



ACCIDENT AVOIDING SYSTEM IN TWO/ FOUR WHEELER WITH AIR BAG AND DIM CONTROLLER

Dr.M.Sangeetha, Associate Professor, M.A.M School of Engineering
D.VIMALRAJ, K.NAVEENKUMAR, R.SUBASH
Student
M.A.M School of Engineering

Abstract

The Airbag system is first introduced in 4-wheeled vehicles, this paper gives information about the introduction of the airbag system can be used in the two wheelers and four wheeler. Also Control Automatic Dim and Dipper is used to control the intensity of the bulb automatically using the control circuit. By knowing the Light Intensity value, the intensity of the bulb is varied accordingly. This system is accurate, reliable and it is easy to operate also.

Problem Statement

This paper shows the working, construction, installation and what will be problems can occurs are discussed. The concept of this airbag system is “To reduce the injuries to a rider when impacting with an opposing vehicle and/or opposing vibration in frontal collisions by absorbing

rider kinetic energy and by reducing rider separation velocity from motorcycle in the forward direction. With the help of the Vibration sensor with an angle indicator and sense of the collision and the large frequency vibration for to open the air bag

Introduction :

Here we have introduced the automatic braking system with air bag. A brake is a device for applying a force against the friction of the road, slowing or stopping the motion of a vehicle, or alternatively a device to restrain it from starting to move again. An airbag is a vehicle safety device. It is an occupant restraint consisting of a flexible envelope designed to inflate rapidly in an automobile collision, to prevent vehicle occupants from striking interior vibrations such as the steering wheel ,the air bags will be opened at the particular time with the help of air supply.

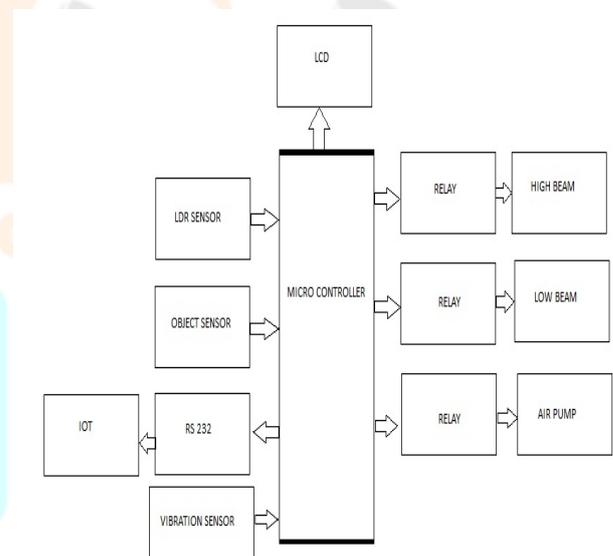
It was very safe to the driver while driving the vehicle. This project consists of the following parts Control unit, Vibration sensor, vibration sensor Air pump, Solenoid valve and Air bag.

Description of the proposed method and figures

The system consists power supply unit, lighting system, LDR (light dependent resistor), comparator, and a relay. The LDR is a light detecting resistor, which output voltage varies depends on the environmental light, it is connected with comparator for compare the reference voltage and input voltage, when the sun light is dark, the LDR sends low voltage to the comparator, so the reference voltage and LDR output voltage are not matched with each other, then the comparator triggers a high pulse from its output pin, this is given to the relay driver circuit for controlling the light brightness of light. If the opposite vehicle light is in normal power the LDR output voltage will be equal to the reference voltage then the comparator triggers a low pulse to the relay driver circuit, so the brightness will reduce by relay. The vibration sensor is fixed in the front side of the vehicle to identify the vehicles, which are in front of it or the opposite vehicles, whenever comes closer to our vehicle. When the signal passes from the vibration sensor to control unit it then operates the piston rod which is connected to the brake pedal of the vehicle. Thus automatic braking of the

vehicle can be carried out. The air bag is fixed on the steering wheel and the relay to air blower is connected to the air bag's tube. If the vehicle gets accident in any direction, the impact will be sensed by the vibration sensor and the vibration sensor will give the corresponding signal to control unit. With this input relay valve connected to the Air Bag will be actuated to operate the air bag. The all above process are controlled by the control unit it is nothing but the small chip called microcontroller it already programmed and feed in the chip for working our automatic breaking system with air bag.

Block diagram



Existing System

Current Problem Faced By Motorists .Motorists are facing a huge problem due to this high beam light which falls directly onto their eyes during driving. There are

many medical facts and figures which support their problems of night driving.

