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IOT ENABLED INNOVATIVE ACCIDENT PREVENSION AND RESCUE SYSYTEM

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Abstract: This paper proposed an Internet of Things (IoT)- based wearable device system to protect the person's safety and prevent accidents. Human loss by road accidents has been a devastating issue, which possess negative implications on the socio-economic development of the societies. Most developing countries are recording higher volumes offatalities whenever a road accident occurs due to the lack of a proper and quick system that reports accidents to the emergency services for an immediate rescue. Moreover, the chances of survival of any casualty of an accident is mostly dependent on how quick the emergency medical services arrive at the scene and quickly reaches the nearest hospital with the victims for treatment. However, these emergency vehicles are sometimes delayed by heavy traffic en route to and from the accident scene. This paper introduces a robust automatic vehicle accident detection and alert system, which uses an accelerometer to detect the tilting and the crashing of the vehicle, sends the Global Positioning System (GPS) location of the accident scene to intended security, medical and family contacts. The proposed design achieved a turnaround response, which is faster than conventional rescue system without these features. Hence, saving more lives as possible through technology.

Keywords— Emergency Medical Services (EMS), Global Positioning System (GPS), Global System for Mobile Communication, Internet of Things (IoT)

1. Introduction

The incidence of accidents has been rising at an alarming level recently. Approximately 23 accidents occur per hour because bikes lack many safety features seen in four-wheeled vehicles, cause for a disproportionate share of all accidents [1]. Many factors can contribute to this, including but not limited to driving while tired or under the influence of alcohol; failing to wear a helmet; vehicles drifting too close to one another; disregarding traffic signals; operating a vehicle without a valid license; driving recklessly; accidentally pressing the accelerator; etc. The primary goal of the proposed is to present a system that efficiently helps avoid accidents and develop the system if such circumstances arise. Accident victims must seek medical care quickly to reduce fatalities. Two scenarios are examined in [2]. The vehicle's MEMS or gyroscopic sensor, vibration sensor, and gas sensor coupled with a microcontroller identify the accident. The ESP8266 Wi-Fi module updates the cloud once the GPS module detects the position. The RF transmitter circuit alerts the receiver of any accident. The Ambulance setup uses the NodeMCU microcontroller's RF receiver circuit. NodeMCU collects cloud data from the receiver and presents it on the LCD. Tracking systems and radio frequency transmitters and receivers assist embedded systems in constructing IoT services.

2. Existing Methodology

Accident prevention and rescue systems rely on various methodologies to ensure safety and minimize the

impact of accidents. These include conducting risk assessments to identify potential hazards, providing comprehensive safety training and education, implementing safety regulations and standards, developing emergency response plans, utilizing advanced technological solutions like surveillance systems and alarms, and promoting collaboration and coordination among different stakeholders. By combining these approaches, we can enhance safety, prevent accidents, and ensure effective rescue operations in different industries and contexts. It's important to prioritize accident prevention and rescue systems to protect lives and create a safer society. When it comes to accident prevention and rescue systems, there are a few existing methodologies that play a big role. First, we have risk assessment, where potential hazards are identified and measures are taken to reduce or eliminate risks. Then, there's safety training and education, which helps individuals learn about safety protocols and best practices. Safety regulations and standards are also important, as they ensure compliance and promote safe practices. Emergency response planning is crucial too, with detailed procedures for evacuation and coordination during emergencies. Technological solutions like surveillance systems and automated detection systems are also used. Lastly, collaboration and coordination among different stakeholders is key for an effective accident prevention and rescue system. Safety regulations and standards are also in place to ensure that organizations and individuals follow specific guidelines to maintain a safe environment. These regulations serve as a framework for implementing safety measures and practices.Emergency response planning is another vital component. Having well-defined emergency response plans helps organizations and communities effectively handle accidents or disasters. These plans outline the steps to be taken, such as evacuation procedures and communication protocols, to ensure a coordinated and efficient response.

3. Proposed Methodology

The proposed Automated Driver Safety System (ADSS) aims to revolutionize road safety by addressing the shortcomings of existing solutions through seamless integration of drowsiness detection and alcohol sensing capabilities. Unlike fragmented systems, the ADSS offers a unified platform that continuously monitors the driver's condition in real-time with unparalleled accuracy and reliability. Leveraging advanced sensors and algorithms, the system promptly responds to potential hazards by gradually reducing motor speed upon detecting signs of drowsiness and initiating controlled stops if necessary. Moreover, in the event of alcohol impairment, the ADSS automatically alerts nearby authorities through SMS notifications containing crucial driver information, facilitating swift intervention. With its user-friendly interface and cost-effective implementation, the ADSS represents a significant advancement in driver safety technology, promising to enhance road safety and save lives by providing comprehensive protection against drowsiness and alcohol-related accidents.

