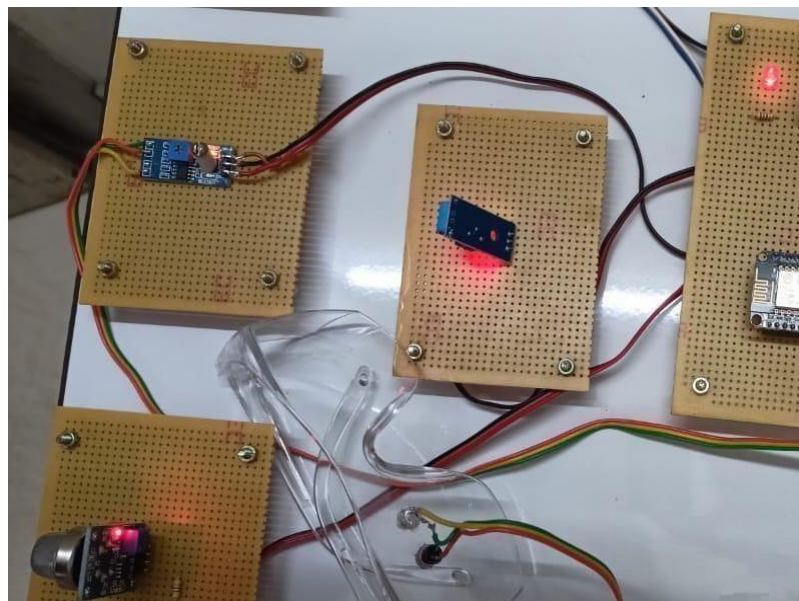


Fig no 5.2 connections of proposed system

5.2 PERFORMANCE ANALYSIS .



Fig 5.3 Driver wearing the glasses which are connected with eye blink sensor

Here in this figure the driver is wearing the glasses which is connected with IR sensor. This total set up is known as Eye Blinking Monitoring System. If driver is continuously closing his eyes for 3 or more than 3 seconds it automatically detected that driver is sleeping and immediately system sends the notification to the corresponding mobile and buzzer will make the sound. So that the driver get alert and he take the necessary action to avoid the accidents.

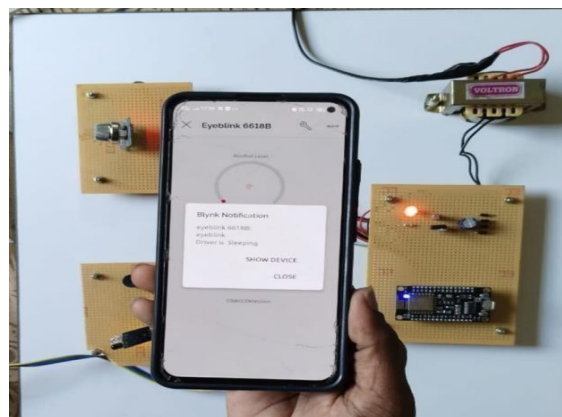


Fig 5.4 shows the notification that the driver is sleeping during the driving.

This figure defines that the driver is driving the vehicle while sleeping. In this notification it defines that the driver is sleeping during the driving.. Here with the help of eye blinking monitoring system which consists of IR sensor the driver eyes is always monitoring . when the driver is closed his eyes immediately eye blinking monitoring system sends the notification to the corresponding mobile and buzzer will make the sound. So that the driver get alert and he take the necessary action to avoid the accidents.



Fig 5.5 shows the notification that the driver driving the vehicle after taking that the Alcohol 32 percent.

This figure defines that the driver is driving the vehicle after taking the alcohol. In this notification the alcohol percentage is 32 .Here with the help of alcohol sensor the alcohol percentage is monitored. when the alcohol is detected immediately the notification is send to the corresponding mobile and buzzer will make the sound. So that the driver get alert and he take the necessary action to avoid the accidents.

