Automatic Light- DIM and DIP Control for Automobiles

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Abstract *This report deals with design and fabrications of automatic dim and dip of the light “AUTOMATIC LIGHT-DIM AND DIP CONTROL FOR AUTOMOBILES”. The number of vehicles on our roads is burgeoning day by day. This is turn forced almost all this vehicle manufactures to think about the extra safety instruments and electronic controls to attach with these products for giving the users a safety derived in all road conditions through a mass flow traffics .If asked, one should always mention that the right driving is very cumbersome due to the dazzling light problems and the frequent dipping of head lights by manual means that often cause fatigue to the driver particularly at the time of peak traffic. So naturally to get rid of this perennial problem, an automatic mechanism has to come up to dip and dim the headlamp automatically whenever required. For keeping a motor vehicle under perfect control and reins of the driver different types of control and accessories are provided in an automobile around the driver seat, on the dash board and at the the foot board. Simply, an automatic dimmer and dipper is a unit . which can automatically judge when the head light beam needs to be lowered, and which dip the headlamp from which the beam to a dipped beam. As the dipper unit is well connected to the lighting system of the vehicle , we have to look short into discussing the wiring diagram or the construction of automatic dimmer and dipper.*

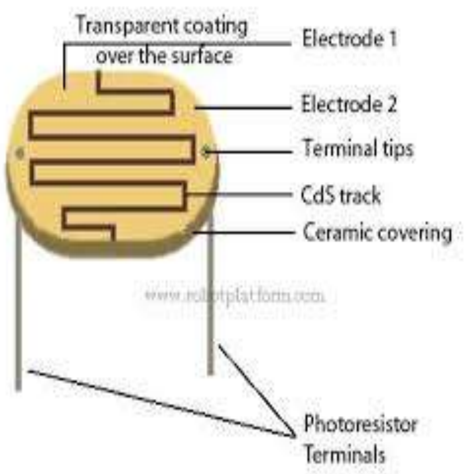
Keywords — *Dazzling light problems, lighting system of the vehicle*

I Introduction

The number of vehicles on our roads is burgeoning day by day. This is turn forced almost all this vehicle manufactures to think about the extra safety instruments and electronic controls to attach with these products for giving the users a safety derived in all road conditions through a mass flow traffics .if asked, one should always mention that the right driving is very cumbersome due to the dazzling light problems and the frequent dipping of head lights by manual means that often cause fatigue to the driver particularly at the time of peak traffic. So naturally to get rid of this perennial problem, an automatic mechanism has to come up to dip and dim the headlamp automatically whenever required. For keeping a motor vehicle under perfect control and reins of the driver,different types of control and accessories are provided in an automobile around the driver seat, on the dash board and at the the foot board. Simply, an automatic dimmer and dipper is a unit , which can automatically judge when the head light beam needs to be lowered, and which dip the headlamp from which the beam to a dipped beam. As the dipper unit is well connected to the lighting system of the vehicle, we have to look short into discussing the wiring diagram or the construction of automatic dimmer and dipper.

II DESCRIPTION OF EQUIPMENTS LDR SENSOR (LIGHT DEPENDENT RESISTOR):

A photoresistor or light-dependent resistor (LDR) or photocell is a light-controlled variable resistor. The resistance of a photo resistor decreases with increasing incident light intensity; in other words, it exhibits photoconductivity. A photo resistor can be applied in light-sensitive detector circuits, and light- and dark-activated switching circuits. A photo resistor is made of a high resistance semiconductor. In the dark, a photo resistor can have a resistance as high as a few mega ohms (MΩ), while in the light, a photo resistor can have a resistance as low as a few hundred ohms. If incident light on a photo resistor exceeds a certain frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. Moreover, unique photo resistors may react substantially differently to photons within certain wavelength bands. A photoelectric device can be either intrinsic or extrinsic. An intrinsic semiconductor has its own charge carriers and is not an efficient semiconductor, for example, 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 are sufficient to trigger the device.