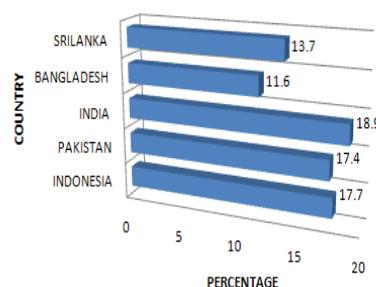
Troxler Effect

In the medical world, Troxler effect is used to describe a kind of temporary blindness. It is otherwise known as the 'fading effect'. A study shows that if our eyes are exposed to a very bright light source of around 10,000 lumens, we experience a glare. This glare is produced due to over exposure of the rods and cones inside our eye. Even after the source of glare is removed, an after-image remains in our eye that creates a blind spot. This phenomenon is called Troxler effect. This means that the driver's reaction time is increased by 1.4 seconds. For example, let us assume a motorist travelling at 60 miles per hour takes 0.5 seconds to react to a hazard and will stop within 41 feet. Due to Troxler effect, the same person travelling under the same conditions will take 0.9 seconds longer to react and hence will come to a complete halt only at 123 feet. There is a huge difference of 82 feet. This is more than enough to cause a disaster on the road. This Troxler effect is across all ages. Any one exposed to sudden bright light experiences this Troxler effect.

Accidents due to Troxler Effect

As discussed earlier, there are many accidents caused due to Troxler effect. Many accident reports have been witnessed

where a large vehicle, hitting a slow moving smaller vehicle while the latter is trying to over-take. Though it might be obvious to blame the driver, they claim to have not seen the smaller vehicle approaching. This is the most common example of illustrating the Troxler effect in our day-to-day life. Due to excessive brightness, the driver of the large vehicle is blinded. So he is unable to notice the smaller vehicle even though it is right in front of him. This can be avoided if the headlight is dipped to low beam mode. According to Forbes, the statistics shown in below gives the details of the accidents that had occurred in the year 2021 in Asia due to over-bright light. It shows clearly that India tops the list. Hence, this becomes the major concern to think of a new innovative solution that is useful and also cost effective. This had led to the development of the automatic headlight dimmer prototype.



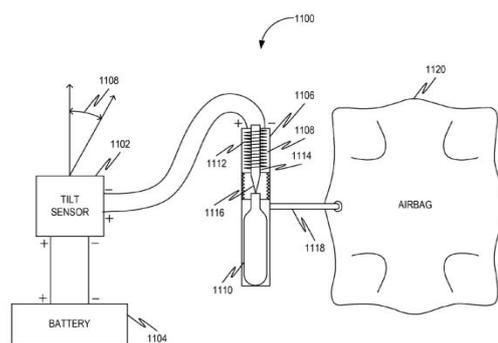
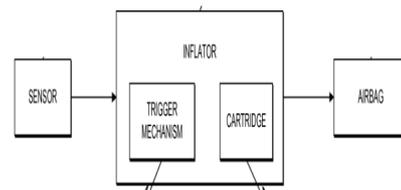
The available accident detection systems in automobiles are only post-accident response systems such as air bags. They fail to track collision and pre-damage status. Also monitoring the physical condition of the driver is missing there is no automatic means of reaching out for immediate help or first aid in the occurrence of an accident.

There are no such accident prevention technologies in use. There are various proposed projects and a live system in US only .The systems detects a crash , built in accelerometer and places a message to let you know it's about to call for help. You can cancel the alert if needed otherwise the app uploads crash details to automatic emergency call center. An agent calls your phone to confirm that you need assistance then request help from local authorities. They can stay online with you till the help arrives. Agents also can call the loved ones to let them know help is on the way. In the existing system, the victim has to manually press the sensor. This system is provided only in few states in the US. The live system is just an app; hence if the victim isn't carrying his mobile, this is of no help. If phone is damaged, help cannot be reached. The victim is required to confirm the assistance needed which is not practical in case he is seriously injured. This exists only in the higher profile cars. The existing system is automatic, if at all the accident is not severe, and then the victim cannot stop the siren or prevent the notification from sending to dear once.

