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INTELLIGENT LIGHTING SYSTEM FOR AUTOMOBILES

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ABSTRACT

The concept described in this project report is aimed to design & implement an automatic lighting system for automobiles by which the vehicle can be protected by avoiding collision with another vehicle. In general, especially in highways, most of the accidents are taking place during knights only, this is because of dazzling lights effect, there by this system is designed to switch off the head lights and switch on the dim lights automatically by sensing the oppositevehicle.Ifthiskindofsystemisimplementedinallsortsofvehicles, accidents rate can be decreased to some extent.

In addition to the control of head lights, this system is designed to control the other important lights automatically according to the circumstances; there bythedriverneednotoperateanylightsmanually.Thefollowingaretheactivities:

1) Natural light sensor is used for activating the head lights automatically during the dark.

2) The system is designed to sense the opposite vehicle light, for safety measure if any vehicle coming from the opposite direction, automatically headlights will be switched off & dim lights are energized until the vehicle passes.

Inthisconceptaccidentscanbeminimizedduetothedazzlinglightseffectofforthcoming vehicle.

3) Though the breaks are not applied, the tail lamps will be activated automatically along with alarm, when following vehicle is close to the forward vehicle.

The demo module is constructed with six small lamps; all these lamps along with alarm are controlled through 3 relays. Control circuit is designed withAT 89C2051 chip, this chip belongs to Atmel family and all the devices areinterfaced with this tiny controller. Entire circuitry including its power supply unitisarrangedoverafour-wheelerchassis.Requiredpowersourceisderivedfromthe mains.

I.INTRODUCTION

1.1 INTRODUCTION

Most of the road accidents are taking place at Highways, that too during nights only. This is happening because of dazzling focusing head lights of opposite vehicles, these lights are operated manually by the driver. Generally, athigh-ways drivers are so alerted, even though it is difficult to estimate the edges of theroaddue tothefocusinglampsof opposite vehicle,mostof the driversneverrespondstothesituationofotherdrivers,iftheyrespondintimebyswitchingofftheheadlightswhenitreachesnearoppositevehicle,thentosome extent accidents can be reduced. Since this activity is done manually and because of human errors,accidents are taking place. To avoid this kind of accidents, an automaticlighting control system is essential for every vehicle. Thereby this project work is taken up.

1.2 PROJECT ELABORATON:

The main function of the system is to switchoff the focusing lamp sand switch on the dim lights automatically, whenever it senses the lighting of opposite vehicle.For this purpose, LDR isused in the system forsensing the light intensity. Another function is also implemented in the system such that usinganother LDR natural light is sensed, if it is dull automatically head lights areactivated. The third and important function is to alert the following vehicle driver,whenever the following vehicle came very near to the front vehicle, immediatelythe system raises alarm and energizes tail lamps automatically. Here to simulatethe tail lamps, two red LEDs are used. Similarly, to simulate the head lamps anddimlights,four12V, less wattage automobile lamp sare used, and the yarearrangedat their positions over a small four wheeled chassis.

Thisdocumentprovidesareviewofintelligentlightingsystemsformotorvehicles which is aimed to enhance the vehicle safety. The field of automobilesadoptingelectroniccontrolsystemstomakethemotorvehicleasIntelligenttransportsystem.IntelligentTransportSystems(ITS)builtwithintelligentelectronic control systemshave significant potential to enhance trafficsafety.NumerousITStechnologieshavebeendevelopedtoimprovethesafetyandefficiencyofcars,commercialvehicles,publictransportandinfrastructure.Its applications have been developed with car safety in mind, but the potential fordevelopments for other vehicles is appreciable, and hence the system designedherecan beadoptableforall sorts of vehicles.

Now to prove the concept practically, prototype module is constructed forthe live demonstration, and it is implemented over a module of vehicle chassisconstructed with four free wheels. The control circuit is designed

with ATMELmicrocontroller, this chip belongs to 8051 family is having 40pins. As this IC ishaving 32 I/O lines, lot of electronic hardware can be interfaced with single chip.But here as the concept is simple, very few I/O lines are used to control the lampsthroughrelays accordingto theinput signals.

