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A New Road Safety and Street Light Intensity Control Technique

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ABSTRACT- Street lightings is particular critically concerned for the communal authoritie in a developing country because of it strategics importances for the economical & social stabilities. The paper's main goal is to make roads safer by using an intelligent lighting system that uses less energy. System feature automatically street light brightness adjustment based on the vehicle movements, as well as automatic street light switching ON and OFF based on ambient light. Every given distance, a street light module is put one after the other. The suggested technology also seeks to reduce traffic accidents by identifying whether or not the driver has consumed alcohol. An alcohol sensor module with a skin sensor, breath alcohol sensor, and proximity sensor can be used to do this. The proximity sensor aids in detecting any type of carelessness, while skin sensors & alcohol sensor identify presences of the alcoholic content. Novelty of paper is effectively reducing consumption of energy of the road light by the controlling of intensity of the streets lights, detecting both the human & vehicular movements, and preventing injury and death caused by drunk driving by pre-sensing the alcohol content in drivers in a simple and cost-effective manner. The suggested system may be implemented on a wide scale by the government, and other features can be added in the future, such as a GSM module that can be used to send a notification to the traffic police if the motorist tries to remove the alcohol detection module in any way. In the future, an overspeed detection technology might be combined with street light control.

KEYWORDS Alcohol, LDR, Vehicle, Sensor, Street Light.

I. INTRODUCTION

Every engineer working in this sector is intrigued by the prospect of creating a new streetlight system that uses less power and illuminates broad areas with the maximum intensity of light. One of the most essential and costly tasks of a city's authority is to provide street lighting. In average cities across the world, lighting can account for 10-38 percent of the overall energy cost. Because of its strategic relevance for economic and social stability, street lighting is a particularly pressing problem for governments in developing nations. Every year, inefficient lighting costs a considerable amount of money, and inadequate illumination puts people in danger. Street lighting costs may be substantially reduced thanks to energy-efficient technology and design features [1,2].

The goal of this article is to build and execute an automated system to regulate and minimise the energy usage be a major cause of accidents in the vast majority of countries across the world. Drunk driving is an unpleasant fact that occurs in our society today, causing numerous difficulties and fatalities for people in various locations. Drivers must ensure that they are sober and capable of driving to their destination so that they do not jeopardise the lives of others who are still alive. Alcohol consumption was shown to be present in up to 33 percent - 69 percent of fatally wounded drivers, and in between 8 percent - 29 percent of drivers engaged in collisions who were not fatally injured, according to several studies. Despite the fact that the number of alcohol-related collisions has decreased in recent decades, there are still far too many of these avoidable tragedies. As a result, if this article is widely adopted, it can result in considerable savings in the amount of energy used by street lighting [3,4].

Several accidents have occurred recently as a result of the motive force or the person operating the car consuming alcohol. As a result, drunk driving may be a major cause of accidents in the vast majority of countries across the world. Drunk driving is an unpleasant fact that occurs in our society today, causing numerous difficulties and fatalities for people in various locations. Drivers must ensure that they are sober and capable of driving to their destination so that they do not jeopardise the lives of others who are still alive. Alcohol consumption was shown to be present in up to 33 percent - 69 percent of fatally wounded drivers, and in between 8 percent - 29 percent of drivers engaged in collisions who were not fatally injured, according to several studies. Despite the fact that the number of alcohol-related collisions has decreased in recent decades, there are still far too many of these avoidable tragedies. Despite significant progress, intoxicated driving remains a severe national problem that claims the lives of many people each year [5-9].

There are a variety of alcohol detection devices that may be worn on the wrist, such as a wrist band. The disadvantage of the currently available alcohol detecting wrist band, which uses similar transdermal sensor technology, is that it is not guaranteed that every driver will be wearing it at all times, necessitating the addition of a separate module to ensure that the person who drives is wearing it at all times, which would make the circuitry more complex. Alcokey is another suggested device, although it may be used by someone other than the intoxicated driver. This paper aims to detect alcohol intake by the driver, and if it reaches a specific threshold (0.08mg/100ml), the vehicle's access and mobility will be restricted. Accidents or deadly wrecks are avoided as a result of this. For the detection of alcohol intake, skin sensors and breath alcohol sensors are used [10-12].