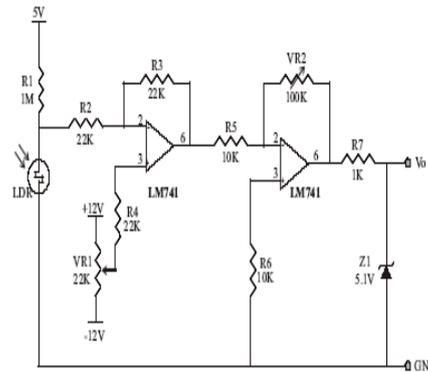
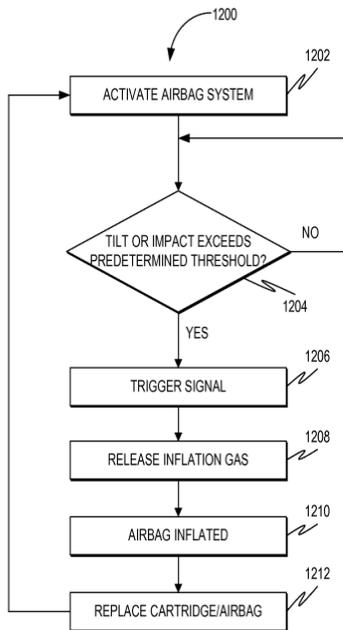
Proposed system

Headlights of vehicles pose a great danger during night driving. The drivers of most vehicles use high, bright beam while driving at night. This causes a discomfort to the person travelling from the opposite direction. He experiences a sudden glare for a short period of time. This is caused due to the high intense headlight beam from the

other vehicle coming towards him from the opposite direction. We are expected to dim the headlight to avoid this glare. This glare causes a temporary blindness to a person resulting in road accidents during the night. To avoid such incidents, we have fabricated a prototype of automatic headlight dimmer. This automatically switches the high beam into low beam thus reducing the glare effect by sensing the approaching vehicle. It also eliminates the requirement of manual switching by the driver which is not done at all times. The construction, working and the advantages of this Prototype model is discussed in detail in this paper.



LDR

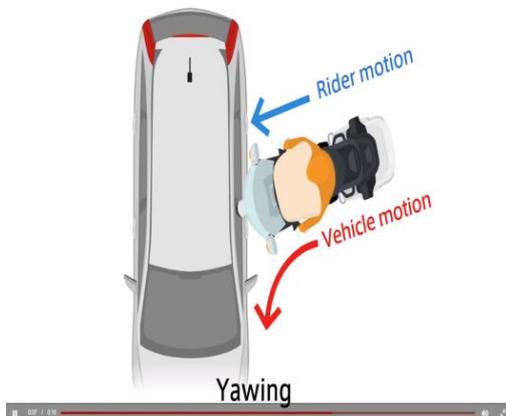
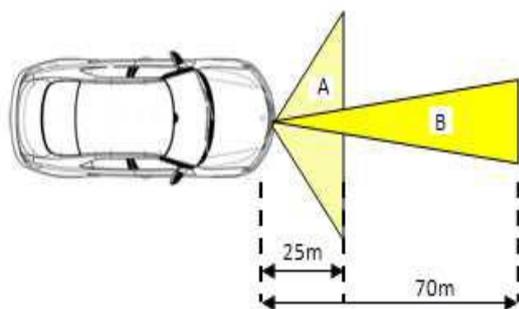


LDR:

A photo resistor is an electronic component whose resistance decreases with increasing incident light intensity. It can also be referred to as a light-dependent resistor (LDR), or photoconductor.

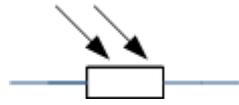
A photo resistor is made of a high-resistance semiconductor. If light falling on the device is of high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electron (and its hole partner) conduct electricity, thereby lowering resistance.

A photoelectric device can be either intrinsic or extrinsic. In intrinsic devices, the only available electrons are in the valence band, and hence the photon must have enough energy to excite the electron across the entire band gap. Extrinsic devices have impurities added, which have a ground state energy closer to the conduction band — since the electrons



Circuit diagram

don't have as far to jump, lower energy photons (i.e. longer wavelengths and lower frequencies) are sufficient to trigger the device.



Cadmium sulphide cells:

Cadmium sulphide (CdS) cells rely on the material's ability to vary its resistance according to the amount of light striking the cell. The more light that strikes the cell, the lower the resistance. Although not accurate, even a simple CdS cell can have a wide range of resistance from less than 100 Ω in bright light to in excess of 10 M Ω in darkness. The cells are also capable of reacting to a broad range of frequencies,



including infrared (IR), visible light, and ultraviolet (UV). They are often found on street lights as automatic on/off switches. They were once even used in heat-seeking missiles to sense for targets.

