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An Arduino Based Alcohol, Drowsiness And GPS Detection

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Abstract: An innovative approach to enhancing road safety by integrating multiple functionalities into a single Arduino-based system. With a focus on preventing accidents caused by alcohol impairment and driver drowsiness, our solution combines alcohol detection sensors and drowsiness detection technology to monitor the driver's condition in real-time. Utilizing the Arduino Uno platform ensures cost-effectiveness and ease of implementation, making it accessible for widespread adoption. In addition to the safety features, our system incorporates GPS navigation capabilities, enabling drivers to receive real-time navigation guidance via GSM communication. By leveraging the capabilities of Arduino Uno and integrating alcohol detection, drowsiness detection, and GPS navigation, the project aims to significantly reduce the incidence of road accidents caused by impaired or fatigued driving, thereby improving overall road safety and saving lives.

Index Terms **– Arduino uno, Alcohol, Drowsiness, GPS, GSM**

I. INTRODUCTION

In today's fast-paced world, road safety is of paramount importance, and driving under the influence of alcohol or while drowsy poses significant risks to both the driver and others on the road. To address these concerns, we propose a cutting-edge solution: an Alcohol and Drowsiness Detection System, leveraging Arduino microcontrollers, GSM technology, and GPS tracking. To address this, our system incorporates advanced alcohol detection technology utilizing sensors capable of accurately measuring alcohol levels in the breath of the driver. Our system includes sophisticated drowsiness detection sensors that monitor subtle indicators such as eyelid movements and head position [1-3]. By analyzing these signals, our system can reliably detect signs of driver fatigue or drowsiness, providing early warnings to prevent potential accidents. Central to the functionality of our system is the integration of GSM (Global System for Mobile Communications) technology. In the event of alcohol detection or drowsiness, the system automatically sends alert messages to predefined contacts, including emergency services or designated individuals. Additionally, our system incorporates GPS (Global Positioning System) tracking capabilities, enabling real-time monitoring of the vehicle's location. This information is included in the alert messages, allowing authorities to precisely locate the vehicle in distress and respond effectively [4-7].

In brief, our Alcohol and Drowsiness Detection System represents a significant advancement in road safety technology. By combining state-of-the-art detection mechanisms with advanced communication and tracking capabilities, our project aims to reduce the incidence of accidents caused by impaired driving and drowsiness, ultimately saving lives and making roads safer for everyone.

II. RELATED WORK

Lea Angelica Navarro, Mark Anthony Dino, Exechiel Joson, Rommel Anacan, Roberto Dela Cruz Electronics Engineering Department, Technological Institute of the Philippines- Manila Manila, Philippines-Design of Alcohol Detection System for Car Users thru Iris Recognition Pattern Using Wavelet Transform [2016 7th International Conference on Intelligent Systems, Modelling and Simulation] Mugila.G, Muthulakshmi.M, Santhiya.K, Prof. Dhivya.P- Smart Helmet System Using Alcohol Detection For Vehicle Protection. [International Journal of Innovative Research in Science Engineering and Technology (IJIRTSE) ISSN: 2395-5619, Volume – 2, Issue – 7. July 2016] Prashanth KP, Padiyar K, Naveen KPH, Kumar KS. Road Accident Avoiding System using Drunken Sensing Technique. International Journal of Engineering Research and Technology. 2014; 3(10): 818-823. Shah S, Nawgaje DD. ARM Based Drunk Driver Identification with Tracking System. International Journal of Modern Trends in Engineering and Research. 2016; 3(4): 302-307 This paper introduces a low cost, handheld, Automatic alcohol and drowsiness detection system by using Arduino microcontroller and their performance analysis based on the parameter such as range, BER (bit error rate), RSSI(Received signal strength indicator), signal attenuation and power consumption.

III. HARDWARE IMPLEMETATION

The hardware implementation of pick and place arm system consists of Arduino Uno, alcohol sensor, eye blink sensor, GPS, GSM module, DC motor, Bluetooth, Motor Driver, and power supply. The block diagram of proposed design is as show in figure.