II. LITTERATURE REVIEW

Andrzej et al. discussed the transdermal sensor detects the presence of alcohol on the skin, while the proximity sensor ensures that the contact is constant. The car cannot be opened if the amount of alcohol drank exceeds the predetermined limit. Vehicle entry is permitted in the absence of the aforesaid situation. A breath alcohol sensor is located between the dashboard and steering wheel, and when the Breath Alcohol Threshold (BAL) exceeds a certain level, the vehicle's movement is gradually restricted. This is important because alcohol takes time to disperse in the bloodstream and is not detectable by the skin sensor if the individual has ingested it only a short time earlierThey were developed, analysed, and then deployed and tested in a real-world street lighting system. Alcokey is another suggested device, although it may be used by someone other than the intoxicated driver. This paper aims to detect alcohol intake by the driver, and if it reaches a specific threshold (0.08mg/100ml), the vehicle's access and mobility will be restricted. Accidents or deadly wrecks are avoided as a result of this. For the detection of alcohol intake, skin sensors and breath alcohol sensors are used [13].

Gouthami et al. discussed an automatic street light controller using a light dependent resistor (LDR) to remove manual works. The transdermal sensor detects the presence of alcohol on the skin, while the proximity sensor ensures that the contact is constant. The car cannot be opened if the amount of alcohol drank exceeds the predetermined limit. Vehicle entry is permitted in the absence of the aforesaid situation. A light-detection resistor (LDR) is used to detect light. When there is enough light available, the streetlight will be in the OFF state, and when it is dark, the light will be in the ON state, indicating that LDR resistance is inversely proportional to light falling on it. With the aid of an electromagnetically controlled switch, it takes advantage of the saturation and cut-off regions of a transistor to turn on and off the lights at the proper times. Nonetheless, because it controls the intensity of light, it can conserve energy to some extent; however, energy used by high-intensity street lights during periods of low traffic cannot be saved [14].

Paul et al. discussed two types of transdermal devices that detect alcohol at the skin surface representing two types of electrochemical sensing technology. 22 paid study volunteers wore the ankle and wrist devices for a total of 96 weeks in order to evaluate them. Each individual drank to a blood alcohol concentration (BAC) of 0.08 grammes per decilitre in both the lab and on their own. There were a total of 271 drinking events with BACs of less than.02 g/dL logged: 60 from laboratory dosing and 211 from self-dosed drinking. At the skin's surface, both devices identified alcohol. The drawback of this band is that it is not guaranteed that every driver will wear it at all times. As a result, a separate module should be included to ensure that the driver wears it at all times, which would complicate the circuitry [15].

Research Question

- How to control the intensity of the street light automatically?
- How to detect the alcohol consumtion level?

III. METHODOLOGY

A. Design Methodology

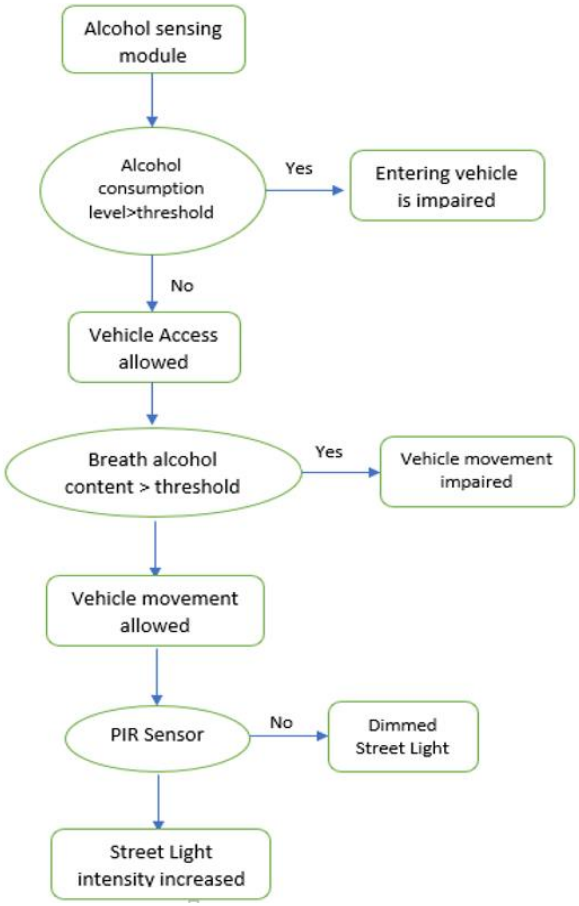


Figure 1: Illustrates the flow chart of the complete module of the light intensity sensor with an alcohol detector