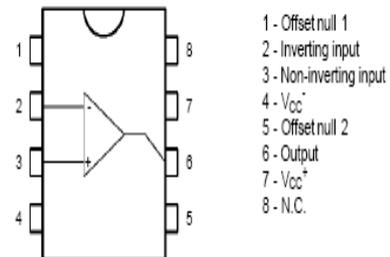
Applications:

Photo resistors come in many different types. Inexpensive cadmium sulphide cells can be found in many consumer items such as camera light meters, clock radios, security alarms, street

lights and outdoor clocks. At the other end of the scale, Ge:Cu photoconductors are among the best far-infrared detectors available, and are used for infrared astronomy and infrared spectroscopy.

Circuit working principle:

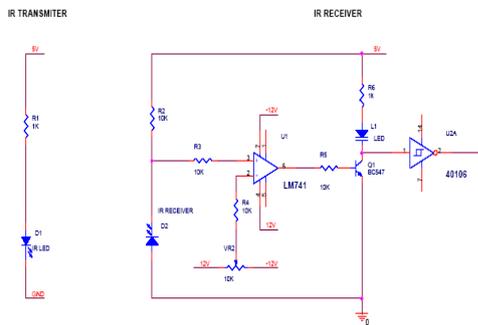
In this circuit the LDR is connected in series with resistor R1 formed as voltage divider network which is connected to inverting input terminal of comparator. The reference voltage is given to non inverting input terminal. The comparator is constructed by the operational amplifier LM741. The LM741 is a high performance monolithic operational amplifier on a single silicon chip.



When there is no light rays the output of the comparator is zero because we have set the reference voltage equal to inverting input voltage. When the light rays fall on the LDR, its resistance value is decreased. The comparator delivered error voltage on the output terminal. Then the error voltage is given to next stage of the gain amplifier in which the variable resistor is connected in the feedback path. By adjusting the resistor we can get the variable gain voltage on the output terminal which is given to ADC or other related

circuit in order to find the light intensity level.

IR TRANSMITTER AND RECEIVER



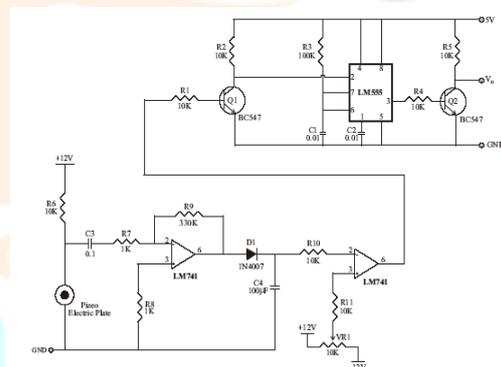
Infrared transmitter is one type of LED which emits infrared rays generally called as IR Transmitter. Similarly IR Receiver is used to receive the IR rays transmitted by the IR transmitter. One important point is both IR transmitter and receiver should be placed straight line to each other.

The transmitted signal is given to IR transmitter whenever the signal is high, the IR transmitter LED is conducting it passes the IR rays to the receiver. The IR receiver is connected with comparator. The comparator is constructed with LM 741 operational amplifier. In the comparator circuit the reference voltage is given to inverting input terminal. The non inverting input terminal is connected IR receiver. When interrupt the IR rays between the IR transmitter and receiver, the IR receiver is not conducting. So the comparator non inverting input terminal voltage is higher than inverting input. Now the comparator output is in the range of +12V. This voltage

is given to base of the transistor Q1. Hence the transistor is conducting. Here the transistor is act as switch so the collector and emitter will be closed. The output is taken from collector terminal. Now the output is zero.

When IR transmitter passes the rays to receiver, the IR receiver is conducting due to that non inverting input voltage is lower than inverting input. Now the comparator output is -12V so the transistor is cutoff region. The 5v is given to 40106 IC which is the inverter with buffer. The inverter output is given to microcontroller or PC. This circuit is mainly used to for counting application, intruder detector etc.

VIBRATION



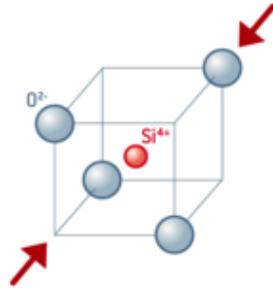
Piezo Electric Sensor:

A piezoelectric sensor is a device that uses the piezoelectric effect to measure pressure, acceleration, strain or force by converting them to an electrical signal.