1.3 WorkingModel

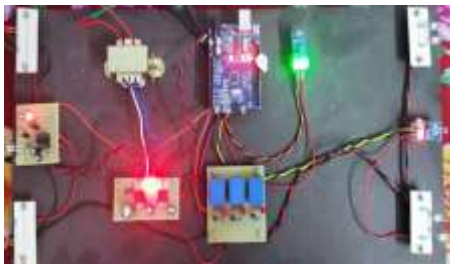

Figure1.1WorkingModel

Automaticheadlightintensitycontrolsystemisintroduceddu etoincreasing rate of accidents in India and it is also a cost-effective solution for theproblem of night time accidents. During night travel headlights of vehicles cancause great danger .Most of the drivers use high bright beams during their nightdrives. This will cause great discomfort for the person travelling from the oppositedirection. It will cause a sudden glare for the person travelling from opposite for ashort period of time. This is caused due to high intensity of light of the vehiclecomingfromoppositedirection.Nowadaysmanyacci dentsatnightarecauseddue to high intensity of headlight from the opposite vehicles. So many healthissues like eye problems , headaches , mental stress etc are caused due to highheadlightintensity.

1.4BlockDiagram

The control circuit is designed with ATMEL microcontroller, this chipbelongs to 8051 family is having 40pins. As this IC is having 32 I/O lines, lot ofelectronic hardware can be interfaced with single chip. But here as the concept issimple, very few I/O lines are used to control the lamps through relays accordingto theinput signals.

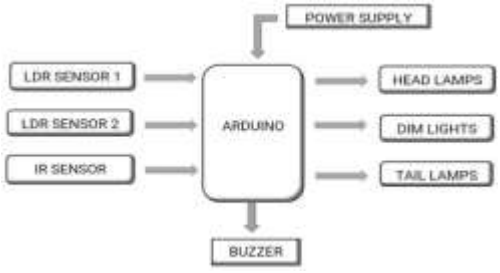

Figure1.2:Block Diagram ofProposedSystem

1.5 FlowChart

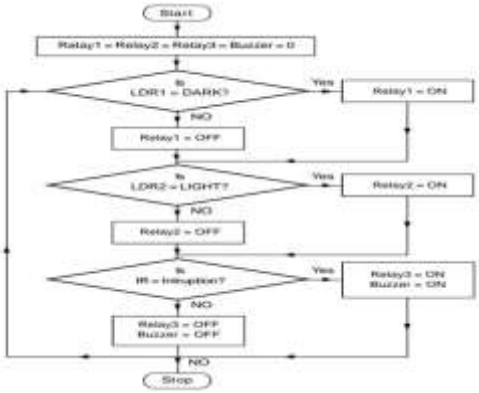

Figure1.3Flowchart

II.DESIGN OF HARDWARE

This chapter briefly explains about the Hardware. It discuss the circuit diagram of each module in detail.

ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode. Arduino board has the following new features:

• 1.0 pin out: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible both with the board that use the AVR, which operate with 5V and with the Arduino

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Due that operate with 3.3V. The second one is a not connected pin, that is reserved for future purposes.

- Stronger RESET circuit.
- Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

Fig: ARDUINO UNO

POWER SUPPLY:

The power supplies are designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronic circuits and other devices. A power supply can by broken down into a series of blocks, each of which performs a particular function. A d.c power supply which maintains the output voltage constant irrespective of a.c mains fluctuations or load variations is known as "Regulated D.C Power Supply".

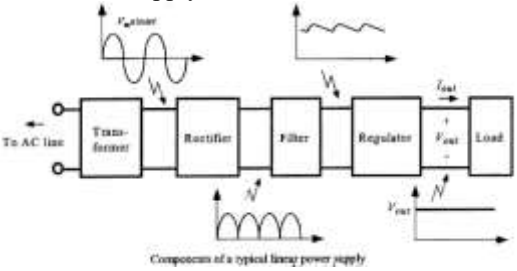


Fig: Block Diagram of Power Supply

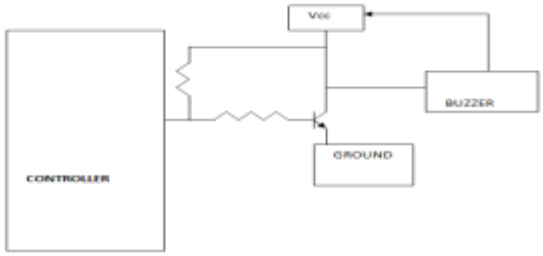
LCD DISPLAY

A model described here is for its low price and great possibilities most frequently used in practice. It is based on the HD44780 microcontroller (Hitachi) and can display messages in two lines with 16 characters each. It displays all the alphabets, Greek letters, punctuation marks, mathematical symbols etc. In addition, it is possible to display symbols that user makes up on its own. Automatic shifting message on display (shift left and right), appearance of the pointer, backlight etc. are considered as useful characteristics.