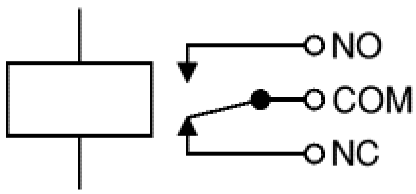


COMPARATOR A comparator is a circuit that accepts two voltages, V_1 and V_2 and outputs zero volts if $V_1 > V_2$ or outputs a positive voltage level if $V_2 > V_1$. Comparators can be built from operational amplifiers.

Remember that the gain of the op-amp is extremely large, somewhere on the order of 10^6. So if the difference between the two input voltages is around 1 volt, would we expect an output voltage of one million volts? Obviously this can't happen. The large gain of the op-amp is only valid over a small range of input voltages. If the output voltage becomes larger than the supply voltages for the op-amp, then the output will saturate or clip at that level. This means that uncompensated op-amps output voltage as a function of its input voltage will appear . The implication inherent is that an uncompensated op-amp can be used to compare two voltages. The two inputs to the circuit are analog voltages. But if the input voltage difference is only a few millivolts, then the output will be one of two voltages, pegged at one of the two power supply voltages. In other words, the output will be binary in nature and we can use these binary voltages as a way of testing whether or not one voltage is greater than another.

DRIVER CIRCUIT In electronics, a driver is an electrical circuit or other electronic component used to control another circuit or component, such as a high-power transistor, liquid crystal display (LCD), and numerous others.
They are usually used to regulate current flowing through a circuit or is used to control the other factors such as other components, some devices in the circuit. The term is often used, for example, for a specialized integrated circuit that controls high-power switches in switched-mode power converters. An amplifier can also be considered a driver for loudspeakers, or a constant voltage circuit that keeps an attached component operating within a broad range of input voltages. Typically the driver stage(s) of a circuit requires different characteristics to other circuit stages. For example in a transistor power amplifier, typically the driver circuit requires current gain, often the ability to discharge the following transistor bases rapidly, and low output impedance to avoid or minimize distortion.

RELAY A relay is an electrically opeated 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 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**.

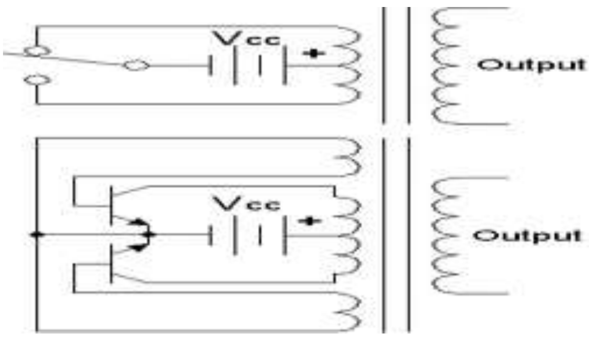
NO = Normally Open, COM is connected to this when the relay coil is **on**.

CIRCUIT DESCRIPTION

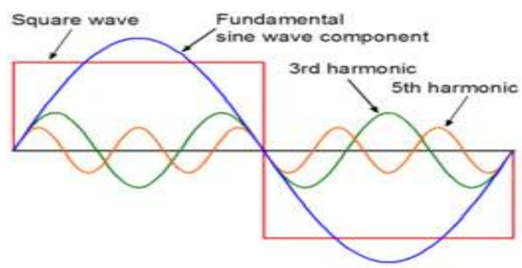
This circuit is designed to control the load. The load may be motor or any other load. The load is turned ON and OFF through relay. The relay ON and OFF is controlled by the pair of switching transistors (BC 547). The relay is connected in the Q2 transistor collector terminal. A Relay is nothing but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

INVERTER An **inverter** is an electrical or electro-mechanical device that converts direct current (DC) to alternating current (AC); the resulting AC can be at any required voltage and frequency with the use of appropriate transformers, switching, and control circuits Static inverters have no moving parts and are used in a wide range of applications, from small switching power supplies in computers, to large electric utility high-voltage direct current applications that transport bulk power. Inverters are commonly used to supply AC power from DC sources such as solar panels or batteries. The electrical inverter is a high-power electronic oscillator. It is so named because early mechanical AC to DC converters were made to work in reverse, and thus were "inverted", to convert DC to AC. The inverter performs the opposite function of a rectifier.