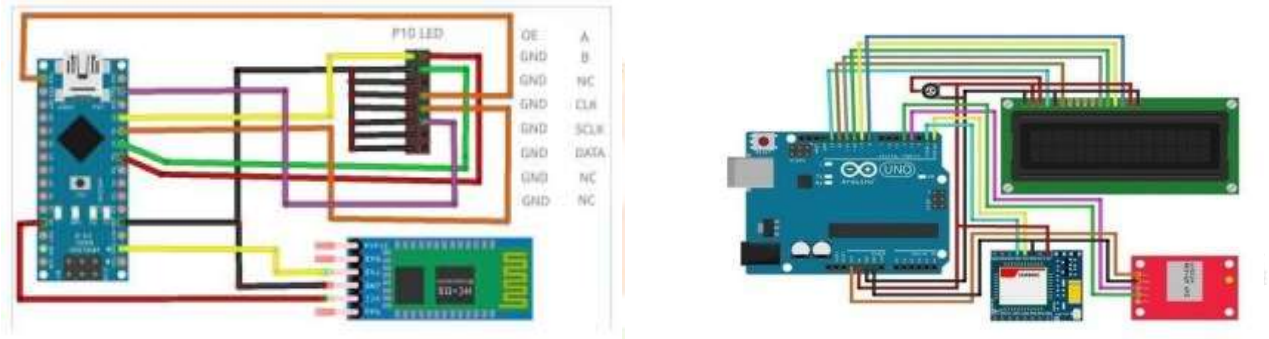

Fig 1: proposed hardware design

Arduino UNO (R3):

Fig 2: Arduino UNO

Arduino UNO is a microcontroller board based on the ATmega328P. 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 itwith a AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

- The operating voltage is 5V
- The recommended input voltage will range from 7v to 12V3.The input voltage ranges from 6v to 20V
- Digital input/output pins are 14
- Analog i/p pins are 6
- DC Current for each input/output pin is 40 mA7.DC Current for 3.3V Pin is 50 mA
- Flash Memory is 32 KBSRAM is 2 KB EEPROM is 1 KB
- CLK Speed is 16 MHz

Alcohol sensor

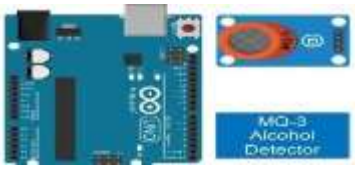

Fig 3: Alcohol sensor

Alcohol sensors operate based on the principle of gas detection, utilizing a sensing element that interacts with alcohol molecules in the surrounding air. When alcohol vapor comes into contact with the sensing element, it triggers a chemical reaction, resulting in a change in the sensor's electrical conductivity. This change in conductivity is then measured and quantified, providing a real-time indication of the alcohol concentration present.

There are several types of alcohol sensors available, including semiconductor-based sensors, electrochemical sensors, and infrared spectroscopy sensors. Each type has its own unique characteristics and advantages, making them suitable for different applications and environments. Semiconductor sensors are commonly used for their affordability and versatility, while electrochemical sensors offer high sensitivity and accuracy. Infrared spectroscopy sensors provide precise measurements but may be larger and more complex.

The MQ-3 sensor operates based on the principle of gas detection through a chemical reaction. The sensor contains a small heating element that heats up a metal oxide semiconductor (MOS) sensor. When alcohol vapors are present in the air, they interact with the MOS sensor, causing a change in its electrical resistance. The sensor then sends a signal to a microcontroller, which can be used to trigger an alarm or other action.

Eye Blink Sensor

Fig 4: Eye Blink Sensor

Eye blink Sensor is a relatively simple sensor used to detect eye blinks. It uses a simple infrared sensor to detect if the person's eye is closed and the corresponding data received can further be processed by any logic as required for the application. The eye blink system comes with an IR sensor mounted on glasses which the user can wear like regular glasses, shown in the picture above.

