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Arduino Based Driver Drowsiness Detection & Alerting System

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ABSTRACT

There seems to be an increasingly high and unpredictable number of accidents nowadays. In the worst cases, accidents can even prove fatal. A driver drowsiness detection system is an important piece of automotive safety technology for avoiding crashes caused by driver fatigue. Approximately 20% of all traffic accidents may be attributable to drowsy driving, according to a number of studies. The detection technology has improved greatly recently. Staying awake at the wheel is a formidable obstacle to accident avoidance. Systems. Many new drivers are aware of the risks associated with getting behind the wheel while sleepy. It's important to develop plans to mitigate the impact. The goal here is to devise some sort of defence system to keep unwanted people from taking up residence in the car. We cannot care for ours while sprinting while distracted. If we install an automatic security system in every vehicle, the driver will be kept safe and an alarm will go off. Take initiative with this project. Using an infrared (IR) sensor, it controls when the eyes blink. Information can be sent through the IR transmitter. Light that is infrared to the retina. The IR receiver picks up the signal that has been reflected back to it. Detectable by the human eye's infrared sensors. With the eye closed, the IR receiver's output is at its highest. The IR receiver's output is subpar if the other conditions are not met. Knowing the exact moment the eye closes is crucial. This is the signal that is sent to the logic circuit to trigger the alarm. Drivers The majority of accidents that occur in society can be attributed to sleepiness. The technology we're using, a drowsy-driver detection and alerting system, helps us cut down on accidents caused by sleepy drivers. A drowsy driver's state can be detected by an eye blink sensor. The blink rate of the eye can be detected using an eye blink sensor, and if the user's blink rate deviates too greatly from the average, a buzzer will sound. The car will come to a halt if the person's eye is still closed. Once the person is informed that the buzzer has sounded, the beeping will cease and the vehicle will resume its normal operation.

KEYWORDS-EyeBlink sensor,ArduinoUNO, RF Transceiver module ,buzzer,BO Motor with wheel,HD12E &HD12D IC.

1. INTRODUCTION

Someone who is drowsy feels an intense need to sleep and is on the verge of falling asleep. It can describe both the normal condition of winding down for sleep and the chronic condition of remaining in that state on a regular basis. Driving while sleepy is a recipe for disaster, as is engaging in any activity that requires constant focus. The detection or prevention of driver drowsiness is a significant challenge in the development of accident avoidance systems because of the increased risk of traffic accidents that occurs when a person is sleepy while operating a vehicle. Because of the potential dangers associated with sleepiness, methods must be developed to reduce them. The purpose of this work is to build a system that can simulate sleepiness detection. It is claimed that keeping an eye on the eyes can detect the signs of driver drowsiness in a sufficiently early stage, to avoid a car accident.The most common cause of auto accidents is poor driving, so the focus will be on creating a system that will precisely track whether the driver's eyes are open or closed. Such incidents are common when a driver is under the influence of alcohol or fatigue. Fatigued driving is widely recognised as a major cause of car crashes. Drunk driving is proven to account for over 20% of all car accidents. However, it is impossible to bring back a life that has been lost. The infrared waves emitted by the IR transmitter offer some protection

against these, and modern technology holds the promise of further improvement. The IR detector picks up the reflected infrared light from the eye. The IR receiver's output is high if the eye is closed, and low otherwise. for identifying whether or not the eye is closed. This is the signal that is sent to the logic circuit to trigger the alarm. Thecontrolling mishap brought on by unconsciousness via eye blink. One eye blink sensor is shown hereplaced in vehicles so that if somebody passes out, the alarm will sound. A study using an automobile simulator was created to gather physiological data for the technology's validation. the objective evaluation of sleepiness andsequential fitting is used to construct a drowsiness detection algorithm.

2. LITERATURESURVEY

Recently, image processing methods have been applied to the problem of detecting driver fatigue. As soon as the driver's eyes close for more than a certain amount of time, they are considered to be drowsy. The car's speed is reduced and information about the driver's health is obtained. Every day, more and more people lose their lives as a result of car accidents. Driver Sleepiness is a major contributor to the risk of vehicular accidents. Device capable of identifying and preventing drivers from being distracted. A technique based on image processing was utilised to identify the driver's blinking eyes. If the driver closes their eyes for longer than a certain amount of time, they are considered to be drowsy.