CIRCUIT DESCRIPTION In one simple inverter circuit, DC power is connected to a transformer through the centre tap of the primary winding.. A switch is rapidly switched back and forth to allow current to flow back to the DC source following two alternate paths through one end of the primary winding and then the other. The alternation of the direction of current in the primary winding of the transformer produces alternating current (AC) in the secondary circuit. The electromechanical version of the switching device includes two stationary contacts and a spring supported moving contact. The spring holds the movable contact against one of the stationary contacts and an electromagnet pulls the movable contact to the opposite stationary contact. The current in the electromagnet is interrupted by the action of the switch so that the switch continually switches rapidly back and forth. This type of electromechanical inverter switch, called a vibrator or buzzer, was once used in vacuum tube automobile radios. A similar mechanism has been used in door bells, buzzers and tattoo guns. As they became available from early 1970s, transistors and various other types of semiconductor switches have been incorporated into inverter circuit designs.



OUTPUT WAVEFORMS The switch in the simple inverter described above produces a square voltage waveform as opposed to the sinusoidal waveform that is the usual waveform of an AC power supply. Using Fourier analysis, periodic waveforms are represented as the sum of an infinite series of sine waves. The sine wave that has the same frequency as the original waveform is called the fundamental component. The other sine waves, called harmonics that are included in the series have frequencies that are integral multiples of the fundamental frequency. The quality of the inverter output waveform can be expressed by using the Fourier analysis data to calculate the total harmonic distortion (THD). The total harmonic distortion is the square root of the sum of the squares of the harmonic voltages divided by the fundamental voltage:



ADVANCED DESIGNS There are many different power circuit topologies and control strategies used in inverter designs. Different design approaches address various issues that may be more or less important depending on the way that the inverter is intended to be used.

The issue of waveform quality can be addressed in many ways. Capacitors and inductors can be used to filter the waveform. If the design includes a transformer, filtering can be applied to the primary or the secondary side of the transformer or to both sides. Low-pass filters are applied to allow the fundamental component of the waveform to pass to the output while limiting the passage of the harmonic components. If the inverter is designed to provide power at a fixed frequency, a resonant filter can be used. For an adjustable frequency inverter, the filter must be tuned to a frequency that is above the maximum fundamental frequency. Since most loads contain inductance, feedback rectifiers or anti parallel diodes are often connected across each semiconductor switch to provide a path for the peak inductive load current when the switch is turned off. The anti parallel diodes are somewhat similar to the freewheeling diodes used in AC/DC converter circuits.

RECTIFIER AND INVERTER PULSE NUMBERS

Rectifier circuits are often classified by the number of current pulses that flow to the DC side of the rectifier per cycle of AC input voltage. A single-phase half-wave rectifier is a one-pulse circuit and a single-phase full-wave rectifier is a two-pulse circuit. A three-phase half-wave rectifier is a three-pulse circuit and a three-phase full-wave rectifier is a six-pulse circuit.[6] With three-phase rectifiers, two or more rectifiers are sometimes connected in series or parallel to obtain higher voltage or current ratings. The rectifier inputs are supplied from special transformers that provide phase shifted outputs. The associated rectifier circuits are 12-pulse rectifiers, 18-pulse rectifiers and so on.