Piezo Electric Effect:

Piezoelectricity is the ability of crystals and certain ceramic materials to generate a voltage in response to applied mechanical stress. Piezoelectricity was discovered by Pierre Curie and the word is

derived from the Greek *piezein*, which means to squeeze or press.



The piezoelectric effect is reversible in that piezoelectric crystals, when subjected to an externally applied voltage, can change shape by a small amount. (For instance, the deformation is about 0.1% of the original dimension in PZT.) The effect finds useful applications such as the production and detection of sound, generation of high voltages, electronic frequency generation, microbalance, and ultra fine focusing of optical assemblies.

Application:

Piezoelectric sensors have proven to be versatile tools for the measurement of various processes. They are used for quality assurance, process control and process development in many different industries.

Piezo electric sensors are also seen in nature. Bones act as force sensors. Once loaded, bones produce charges proportional to the resulting internal torsion or displacement. Those charges stimulate and drive the build up of new bone material. This leads to the strengthening of structures where the internal displacements are the greatest. With time, this causes weaker structures to increase their strength and stability as material is laid down

proportional to the forces affecting the bone.

Circuit Description:

Vibration circuit is used to sense the mechanical vibration. This circuit is constructed with

- Piezo electric plate.
- Operational amplifier
- 555 IC timer

Piezo electric plate is the special type of sensor which is used to sense the mechanical vibration. Piezo electric plate converts the mechanical vibration to electrical signal. The converted electrical signal is in the range of small milli voltage signal.

Then the electrical signal voltage is given to amplifier unit through 0.1uf capacitor in order to filter the noise signal. The amplifier circuit is constructed with operational amplifier LM 741. The amplified output is in the form of AC signal the diode is used to rectify the negative signal.

The rectified signal is given to comparator. The comparator circuit is constructed with LM 741 operational amplifier in which the signal is given to inverting input terminal. The reference voltage is given to non inverting input terminal. It converts the input signal to +12V to -12V square pulse.

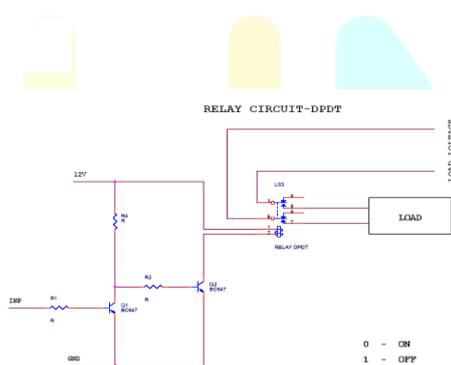
The square pulse is given to base of BC 547 transistor whenever the positive side of square pulse is come the transistor

conducts emitter and collector side is short circuited because the transistor is act as switch. The collector side is connected to trigger terminal of the 555 IC. When the transistor is conducted negative signal is given to trigger terminal because the emitter is connected to ground side.

Now the 555 IC conducts and generates the square pulse. The frequency of the square pulse is depends upon the resistor and capacitor connected in between 7th (discharge) and 6th (threshold) terminal.

The square pulse is given to base of the Q2 transistor. The transistor is turn ON and turn OFF depends upon the square pulse. The Q2 transistor output is 0 to 5V pulse.

Whenever the Piezo electric plate sense the vibration the Q2 transistor outputs the 0 to 5V pulse. This pulse is given to microcontroller or other related circuit to inform that vibration has been occurred.



Relay:

A relay is an electrically operated switch. Current flowing through the coil of

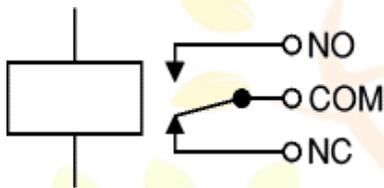
the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical.

The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages. Most ICs (chips) cannot provide this current and a transistor is usually used to amplify the small IC current to the larger value required for the relay coil. The maximum output current for the popular 555 timer IC is 200mA so these devices can supply relay coils directly without amplification.



Relays are usually SPDT or DPDT but they can have many more sets of switch contacts, for example relays with 4 sets of

changeover contacts are readily available. Most relays are designed for PCB mounting but you can solder wires directly to the pins providing you take care to avoid melting the plastic case of the relay. The animated picture shows a working relay with its coil and switch contacts. You can see a lever on the left being attracted by magnetism when the coil is switched on. This lever moves the switch contacts. There is one set of contacts (SPDT) in the foreground and another behind them, making the relay DPDT.