3. EXISTING MODEL

An integral part of many modern systems is a camera installed in the dashboard ahead of the driver. If the driver appears tired, the device will point a straight arrow at his or her face and monitor eye movement. Putting a camera in the front windshield will block the driver's field of view, rendering the camera useless. We need to address the problem of the present This project creates a brand-new kind of detection system. Most investigations into driver behaviour can make use of an inexpensive camera-based system. There will be a greater pool of data from which to draw conclusions about driver behaviour, and the results of various driving simulators, for example, will be easier to compare. Camera-based systems for detecting or predicting driver impairment require indicators of various driver states to be defined and implemented. When trying to gauge a driver's emotional or mental state, you'll find that many of the indicators you use are themselves subject to a wide range of influences. It's possible that a person's partially closed eyes indicate sleepiness, but they could also be caused by external factors like direct sunlight or a powerful fan. Therefore, it is crucial to find reliable indications. By incorporating data from many indications, the accuracy of a detector or classifier can be improved. Such a classifier would be useful in studies conducted in simulators to assess things like the efficacy of various warning interfaces or how people drive while impaired. Driver state can be determined in a consistent and objective manner by using a classifier.

4. PROPOSED MODEL

Drowsy driving is a major cause of accidents, but they may be avoided with the use of eye blink sensors. The driver must wear an eye blink sensor frame at all times when operating a motor vehicle, and each blink must be sustained for several seconds to reliably detect fatigue. When the steering motion fluctuates erratically, the wheel speed drops. The threshold of the vibration sensor may be changed, allowing for tailored responses. Therefore, if the driver turns off, the eye blink sensor's frame vibrates and the LCD also displays the warnings. Depending on the circumstance, the wheel either slows down or stops. The circuit should be wired as shown in the block diagram. Second, debug the code on the Arduino Nano board. When an eye blinks, the eye blink sensor registers that fact. There will be a complete halt and the driver will be alerted. For Step 7 to work, you must reset the button.

The purpose of this project is to create an eye-blink-based drowsiness detection and alerting system for drivers using an RF transceiver module and an Arduino Nano. The system's main job is to track the position of the driver's gaze. When the device's Eye Blink Sensor detects that the driver is becoming drowsy, it will alarm them with a piercing beep and reduce the vehicle's speed. A comprehensive outline of the proposed project is depicted in the block diagram. The whole concept and its intended implementation are shown in a single block diagram.

4.1 COMPONENTS REQUIRED

Eye-Blink sensor, Arduino UNO, RF Transceiver module, buzzer, BO Motor with wheel, HT12E & HT12D IC.

1)Eye-Blink sensor:

Blink detection is accomplished by shining infrared light into the eye, and then monitoring any changes in the amount of reflected light. Infrared light reflected from the eye is used to determine the results. The sensor's active high output, which is useful for interfacing with a microcontroller, is present while the eye is closed (e.g. buzzer)

2) Arduino UNO:

The Arduino Uno is a free and open-source microcontroller board developed by Arduino.cc that utilises the Microchip ATmega328P microprocessor. The board features digital and analogue input/output (I/O) pins that can connect to a wide range of expansion boards (shields) and other circuits. There are six PWM output pins available among the board's fourteen digital I/O pins. Connecting it to a computer via USB type B allows for programming in the Arduino IDE (Integrated Development Environment). [4] It works with power supplies in the 7–20 volt range, as well as 9–volt batteries and USB cables. There are parallels can be drawn with the Arduino Nano and Leonardo. [5] [6] Under a Creative Commons Attribution Share-Alike 2.5 licence, the hardware reference design has been made publically available.

3) RF- Transceiver module (433MHz):

To transmit and receive radio waves, two devices need a small electrical component called an RF module. The RF module is most commonly used in embedded systems for wirelessly transferring data to and from another device. This communication might be accomplished using radio waves. For many uses, the non-line-of-sight nature of radiofrequency makes it the ideal medium. Mainstream applications for RF modules include modest and medium-volume wireless alarm systems, garage door openers, smart sensor applications, wireless home automation systems, and industrial remote controls. This article describes the block diagram of an RF transceiver module and its applications.

In remote control systems, a CMOS LSI family known as the HT 12E Encoder ICs is employed. They have a capacity for 12-bit encoding, with N address bits and 12-bits of data. Each address/data input is trinary programmable from the outside if the bond is broken. The HT 12D IC family of CMOS LSIs finds widespread use in remote control systems. This IC is paired with another one. For optimal performance, pick an encoding and decoding combination that uses the same amount of addresses and data format. The serial address and data from the corresponding decoder are transmitted by a carrier via radio frequency (RF), and the Decoder analyses the data before delivering it to the output pins.

4. EYE BLINK SENSOR:

The IR technology is used in this eye blink detector. Consisting of an infrared (IR) transmitter and a receiver, it can communicate with remote devices. The eye blink sensor shines infrared light into the eye and detects any fluctuations in the reflected beam. The results are based on the infrared light reflected from the eye.