RF TRANSMITTER :The RF transmitter module uses Amplitude Shift Keying (ASK) and operates at 433MHz. The transmitter module takes serial data input and transmits that signal through RF. The transmitted signals are then received by the receiver module wirelessly.

RF RECEIVER**:**The RF receiver module receives the data and sends it to the data OUTPUT pin. The output data can be decoded by the Microcontroller for further action.

The onboard IR array contains two components, an IR Emitter and an IR Photodiode.The IR Emitter emits an IR light towards the eye. The IR Photodiode is designed to detect if the radiation of the same wavelength is reflected back and detected: If the eye is closed, the IR rays will reflect back with a larger intensity and the photodiode will detect it. If the eye is open, the IR rays will wither go into the eye or scatter across the eye thereby causing a very low intensity of reflected IR light. Therefore, by monitoring the Photodiode, we can come to a reasonable conclusion if the eye is indeed closed or not.

Global Positioning System (GPS)

The GPS (Global Positioning System) is a "constellation" of 31 well-spaced satellites that orbit the Earth and make it possible for people with ground receivers to pinpoint their geographic location. The location

accuracy is anywhere from 100 to 10 meters for most equipment and within one meter with special military-approved equipment. GPS equipment is widely used in science and has now become sufficiently low-cost so that almost anyone can own a GPS receiver.

GSM module

GSM (Global System for Mobile communications) is an open, digital cellular technology used for transmitting mobile voice and data services. GSM uses a variation of Time Division Multiple Access (TDMA) and is the most widely used of the three digital wireless telephone technologies (TDMA, GSM, and CDMA). A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. You can use a GSM modem just like a dial-up modem.

- Reading, writing and deleting SMS messages.
- Sending SMS messages.
- Monitoring the signal strength.
- Monitoring the charging status and charge level of the battery.
- Reading, writing and searching phone book entries.

Dc Motor

A DC motor is an electrical motor that uses direct current (DC) to produce mechanical force. The most common types rely on magnetic forces produced by currents in the coils. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor.

Relay Driver IC ULN2003

Fig 5 : Relay Driver IC ULN2003

The relay driver uln2003 ic is a high voltage and current Darlington array ic, it comprises of 7-open collector Darlington pairs with common emitters. A pair of Darlington is an arrangement of two bipolar transistors. This IC belongs to the family of ULN200x ICs and various types of this family interface to various logic families. This ULN2003 IC is for 5V TTL and CMOS logic devices. These ICs are used as relay drivers as well as to drive a wide range of loads, line drivers, display drivers etc. This IC is also normally used while driving Stepper Motors. The pairs of Darlington in ULN2003 is esteemed at 500mA and can withstand peak current of 600mA.In the pin layout, the i/p's & o/p's are provided reverse to each other. Each driver also has a suppression diode to dissipate voltage spikes while driving inductive loads

IV. RESULTS AND DISCUSSION

When the power supply is turned on, the sim in GSM module was installed and ready to send notification to phone number mentioned in code .In this design, the motor will be halted and notification will be sent to concerned number if either alcohol or drowsiness is detected .we verified alcohol sensor in our project with a drop of alcohol. the alcohol detector detected the alcohol and dc motor has been halted and notification was sent to mobile. The drowsiness detection has been done with ir sensor on spectacles. when the person closed the eyes for certain period of time, IR sensor detects based on predefined threshold level. Once detected, DC

motor halted working and notification sent to mobile. Notification contains reason for halting the motor and location of the device using GPS.