Fig: LCD

BUZZER

Digital systems and microcontroller pins lack sufficient current to drive the circuits like relays, buzzer circuits etc. While these circuits require around 10milli amps to be operated, the microcontroller's pin can provide a maximum of 1-2milli amps current. For this reason, a driver such as a power transistor is placed in between the microcontroller and the buzzer circuit.



LED:

A light-emitting diode (LED) is a two-lead semiconductor light source. It is a p–n junction diode that emits light when activated.[5] When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons.

This effect is called electroluminescence, and the color of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor. LEDs are typically small (less than 1 mm^2) and integrated optical components may be used to shape the radiation pattern.

Early LEDs were often used as indicator lamps for electronic devices, replacing small incandescent

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bulbs. They were soon packaged into numeric readouts in the form of seven-segment displays and were commonly seen in digital clocks. Recent developments have produced LEDs suitable for environmental and task lighting. LEDs have led to new displays and sensors, while their high switching rates are useful in advanced communications technology.

LEDs have many advantages over incandescent light sources, including lower energy consumption, longer lifetime, improved physical robustness, smaller size, and faster switching. Light-emitting diodes are used in applications as diverse as aviation lighting, automotive headlamps, advertising, general lighting, traffic signals, camera flashes, and lighted wallpaper. They are also significantly more energy efficient and, arguably, have fewer environmental concerns linked to their disposal.

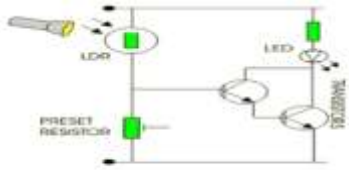
LIGHT DEPENDENT RESISTOR

A photo resistor or light dependent resistor (LDR) is a resistor whose resistance decreases with increasing incident light intensity; in other words, it exhibits photoconductivity. It can also be referred to as a photoconductor or CdS device, from "cadmium sulfide," which is the material from which the device is made and that actually exhibits the variation in resistance with light level. Note that CdS is not a semiconductor in the usual sense of the word (not doped silicon).

A photoresistor 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. An intrinsic semiconductor has its own charge carriers and is not an efficient semiconductor, e.g. silicon. 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 bandgap. Extrinsic devices have impurities, also called dopants, added whose ground state energy is closer to the conduction band; since the electrons do not have as far to jump, lower energy photons (i.e., longer wavelengths and lower frequencies) are sufficient to trigger the device. If a sample of silicon has some of its atoms replaced by phosphorus atoms (impurities), there will be extra electrons available for conduction. This is an example of an extrinsic semiconductor. Photo resistors are basically photocells.

LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1000 000 ohms, but when they are illuminated with light resistance drops dramatically.



III.CIRCUIT DIAGRAM and RESULT

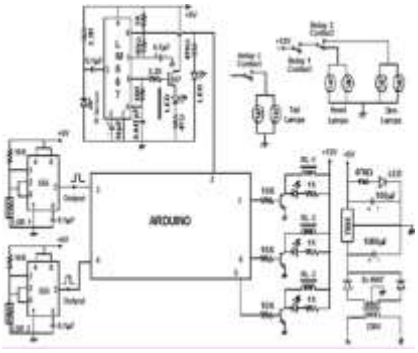


Figure2.1 Circuit Diagram

In order to reduce this we are introducing automatic headlight intensity control system. Our system automatically lower down the head light when a vehicle is coming opposite if our headlight intensityishigh.Alltheothertimesthe headlight of the vehicle will be kept high. We can also manually control theintensity if needed. The sensor used will detect all the light nearby including thelightfromthestores,streetlightetcanddimstheintensityof