5.BO MOTOR WITH WHEEL:

A DC geared motor that runs on batteries and has good torque and rotations per minute (rpm) at lower voltages. This motor can turn at about 150 RPM when it is run by a single Li-Ion battery. Great for light robots that run on batteries. DC geared motors that can be powered by batteries are called Battery Operated (BO) motors. Most of the things you can do with it are light. available in various torque and RPM ranges

Features:

Voltage Range (V): 4.5 to 9

Rating at this time: 0.07A (maximum on load)

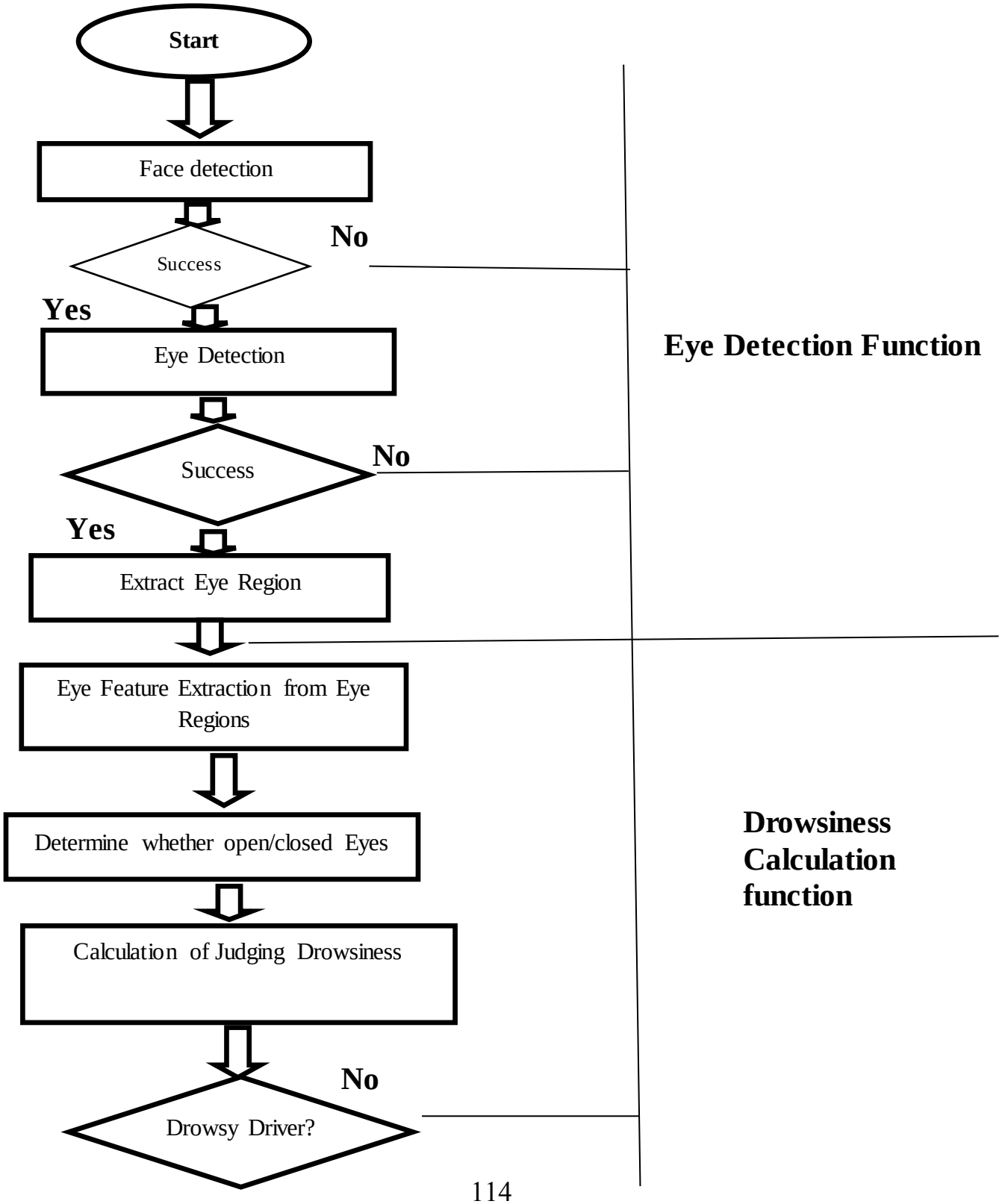
Speed (RPM): 100 RPM + 10%

The BO Motor is used in engineering projects, science projects, robotics, Arduino programming, project design, internet of things (IoT), science exhibition, do-it-yourself (DIY), embedded systems, training, experiments, and robot building

