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# AUTOMATIC VEHICLE STATUS ALERT SYSTEM USING WIRELESS NETWORK

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**Abstract:-** Driver drowsiness is the most critical cause of traffic accidents, thus drowsiness detection play a vital role in preventing traffic accidents. By developing an automatic solution for alerting drivers of drowsing, before an accident occurs, this could reduce the number of traffic accidents. Therefore, this research proposes a real-time detection approach for driver drowsiness. The proposed approach has two phases: gathering information and transferring alert. The role of gathering information phase is to recognize the eye status and then extracts the count of the eyes of the driver. This phase uses IR led's for detecting eye status that takes captured frames of image as input and then the detected digital signals as output. Next, algorithm is also used to extract the eyes image from the detected counts which will be used as an input for the controller learning phase. The main role of the transferring alert is to classify either the eyes of the driver are closed or opened using Support Vector Machine (SVM). If the result of the classification indicates that the driver's eyes is closed for a predefined period of time, the eyes of the driver will be considered closed and hence an alarm will be started to alert the driver. The proposed methodology has been tested on available benchmark data. Location values will be stored in microcontroller using Global positioning system, if the driver continuously sleeping engine will be stopped and sends alert message will be sent to authorize person. The controller also sent message if any accident occurs. Thus, it can be concluded that the proposed approach is an effective solution method for a real-time of driver drowsiness detection.

**Keywords**: Predefined period, Wireless Sensing Network, Module, drowsiness, GSM, GPS, authorized number.

## I. INTRODUCTION

Driver drowsiness detection is a car safety technology which prevents accidents when the driver is getting drowsy. Various studies have suggested that around 20% of all road accidents are fatigue-related, up to 50% on certain roads. Driver fatigue is a significant factor in a large number of vehicle accidents. Recent statistics estimate that annually 1,200 deaths and 76,000 injuries can be attributed to fatigue related crashes. The development of technologies for detecting or preventing drowsiness at the wheel is a major challenge in the field of accident avoidance systems. Because of the hazard that drowsiness presents on the road, methods need to be developed for counteracting its affects. Driver inattention might be the result of a lack of alertness when driving due to driver drowsiness and distraction. Driver distraction occurs when an object or event draws a person's attention away from the driving task. Unlike driver distraction, driver drowsiness involves no triggering event but, instead, is characterized by a progressive withdrawal of attention from the road and traffic demands. Both driver drowsiness and distraction, however, might have the same effects, i.e., decreased driving performance, longer reaction time, and an increased risk of crash involvement. "Fig.1", shows the block diagram of overall system. Based on Acquisition of video from the camera that is in front of driver perform real-time processing of an incoming video stream in order to infer the driver's level of fatigue if the drowsiness is Estimated then the output is send to the alarm system and alarm is activated.

The proposed diagram is shown in Fig 1

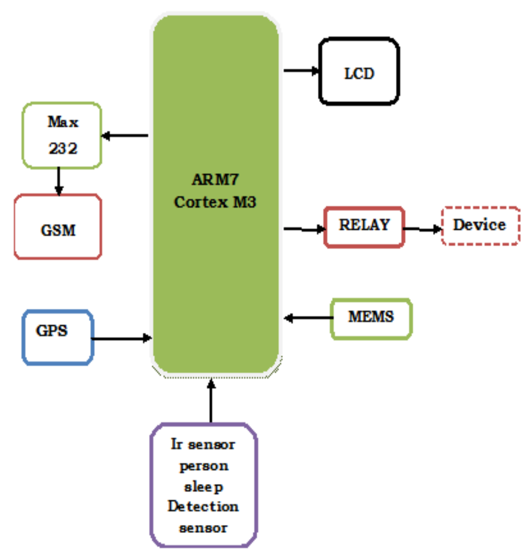


**Fig 1. Proposed Block diagram**

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## II. FACTORS CAUSING DRIVING DROWSINESS

Driver Fatigue is often caused by four main factors:

Sleep, work, time of day, and physical. Often people try to do much in a day and they lose precious sleep due to this. Often by taking caffeine or other stimulants people continue to stay awake. The lack of sleep builds up over a number of days and the next thing that happens is the body finally collapses and the person falls asleep. Time of day factors can often affect the body. The human brain is trained to think there are times the body should be asleep. These are often associated with seeing the sunrise and sunset. Between the hours of 2 AM and 6 AM, the brain tells the body it should be asleep. Extending the time awake will eventually lead to the body crashing. The final factor is a person's physical condition. People sometimes are on medications that create drowsiness or have physical ailments that cause these issues. Being physically unfit, by being either under or overweight, will cause fatigue. Additionally, being emotionally stressed will cause the body to get fatigued quicker.

## III. RELATED WORK

Drowsiness detection can be divided into three main categories (1) Vehicle based, (2) Behavioral based, (3) Physiological based. "Fig.2", shows the three different approaches for drowsiness detection. Drowsiness detection is based on these three parameters. A detailed review on these measures will provide insight on the present systems, issues associated with them and the enhancements that need to be done to make a robust system.

Vehicle based measures: A number of metrics, including deviations from lane position, movement of the steering wheel, pressure on the acceleration pedal, etc., are constantly monitored and any change in these that crosses a specified threshold indicates a significantly increased probability that the driver is drowsy.

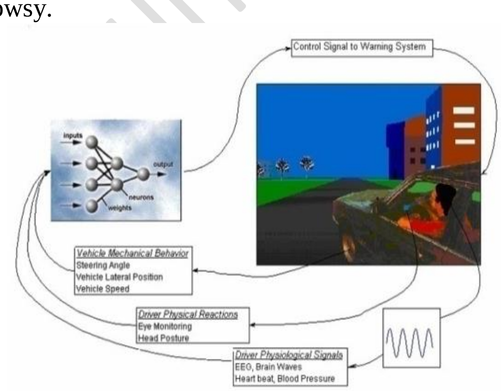


**Fig 2. Different Approaches for Drowsiness**

**Detection and Warnings**

Behavioral based measures: The behavior of the driver, including yawning, eye closure, eye blinking, head pose, etc. is monitored through a camera and the driver is alerted if any of these drowsiness symptoms are detected. Physiological based measures: The correlation between physiological signals ECG (Electrocardiogram) and EOG (Electrooculogram). Drowsiness is detected through pulse rate, heart beat and brain information.

### A. Cortex M3

The Cortex-M3 processor is specifically developed to enable partners to develop high-performance low-cost platforms for a broad range of devices including microcontrollers, automotive body systems, industrial control systems and wireless networking and sensors. Arm Design Start provides the fastest, simplest, no-risk route to custom silicon success.

- ✓ Design the most optimal System-On-Chip with a processor that has the perfect balance between area, performance and power with comprehensive system interfaces and integrated debug and trace components.
- ✓ Develop solutions for a large variety of markets with a full-featured Armv7-M instruction set that has been proven across a broad set of embedded applications.
- ✓ Capture a worldwide experienced developer base to accelerate adoption of new Cortex-M3 powered products and leverage the available extensive knowledge base to reduce support costs.
- ✓ Achieve exceptional 32-bit performance with low dynamic power, delivering leading system energy efficiency due to integrated software controlled sleep modes, extensive clock gating and optional state retention.

Powerful debug and non-intrusive real-time trace

Comprehensive debug and trace features dramatically improve developer productivity. It is extremely efficient to develop embedded software with proper debug.

Memory Protection Unit (MPU)

Software reliability improves when each module is allowed access only to specific areas of memory required for it to operate. This protection prevents unexpected access that may overwrite critical data.

Integrated nested vectored interrupt controller (NVIC)

There is no need for a standalone external interrupt controller. Interrupt handling is taken care of by the NVIC removing the complexity of

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managing interrupts manually via the processor.
Thumb-2 code density

On average, the mix between 16bit and 32bit instructions yields a better code density when compared to 8bit and 16bit architectures. This has significant advantages in terms of reduced memory requirements and maximizing the usage of precious on-chip Flash memory.