When controlled rectifier circuits are operated in the inversion mode, they would be classified by pulse number also. Rectifier circuits that have a higher pulse number have reduced harmonic content in the AC input current and reduced ripple in the DC output voltage. In the inversion mode, circuits that have a higher pulse number have lower harmonic content in the AC output voltage waveform

III POWERSUPPLY

The ac voltage, typically 220V.is connected to a transformer, which steps that ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation. A regulator circuit removes the ripples and also remains the same dc value even if the input dc voltage varies, or the load connected to the output dc voltage changes. This voltage regulation is usually obtained using one of the popular voltage regulator IC units.

WORKING PRINCIPLE OF TRANSFORMER

The potential transformer will step down the power supply voltage (0-230V) to (0-6V) level. Then the secondary of the potential transformer will be connected to the precision rectifier, which is constructed with the help of op–amp. The advantages of using precision rectifier are it will give peak voltage output as DC, rest of the circuits will give only RMS output.

BRIDGE RECTIFIER When four diodes are connected as shown in figure, the circuit is called as bridge rectifier. The input to the circuit is applied to the diagonally opposite corners of the network, and the output is taken from the remaining two corners. Let us assume that the transformer is working properly and there is a positive potential, at point A and a negative potential at point B. the positive potential at point A will forward bias D3 and reverse bias D4. The negative potential at point B will forward bias D1 and reverse D2. At this time D3 and D1 are forward biased and will allow current flow to pass through them; D4 and D2 are reverse biased and will block current flow. One-half cycle later the polarity across the secondary of the transformer reverse, forward biasing D2 and D4 and reverse biasing D1 and D3. Current flow will now be from point A through D4, up through RL, through D2, through the secondary of T1, and back to point A. This path is indicated by the broken arrows. Waveforms (3) and (4) can be observed across D2 and D4. The current flow through RL is always in the same direction. In flowing through RL this current develops a voltage corresponding to that shown waveform (5). Since current flows through the load (RL) during both half cycles of the applied voltage, this bridge rectifier is a full-wave rectifier. One advantage of a bridge rectifier over a conventional full-wave rectifier is that with a given transformer the bridge rectifier produces a voltage output that is nearly twice that of the conventional full-wave circuit.

IC VOLTAGE REGULATORS Voltage regulators comprise a class of widely used ICs. Regulator IC units contain the circuitry for reference source, comparator amplifier, control device, and overload protection all in a single IC. IC units provide regulation of either a fixed positive voltage, a fixed negative voltage, or an adjustably set voltage. The regulators can be selected for operation with load currents from hundreds of mill amperes to tens of amperes, corresponding to power ratings from mill watts to tens of watts. A fixed three-terminal voltage regulator has an unregulated dc input voltage, Vi, applied to one input terminal, a regulated dc output voltage, Vo, from a second terminal, with the third terminal connected to ground.

IV CONCLUSION

Headlamp glare is an issue that has grown in terms of public awareness over the past decade. High beam of headlight of an on-coming car has blinding effect and decreases visibility dangerously. With the auto boom, the ability to see and visual comfort lighting can result in glare, which can be a major problem both in terms in accident rate has also risen alarmingly. However too much light or improper lighting can result in glare, which can be a major problem both in terms of the ability to see and visual comfort. Glare occurs when visual field brightness is greater than the luminance to which the eyes are adapted. Glare is caused by both direct and indirect light sources. Discomfort glare produces loss in visual discomfort, annoyance, and fatigue. Disability glare produces loss in visual performance which is generally defined as a reduction in the visibility distance of low contrast objects. The elderly, people with light-colored eyes and those suffering from cataracts are especially sensitive to disability glare. Glare at night can be mitigated by prudent design of the roadway, the automobile, and vehicle lighting systems. The extent to which glare is a problem for night driving is not easily quantified. In the absence of official statistics or scientific data, evidence of a glare problem is based almost entirely upon subjective reports, most of which are anecdotal without data from well-designed experiments, we can only qualitatively assess the deleterious effects of glare, and the economic and safety consequence

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