CHAPTER - 6

FUTURE SCOPE AND CONCLUSION

6.1 CONCLUSION

Our project Accident Prevention by Eye Blinking Sensor and Alcohol Detector was implemented successfully. This device provides much advanced facilities in now a days life as it can be easily implemented in vehicles. Thus we can reduce alcohol and drowsy related road accidents and hence these kinds of detectors have a great relevance. It can also be used in schools, colleges, offices and some public places such as hospitals, libraries etc. Through this project we present hardware programming of microcontroller to facilitate as alcohol sensor, eye blinking sensor.

The driver sleepiness is distinguished and signal ready framework is additionally actualized. In this paper, the conversation respects the shirking of mishaps because of sluggishness is talked about with eye squint and relating framework was created. The task has been effectively tried and executed in cutting edge IC's and with the assistance of developing innovations like GSM and GPS the undertaking has been effectively actualized. This paper has introduced investigation of eye state and HP utilizing an Eye squint sensor and Micro Electro Mechanical Systems for constant checking of readiness of a vehicle driver.

6.2 FUTURE SCOPE

- It will be used for Automated parking.
- The eye blink module of this project will be separately used for Radio-frequency identification in global industries.
- It will be used in picture processing application by replacing sensor by camera module.
- We can't take care of ours while in running by less conscious. If we done all the vehicles with automated security system that provides high security to driver, also gives alarm.
- In Future this project will extends ,whenever driver becomes drowsy then buzzer will be activates immediately then after that the vehicle will get slow down automatically.
- The system can't detect during night due to lack of camera version.
- The response time of the system when the driver closes his/her, eyes should be a function of vehicle speed.
- The system should be adapted to the looking of mirrors scenario.
- Sensor fusion of the camera with all the wearable biosensors.
- Use Night-vision camera to detect the eyes at night.
- Use better specifications camera will increase the efficiency of the system

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APPENDIX

CODE USED:

```
#include <LiquidCrystal.h>

LiquidCrystal lcd(13,12,11,10,9,8);
char lan[15],lat[15];

#define temp 6
#define buzzer 3
#define eye 7
int sw=5;
int alcohol,mems;
void setup()
{
    // initialize serial communications
    Serial.begin(9600);
    lcd.begin(16,2);
    lcd.print("ACCIDENT ");
    lcd.setCursor(0,1);
    lcd.print("IDENTIFICATION SYS");
    pinMode(eye,INPUT);
    pinMode(buzzer, OUTPUT);
    pinMode(temp, INPUT);
    pinMode(sw, INPUT);
    delay(50);
    digitalWrite(buzzer, LOW);
    delay(4000);
}
char my()
{
```

```

while(!Serial.available());
return Serial.read();
}
void gps()
{
    back:
    while(my()!='$');
    if(my()=='G')
    {
        if(my()=='P')
        {
            if(my()=='R')
            {
                if(my()=='M')
                {
                    if(my()=='C')
                    {
                        while(my()!=',');
                        while(my()!=',');
                        int i=0;
                        do
                        {
                            lan[i]=my();
                        }while(lan[i++]!=',');
                        do
                        {
                            lan[i]=my();
                        }while(lan[i++]!=',');
                        lan[--i]=0;
                        i=0;
                    }
                }
            }
        }
    }
}

```

```

do
{
    lat[i]=my();
}while(lat[i++]!='');
do
{
    lat[i]=my();
}while(lat[i++]!='');
lat[--i]=0;
lcd.clear();
    lcd.setCursor(0,0);
    lcd.print(lan);
    lcd.setCursor(0,1);
    lcd.print(lat);

}
else
{
    goto back;
}
}
else
{
    goto back;
}
}
else
{
    goto back;
}
}