**B. Global System for Mobile Communication**

GSM (Global System for Mobile communication) is a digital mobile telephony system that is widely used in Europe and other parts of the world. GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1800 MHz frequency band.

GSM supports voice calls and data transfer speeds of up to 9.6 kbit/s, together with the transmission of SMS (Short Message Service). GSM operates in the 900MHz and 1.8GHz bands in Europe and the 1.9GHz and 850MHz bands in the US. The 850MHz band is also used for GSM and 3G in Australia, Canada and many South American countries. By having harmonized spectrum across most of the globe, GSM's international roaming capability allows users to access the same services when travelling abroad as at home. This gives consumers seamless and same number connectivity in more than 218 countries.

Terrestrial GSM networks now cover more than 80% of the world's population. GSM satellite roaming has also extended service access to areas where terrestrial coverage is not available.
GSM is mainly built on 3 building blocks.

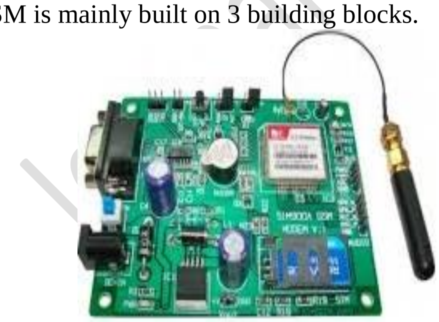

**Fig 4 GSM Module**

- ✓ GSM Radio Network – This is concerned with the signaling of the system. Hand-over occur in the radio network. Each BTS is allocated a set of frequency channels.
- ✓ GSM Mobile switching Network – This network is concerned with the storage of data required for routing and service provision.
- ✓ GSM Operation and Maintenance – The task carried out by it include Administration and commercial operation , Security management, Network configuration, operation, performance management and maintenance tasks.

**C. SPDT**

A relay is an electrically operated switch used to isolate one electrical circuit from another. In its simplest form, a relay consists of a coil used as an electromagnet to open and close switches contacts. Since the two circuits are isolated from one another, a lower voltage circuit can be used to trip a relay, which will control a separate circuit that requires a higher voltage or amperage. Relays can be found in early telephone exchange equipment, in industrial control circuits, in car audio systems, in automobiles, on water pumps, in high-power audio amplifiers and as protection devices.

The switch contacts on a relay can be "normally open" (NO) or "normally closed" (NC)--that is, when the coil is at rest and not energized (no current flowing through it), the switch contacts are given the designation of being NO or NC. In an open circuit, no current flows, such as a wall light switch in your home in a position that the light is off. In a closed circuit, metal switch contacts touch each other to complete a circuit, and current flows, similar to turning a light switch to the "on" position. In the accompanying schematic diagram, points A and B connect to the coil. Points C and D connect to the switch.

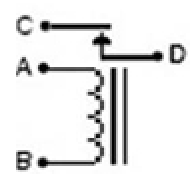


**Fig 5 Relay connection**

When you apply a voltage across the coil at points A and B, you create an electromagnetic field, which attracts a lever in the switch, causing it to make or break contact in the circuit at points C and D (depending if the design is NO or NC). The switch contacts remain in this state until you remove the voltage to the coil. Relays come in different switch configurations. The switches may have more than one "pole," or switch contact. The diagram shows a "single pole single throw" configuration, referred to as SPST. This is similar to a wall light switch in your home. With a single "throw" of the switch, you close the circuit.

**D. Global Positioning System**

The Global Positioning System (GPS) is a U.S. space-based radio navigation system that provides reliable positioning, navigation, and timing services to civilian users on a continuous worldwide basis -- freely available to all. For anyone with a GPS receiver, the system will provide location and time. GPS provides accurate location and time information for an unlimited number of people in all weather, day and night, anywhere in the world.