The implementation of road safety and light intensity control working flow chart is shown in Figure 1. The car cannot be opened if the amount of alcohol drank exceeds the predetermined limit. Vehicle entry is permitted in the absence of the aforesaid situation. A breath alcohol sensor is located between the dashboard and steering wheel, and when the Breath Alcohol Threshold (BAL) exceeds a certain level, the vehicle's movement is gradually restricted. This is important because alcohol takes time to disperse in the bloodstream and is not detectable by the skin sensor if the individual has ingested it only a short time earlier.

B. Implementation of Road Safety and Street Light Modules

1) Street Light Modules

Once deployed on a broad scale, such a system can considerably cut the amount of energy used by street lighting. This effort will assist the government in conserving energy while meeting residential and industrial requirements. The system also has the advantages of being a simple circuit that does not require continual supervision and allows for design flexibility. After putting this method in place, there is still room for improvement. Controlling activities may be essential depending on the quantity of

traffic in a specific direction. Similarly, an alcohol detection device will significantly reduce the number of accidents caused by drunk driving. The suggested alcohol detection system may be used in any vehicle and has a high level of accuracy.

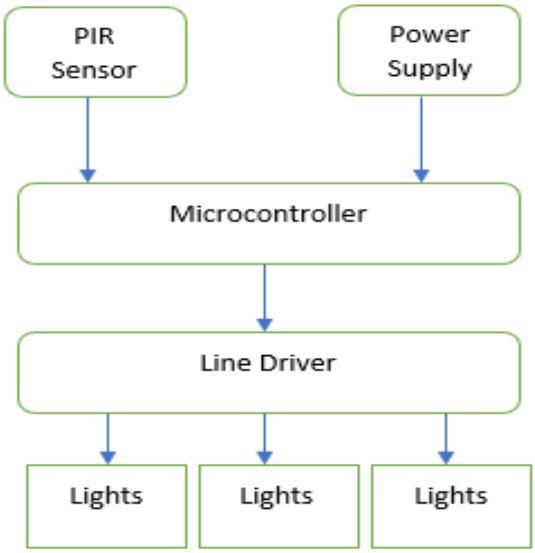


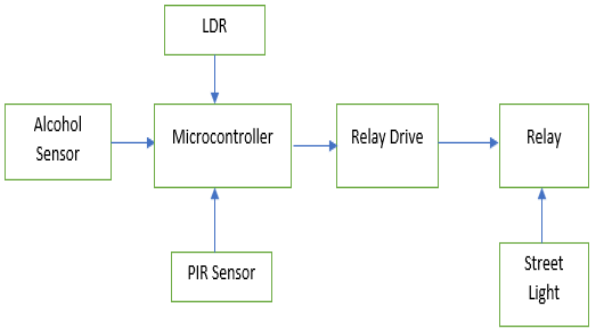
Figure 2: Illustrates the block diagram of street light modules that increase or decrease the intensity of street light using a PIR sensor

The PIR does not emit any kind of energy; instead, it merely absorbs infrared light (IR). The change in the IR rays generated by the cars is used to detect motion, and this information is sent to the microcontroller. The PIC16F877A is utilised in this example. It is built on Harvard design, and it is significantly quicker because to the smaller instruction set computation. An Analog to Digital Converter (ADC) is incorporated inside the controller, which is necessary to collect signals from the different sensors. It is quicker than the 8051 since the highest clock frequency is 20 MHz. The microcontroller is programmed using Embedded C. The resistance of the sensor element fluctuates depending on the intensity of light, which changes the voltage. This voltage drop is measured by the ADC.

2) Road Safety Module

In the road safety module shown in Figure 3, identify handicapped drivers' alcohol levels and keep them off the road. When you drink alcohol, it spreads throughout your body. This alcohol may be found in a variety of bodily fluids, including breath, blood, and sweat. A portion of the alcohol drank is absorbed via the skin. The sensor detects certain chemical properties that are delivered transdermally by entry is disabled. Alcohol sensors with a wide range of detection are installed inside the car. This alcohol sensor, like a standard Breath Analyzer, can detect alcohol content on the breath. It has a great sensitivity and responds quickly. Based on the amount of alcohol in the system, this sensor produces an analogue resistive output. A 0-3.3V ADC might be a simple interface. If alcohol intake exceeds the legal limit, the vehicle's ability to travel will be simply disabled.