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headlightaccordingly. Continuous power supply from the battery isneeded for the sensorycircuits. It is high time to introduce this type of system due to increasing rate ofaccidents in India. It is also a cost-effective solution for the problem of night timeaccidents.Itwillincreasethesafetyforthedriversandpedestrians.Keyword: Sketching1)Headlightintensity2)Automaticcontrol3)Arduino4)PIRsensor 5) LDR module.It's a very hectic job for the drivers to manuallycontrolthe beam of the headlamps during night from time to time when an oncomingvehicle is located within 150 meters of the other vehicle. So, it's high time when asafety control unit should be installed in vehicles that can automatically dim theheadlamps by detecting their intensity which, otherwise, might cause a serioustrouble for the drivers. Our work proposes a cost effective and useful control unitwhich will automatically detect the excessive glare fromheadlamps and will giveasignaltotheoncomingvehiclecausingthetroubletodimthelamps.Assuch,the driver's unnecessary load will be reduced, and driving will become safer andsmootherduringnights.

Aprototypeofautomaticheadlightdimmerthatautomatically switches the high beam into low beam thus reducing the glare effectby sensing the approaching vehicle and eliminates the requirement of manualswitching by the driver which is not done at all times. Toovercome come theabove problems our project is designed which helps to stop the accidents. Thecomponents and the block diagram have been explained in above chapters .theworking of the kit is very easy to understand ,here mainly sensors play the keyrole.as our project is on automatic lighting of vehicles and finding the obstacleswhich are at the back of the vehicles and giving the indication for both the drivers.Whenit isdaytime, wewon't useany head.

ADVANTAGES

• Makes the night-time driving experience safer and easier
• Avoid the dazzling effects
• Enhancement of drivers view at dark places & avoids the fatigue
• Avoid the momentary loss of vision, better controls the levels ofilluminationand focus.
• Eliminates annoying effects that are connected to the lighting.

DISADVANTAGES

• High cost
• Circuit complexity hannormal circuit

APPLICATIONS

• Used in cars and bikes
• Used in heavy transport vehicles
• Used in home appliances
• Used to avoid night accidents or collisions

IV.RESULT

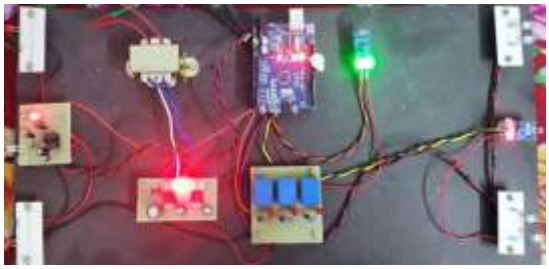

Figure3.1PracticalCircuit

Theconceptdescribedinthisprojectreportisaimedtodesign &implement an automatic lighting system for automobiles by which the vehicle canbe protected by avoiding collision with another vehicle. In general, especially inhighways, most of the accidents are taking place during knights only, this isbecause of dazzling lights effect, there by this system is designed to switch off thehead lights and switch on the dim lights automatically by sensing the oppositevehicle.Ifthiskindofsystemisimplementedinallsortsofvehicles,accidentsratecan bedecreased to some extent.

IV. CONCLUSION

The goal of this project is to expand the safety level in automobiles duringdark riding. As described in the main document, most of the accidents are takingplace duringknightsanditishappeningbecause of dazzlinglightseffectofopposite vehicles. When this kind of system implemented in all vehicles, headlamps will be switched off automatically and dim lamps are energized. If the dimlampsarealigned to view theroadedges, drivercan ridethe vehiclesafely.

Theprojectworkisdesignedanddevelopedsuccessfully,forthedemonstration purpose prototype module is constructed & results are found to besatisfactorily. While designing and developing this prototype module, we haveconsulted staffs of Arunodaya who are having knowledge in embedded systems.Sinceit is a prototypemodule, much amount is notinvested.

While designing and fabrication of this project work, wegathered information from websites. The information is gathered from yahoo.com searchEngine. Regarding micro controllers plenty of books are available, the followingare the references made during design, development and fabrication of the project work.

4.1 FUTURESCOPE

• Although the automotive market has struggled due to pandemic, the automotive intelligent lighting system market has high scope of growing opportunities.
• future due to the factors such has raise in demand in autonomous andsemi-

autonomousvehicles,technologicaladvancementinautomotivelighting and raise in need for automobile safety features from consumer-end.

• Also increase in demand for autonomous and semi-autonomous vehicles,technological advancements in automotive lighting are some factors thatlikely to boost the growth of automotive intelligent lighting system marketsoon.

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