```

```

    }
    else
    {
        goto back;
    }
}
else
{
    goto back;
}

}

void loop()
{
    mems=analogRead(A0);
    alcohol=analogRead(A4);

    if(alcohol>350)
    {
        digitalWrite(buzzer,HIGH);
        lcd.clear();
        lcd.print("ALCOHOL DETECTED");
        delay(2000);
        gps();
        Serial.println("AT+CMGS=\"9640084078\"");
        delay(1000);
        Serial.println("\r\n");
        delay(500);
        Serial.println("ALCOHOL DETECTED\r\n");
    }
}

```

```

delay(500);
Serial.println("GPS VALUES\r\n");
Serial.println(" ");
Serial.println(lan);
Serial.println(lat);
delay(800);
Serial.println("\x1A");
digitalWrite(buzzer,LOW);
lcd.clear();
lcd.print("SENT SMS....");
delay(3000);

}

if(mems<24||mems>45)
{

lcd.clear();
lcd.print("ACCIDENT ");
lcd.setCursor(0,1);
lcd.print(" DETECTED ");
delay(1500);

gps();
Serial.println("AT+CMGS=\"9640084078\"");
delay(1000);
Serial.println("\r\n");
delay(500);
Serial.println("ACCIDENT DETECTED\r\n");

```

```

delay(500);
Serial.println("GPS VALUES\r\n");
Serial.println(" ");
Serial.println(lan);
Serial.println(lat);
delay(800);
Serial.println("\x1A");
digitalWrite(buzzer,LOW);
lcd.clear();
lcd.print("SENT SMS....");
delay(3000);

}

    if(digitalRead(temp)==LOW)
{
    digitalWrite(buzzer,HIGH);

lcd.clear();
lcd.print("HIGH TEMPERATURE ");
lcd.setCursor(0,1);
lcd.print("      ");
delay(1500);
gps();
Serial.println("AT+CMGS=\"9640084078\"");
delay(1000);
Serial.println("\r\n");
delay(500);
Serial.println("HIGH TEMPERATURE\r\n");

```

```

delay(500);
Serial.println("GPS VALUES\r\n");
Serial.println(" ");
Serial.println(lan);
Serial.println(lat);
delay(800);
Serial.println("\x1A");
digitalWrite(buzzer,LOW);
lcd.clear();
lcd.print("SENT SMS....");
delay(3000);

}

    if(digitalRead(sw)==LOW)
{
    digitalWrite(buzzer,HIGH);

lcd.clear();
lcd.print("EMERGENCY ALERT ");
lcd.setCursor(0,1);
lcd.print("      ");
delay(1500);
gps();
Serial.println("AT+CMGS=\\"9640084078\\");
delay(1000);
Serial.println("\r\n");
delay(500);
Serial.println("EMERGENCY ALERT\r\n");
delay(500);

```

```

Serial.println("GPS VALUES\r\n");
Serial.println("  ");
Serial.println(lan);
Serial.println(lat);
delay(800);
Serial.println("\x1A");
digitalWrite(buzzer,LOW);
lcd.clear();
lcd.print("SENT SMS....");
delay(3000);

}

    if(digitalRead(eye)==LOW)
{
    digitalWrite(buzzer,HIGH);

lcd.clear();
lcd.print("DRIVER IN SLEEP ");
lcd.setCursor(0,1);
lcd.print("      ");
delay(1500);
gps();
Serial.println("AT+CMGS=\r\n9640084078\r\n");
delay(1000);
Serial.println("\r\n");
delay(500);
Serial.println("DRIVER IN SLEEP\r\n");
delay(500);
Serial.println("GPS VALUES\r\n");

```

```
Serial.println(" ");
Serial.println(lan);
Serial.println(lat);
delay(800);
Serial.println("\x1A");
digitalWrite(buzzer,LOW);
lcd.clear();
lcd.print("SENT SMS....");
delay(3000);

}

lcd.clear();
lcd.print("ACCIDENT ");
lcd.setCursor(0,1);
lcd.print("IDENTIFICATION SYS");
delay(500);

}
```