Figure 3: Illustrates the block diagram of the Alcohol detector which senses the consumption of alcohol and



performs as programmed

C. Components Used

Following are the list of the main components used in the making of both the modules:

1) Passive Infrared Sensor (PIR)

The PIR sensor contains two slots, each of which is constructed of a specific IR-sensitive substance. When the sensor is turned on, both slots detect the same quantity of IR, which is the ambient amount emitted by the room, walls, or the environment. When a warm person you consume alcohol, it pervades your entire body. This alcohol may be detected in breath, blood, and perspiration, among other body fluids. A part of the alcoholic beverage consumed is absorbed via the skin. When entry is inhibited, the sensor recognizes particular chemical qualities that are supplied transdermally. Inside the automobile, alcohol sensors with a broad detection range are mounted. Like a normal Breath Analyzer, this alcohol sensor can detect alcohol concentration on the breath. It is extremely sensitive and reacts swiftly. This sensor generates an analogue resistive output based on the amount of alcohol in the system. A basic interface may be a 0-3.3V ADC. The vehicle's ability to travel will simply be disabled if alcohol consumption exceeds the legal limit..

2) Light Dependent Resistor

In the circuit where it is essential to sense the presence or level of light, a light dependent resistor, as illustrated in fig. 5, is employed. LDR, photocell, photoconductor, and other terms are used to describe these devices. Many electrical circuit designs benefit from the usage of LDRs, or photo-resistors. For variations in light level, they give a substantial shift in resistance. The resistance varies as light falls on LDR. The resistance of the LDR can vary by several orders of magnitude, with the resistance decreasing as the amount of light rises.

IV. RESULTS AND DISCUSSION

The major goal of this study was to minimise the amount of energy used by street lights by avoiding inefficient lighting, which loses a lot of money every year. This is accomplished by lowering the lights at times when there is less traffic. The PIR sensor is used to detect any movement for this purpose. The goal of this article is to reduce the number of fatal collisions and traffic accidents caused by

alcohol use. Skin sensors in car doors, as well as breadth sensors inside the vehicle, are used to do this. The number of people who die as a result of drunk driving can be drastically decreased if this policy is implemented. The prototype has been implemented and is working as predicted. If scaled up, it will be extremely helpful and will meet all of the current limitations.

According to the analyses and research given in the article, utilising current technology to minimise lighting energy consumption and control power demand in public areas is both logical and economically realistic. The primary disadvantage of today's traditional switching and timed switching systems is power waste.

The cost of putting up the system would be significant at first, but the revenues would far surpass the costs. Once deployed on a broad scale, such a system can considerably cut the amount of energy used by street lighting. This effort will assist the government in conserving energy while meeting residential and industrial requirements. The system also has the advantages of being a simple circuit that does not require continual supervision and allows for design flexibility. After putting this method in place, there is still room for improvement. Controlling activities may be essential depending on the quantity of traffic in a specific direction. Similarly, an alcohol detection device will significantly reduce the number of accidents caused by drunk driving. The suggested alcohol detection system may be used in any vehicle and has a high level of accuracy. A other corporation might deploy this detecting mechanism.

V. CONCLUSION AND IMPLICATIONS

The goal of this article is to develop and execute an automated system for dimming street lights that are not needed throughout the night. Additionally, the lighting ambience is examined, with lights turned on while it is dark and off throughout the day. Our administration is working hard to meet customer demand for power. As a result, if this article is widely adopted, it can result in considerable savings in the amount of energy used by street lighting. This effort will assist the government in conserving energy while meeting residential and industrial requirements. Drunk driving is still a significant national problem that claims the lives of many people every year. The percentage of collisions caused by drinking is still a topic of discussion. This study also attempts to detect the driver's alcohol intake, and if it reaches a specific threshold, it prevents the driver from entering the car. Accidents or deadly wrecks are avoided as a result of this. The suggested system may be implemented on a wide scale by the government, and other features can be added in the future, such as a GSM module that can be used to send a notification to the traffic police if the motorist tries to remove the alcohol detection module in any way. In the future, an overspeed detection technology might be combined with street light control.

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