The GPS is made up of three parts:

1. Satellites orbiting the Earth
2. Control and monitoring stations on Earth
3. The GPS receivers owned by users.

Each GPS receiver then provides three-dimensional location (latitude, longitude, and altitude) plus the time.

1. SPACE SEGMENT
   - 24+ satellites
   - 20,200 km altitude
   - 55 degrees inclination
   - 12 hour orbital period
   - 5 ground control stations
   - Each satellite passes over a ground monitoring station every 12 hours

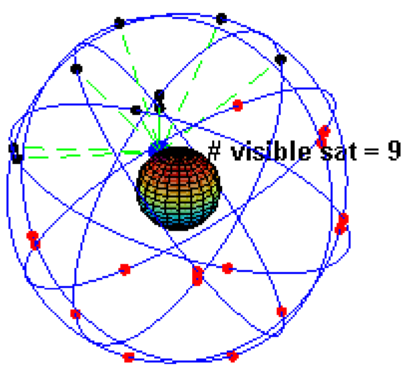


**Fig 6 GPS satellite system**

The GPS satellite system

The space segment is composed of the orbiting GPS satellites or Space Vehicles (SV) in GPS parlance. The GPS design originally called for 24 SVs, this was modified to six planes with four satellites each. The orbital planes are centered on the Earth, not rotating with respect to the distant stars. The six planes have approximately 55° inclination (tilt relative to Earth's equator) and are separated by 60° right ascension of the ascending node (angle along the equator from a reference point to the orbit's intersection). The orbits are arranged so that at least six satellites are always within line of sight from almost everywhere on Earth's surface. The full constellations of 24 satellites that make up the GPS space segment are orbiting the earth about 20,200 km above us. They are constantly moving, making two complete orbits in less than 24 hours. These satellites are travelling at speeds of roughly 7,000 miles an hour. GPS satellites are powered by solar energy. They have backup batteries onboard to keep them running in the event of a solar eclipse, when there's no solar power. Small rocket boosters on each satellite keep them flying in the correct path.

## IV. RESULT ANALYSIS

In this paper a novel method is introduced which is simple in terms of algorithm and gives more accuracy compared to existing methods A non-insidious system to localize the eyes and monitor fatigue was developed. Information about the head and eyes position is obtained through various sensors. During the monitoring, the system is able to decide if the eyes are opened or closed. When the eyes have been closed for too long, a warning signal is issued. Controller achieves highly precise and consistent detection of drowsiness and offers a non-insidious approach to detecting drowsiness without the infuriation and hindrance. A non-insidious system developed judges the driver's alertness level on the basis of continuous eye closures.


**Fig 7 Driver eye counting using sensor**

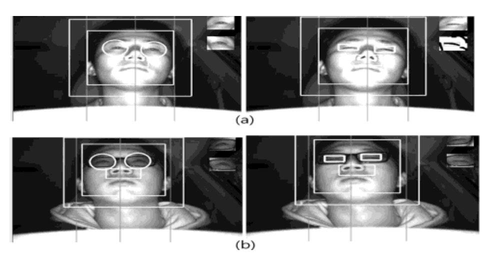


**Fig 8: Shows calculating eye blinking**

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## V. CONCLUSION

In this paper, we have reviewed the various methods available to determine the drowsiness state of a driver. Although there is no universally accepted definition for drowsiness, the various definitions and the reasons behind them were discussed. This paper also discusses the various ways in which drowsiness can be manipulated in a simulated environment. The various measures used to detect drowsiness include subjective, vehicle-based, physiological and behavioral measures; these were also discussed in detail and the advantages and disadvantages of each measure were described. Although the accuracy rate of using physiological measures to detect drowsiness is high, these are highly intrusive. However, this intrusive nature can be resolved by using contactless electrode placement. Hence, it would be worth fusing physiological measures, such as eye blink, with behavioral and vehicle-based measures in the development of an efficient drowsiness detection system. In addition, it is important to consider the driving environment to obtain optimal results.

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