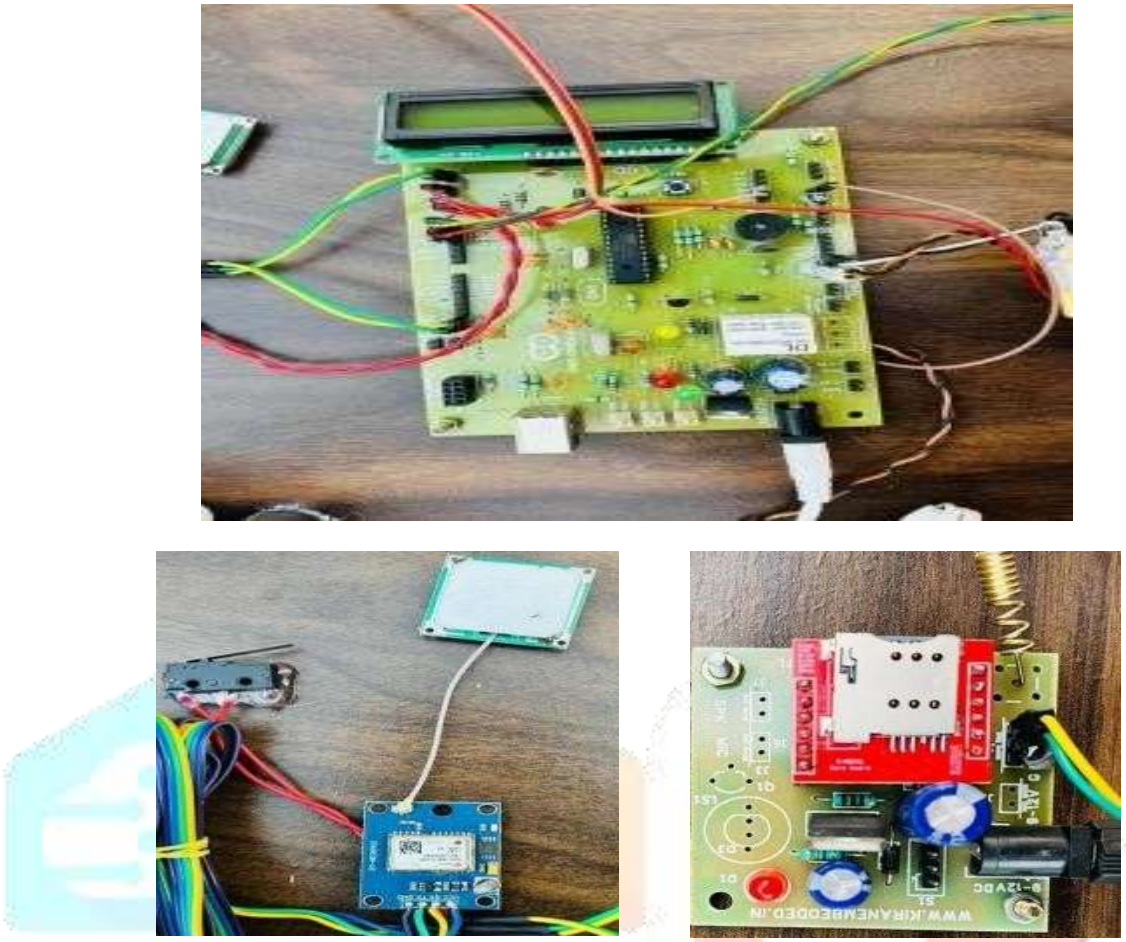

Fig 6 : implementation of proposed design

v. CONCLUSION

In the implementation of drowsiness and alcohol detection systems represent significant advancements in enhancing road safety and preventing accidents caused by impaired driving. These systems leverage various sensors, algorithms, and technologies to accurately monitor the driver's state and alert them when signs of drowsiness or alcohol impairment are detected. By providing timely warnings and interventions, these systems can potentially save lives, prevent injuries, and reduce the economic and social costs associated with road accidents. Throughout the development process, we set out to address the pressing issue of drowsy driving by creating a reliable and cost-effective solution that could be easily integrated into existing vehicles. Our system employs a combination of sensors, including facial recognition or eye-tracking technology, to monitor the driver's behavior and alert them when signs of drowsiness are detected. Additionally, we incorporated features such as sound alarms, vibration alerts, or visual cuesto ensure timely and effective warnings.

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