The relay's switch connections are usually labeled COM, NC and NO:

- **COM** = Common, always connect to this, it is the moving part of the switch.
- **NC** = Normally Closed, COM is connected to this when the relay coil is **off**.
- **NO** = Normally Open, COM is connected to this when the relay coil is **on**.

DPDT:

A DPDT (double-pole double-throw) relay has two pairs of contacts or "throws" and two magnetically activated switch contacts or "poles". A current applied to the relay coil causes both poles to switch.

Circuit description:

This circuit is designed to control the load. The load may be motor or any other load. The load is turned ON and OFF through relay. The relay ON and OFF is controlled by the pair of switching transistors (BC 547). The DPDT relay is connected in the Q2 transistor collector terminal. A Relay is nothing but electromagnetic switching device which consists of six pins. They are two set of Common, Normally close (NC) and Normally open (NO) pins.

The relay common pin is connected to supply voltage. The normally open (NO) pin connected to load. When high pulse signal is given to base of the Q1 transistors, the transistor is conducting and shorts the collector and emitter terminal and zero signals is given to base of the Q2 transistor. So the relay is turned OFF state.

When low pulse is given to base of transistor Q1 transistor, the transistor is turned OFF. Now 12v is given to base of T2 transistor so the transistor is conducting and relay is energized. Hence the common terminal and NO terminal of relay are shorted. Now load gets the supply voltage through relay.

Voltage Signal from Microcontroller or PC	Transistor Q1	Transistor Q2	Relay
1	On	Off	Off
0	off	on	on

ADVANTAGES

This system is an immediate aid system.

- ♣ Monitors all hazards and threats.
- ♣ Alert messages are sent to the nearby hospitals and police stations.
- ♣ It is an affordable system.
- ♣ Can be used in any kind of vehicle.
- ♣ The alert message regarding the accident is automatically sent,
- ♣ This system can be used for a social cause.
- ♣ It does not need any operation manually

CONCLUSIONS

Glare during driving is a serious problem for drivers. This is caused due to the sudden exposure of our eyes to a very bright light; the bright headlights of vehicles in this case. This causes a temporary blindness called the Troxler effect. Eventually this becomes the major reason for night accidents. The driver should actually turn down the bright lights immediately to avoid glare to the other person which is not happening. Hence, is the idea for the design and development of a prototype circuit called the automatic headlight dimmer. It gives the driver to use high beam light when required. But it automatically switches the headlight to low beam when it senses a vehicle approaching from the opposite side. The circuit consists of simple and economical components which can be easily installed. The working and implementation of the prototype are discussed in detail. The effects of bright light on the human eye are also studied.

Thus the implementation of this device in every vehicle in future will not only avoid accidents but also provide a safe and a comfortable driving. By providing total safety to the motorcycle rider by implanting the airbags on both sides of the motorcycle as mention in this article, we will reduce the fatality rate by 20% to 30%. By using this technology there is not only a reduce in death rate but also gives the total protection to the rider as well as motorcycle.

REFERENCES

1. Miss.Katore Koshal P, Prof.Bhambare Rajesh R, 'Vehicle Accident Prevention System using GSM and GPS Technique' International Journal of Computer Trends and Technology (IJCTT) – volume 29 Number 2 – November 2015
2. T.U.Anand Santhosh Kumar, J. Mrudula, "Advanced Accident Avoidance System for Automobiles" International Journal of Computer Trends and Technology (IJCTT) – volume 6 number 2– Dec 2013
3. Anusha c, Dr. P. Venkataratnam, "Collision control and collision avoidance using ultrasonic sensor" International journal of current engineering and scientific research (IJCESR) ISSN (PRINT): 2393-8374, (ONLINE): 2394-0697, VOLUME-2, ISSUE-7, 2015
4. G.B.S. Narang, "Automobile Engineering", Khanna Publishers, Delhi, 1991,

5. William H. Crowse, “Automobile Engineering”.

6. V. B. Bhandari –“Design Data book”

7. Pneumatic Control System----Stroll & Bernaud, Tata Mc Graw Hill Publications, 1999.

8. S. Ramamrutham & R. Narayan, (1998) “Strength of Material”, 12th Edition

9. J.B.K.Das, P.L.Srinivasa Murthy (2011) “Design of Machine Elements-2”, Sixth Edition

10. Dr. K. Lingaiah. (2006), “Machine Design Data Handbook Volume-1”, Fourth Edition.