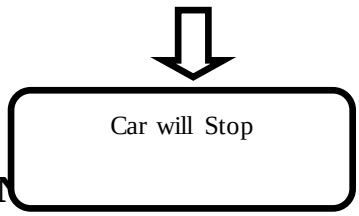
4.2 ALGORITHM:

STEP 1: As per the block diagram, connect the circuit.
STEP 2:Debug the code on the Arduino Nano board in step two.
STEP 3: The eye blink sensor tracks the occurrence of an eye blink.
STEP 4: Finish
STEP 5: The vehicle will stop and the driver will be informed.
STEP 6: Start
Reset the button in Step 7 to start the vehicle.

4.3FLOW CHART:



Yes



5.WORKIN

The technology for detecting drowsy drivers looks at whether or not all of the project's sensor modules are working. This helps describe what goes into modules and what comes out of them. The eye blink sensor shines infrared light on the eye and looks at how the light reflected back changes. The infrared light reflected from the eye is used to figure out the results. When the eye is closed, the sensor output is active high and can be sent directly to the microcontroller for interface purposes (e.g. buzzer). Blinking is a biological process in which the eyelid closes quickly and partly on its own. Instead of the full open and close, a single blink is defined by the forceful closing of the eyelid or the inactivation of the levator palpebrae superioris and activation of the palpebral component of the orbicularis oculi. The parts of the system for detecting drowsy drivers all work together to provide different services. Building a base for something is what architecture design means. Subsystem control was part of the original plans for all The parts of the system that looks for drowsy drivers are named. so that this is what comes out of the design process. The architecture of the software is explained. A system's framework can be made with simple structural and architectural design. way of building. The main parts of the connections between the different parts of the system are taken into account.

6.RESULTS

TRANSMITTER SIDE

Figure 1: IR Proximity sensor

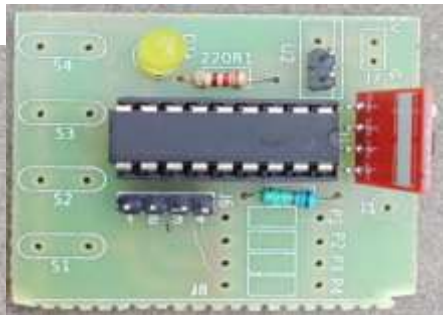


Figure 2: RF transreceiver

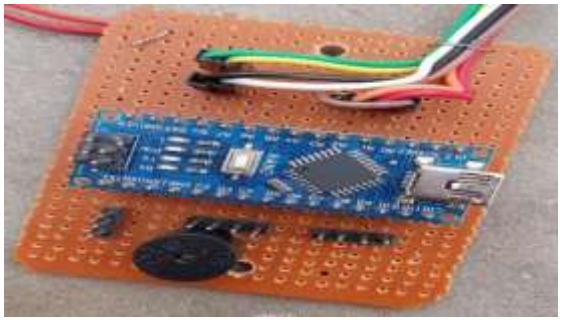


Figure 3: Ardunio nano

RECEIVER SIDE

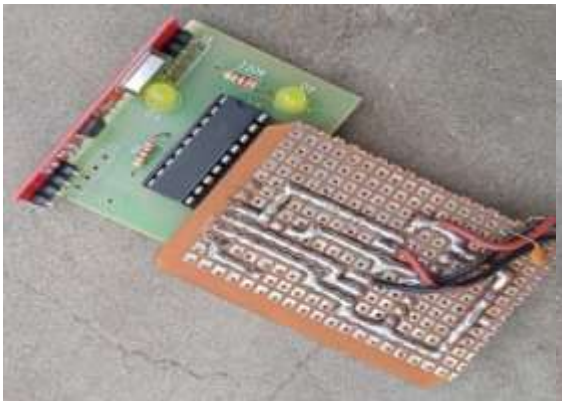


Figure 4: HD12E and HD12D IC

Figure 5:BO motor with wheel

Final setup in Transmitter SideFinal setup in Receiver Side

5 CONCLUSION

The driver drowsiness detection system is a safety feature in cars that can help stop accidents caused by drivers who are too tired to drive. Several studies have shown that about 20% of all traffic accidents are caused by drivers who are too tired to pay attention. Crash avoidance systems face a big problem with new technologies that can detect or stop drivers from getting sleepy. Because of the risk of running out of resources, new plans must be made to lessen the effects. The goal of this project is to make a mechanism that will protect the vehicle and keep it safe by using the kit. We can't take care of our own when we're in a hurry and not paying attention.

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