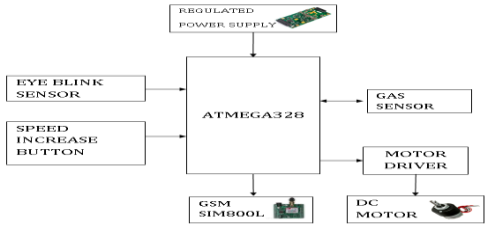

Figure 1: Block diagram of proposed ideology

The Block diagram of The vehicle unit consist of alcohol sensor, eye blink sensor and temperature sensor as preventive measures of an accident, buzzer and red light LEDs for alert. First alcohol sensor detects the concentration of alcohol in driver, if it is found below the threshold the motor rotates and vehicle is ready to be drive.Alcohol is above threshold the motor stops. Similarly, when the driver feels sleepy, the eye blink sensor detects and alert the driver with buzzer and red colored led lights.The system will also check temperature of engine continuously and keeps alerting if found above threshold value of engine temperature.. GSM is used for sending the messages to registered mobile number.Vehicle unit also consists of accelerometer which keeps on informing the coordinate of vehicle position to the microcontroller.If it is found random, the GPS location tracker tracks and informs the emergency number with values of latitude, longitude and Google map position using GSM SIM module.Vehicle unit sends the information to the emergency contacts like police control room and ambulance unit.

4. Schematic structure of APRS system

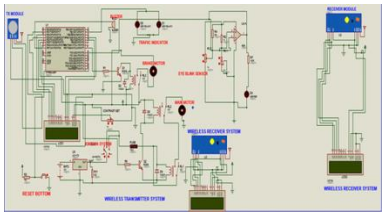

Figure 2: Circuit diagram of APRS system

The system consists of microcontroller which is the brain of the circuit, an eye blink sensor that monitors the drowsiness of the driver, a buzzer which issues a warning signal to prompt the driver when drowsiness is detected, traffic indicators to alert nearby vehicle drivers, automatic braking system which gradually brings the vehicle to a halt and a wireless technology unit that sends information to nearby vehicles in a transmission distance of 300m and a wavelength of 0.69m. Starting the vehicle by turning -on the ignition key, allows current to flow in the circuit, the microcontroller receives a signal (normal state) of the driver and displays on LCD drowsiness not detected.The microcontroller then sends a signal to the RF transmitter, it transmits this information to an RF receiver in other vehicles in a distance of 300m and a wavelength of 0.69m and displays on the RF receiver screen, drowsiness not detected.

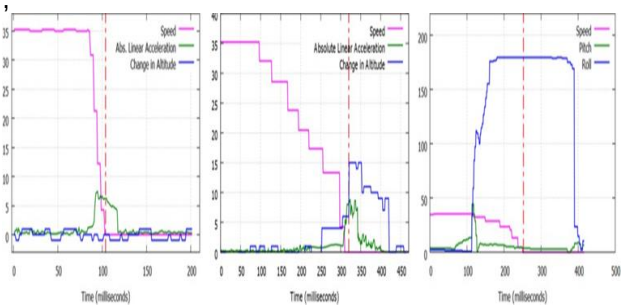

Figure 3:Output Image of an APRS system

When drowsiness is detected by the rate at which the driver blinks his/her eyes, the micro-controller receives deviation in signal from the eye blink sensor through the comparator circuit and sends signal to simultaneously activates the buzzer and the traffic indicators. The microcontroller then sends information about the fault to vehicles in the distance of 300m and a wavelength of 0.69m through the RF module and displays on the RF receiver in other vehicles that drowsiness is detected. This process will persist for three (3) seconds, and if the system is not reset by pressing the reset bottom, a signal from the microcontroller is sent to deactivate (turn-off) the engine of the vehicle by bringing on the braking motor to gradually bring the vehicle to a halt..

5. CONCLUSION

accident prevention and rescue systems are crucial for ensuring safety and minimizing the impact of accidents. By implementing methodologies such as risk assessments, safety training, regulations, emergency response planning, technological advancements, and collaboration among stakeholders, we can create a comprehensive system that prioritizes safety and swift response.The ultimate goal of these systems is to prevent accidents from occurring in the first place and to effectively respond in case of emergencies. By identifying potential hazards, educating individuals, implementing safety measures, and utilizing advanced technology, we can create a safer environment for everyone.Accident prevention and rescue systems require continuous evaluation, improvement, and adaptation to changing circumstances. It's a collective effort involving individuals, organizations, and communities to ensure the well-being and safety of all.Remember, safety is everyone's responsibility, and by working together, we can make a significant impact in preventing accidents and protecting lives.

Traffic security administration should be linked to other aspects of traffic administration to fully utilise the system's efficiency and increase the expressway traffic security level. A traffic accident prevention and emergency rescue system of an expressway tunnel requires advanced information, control and network information technology and the integration of related systems so as to share the traffic information widely and bring all of them into play. A common information system that meets all requirements should be established. The control and administration of dynamic traffic information is the core of traffic accident prevention and an emergency rescue system of expressway tunnels, and the authorities should further develop the collection, transmission and analysis aspects to ensure the system’s proper operation. The establishment of an accident prevention and emergency rescue system for expressway tunnels not only depends on the installation and use of equipment, but also on the broad support of society, especially adherence to traffic rescue regulations and the enhancement of civil consciousness.

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