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Automized Crash Detection and Rescue System

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ABSTRACT: With the advancement of technology in various fields, our transportation system has also undergone several changes. Thousands of new vehicles are introduced to the roads daily. So, the chance of occurring road accidents is also high. Unidentified accident locations and late medical treatment are the main reason behind the increase in the death rate due to road accidents. To decrease the accident mortality rate, an efficient low-cost automatic accident detection system is proposed that automatically detects the accident and sends information through Short Message Service (SMS) to the nearest health care system with exact location. The proposed system consists of a Vibration sensor, Accelerometer /Tilt sensor, Global System for Mobile Communication (GSM), and Global Positioning System (GPS) which decreases the cost and difficulty of interfacing. And by being affordable to all, we can rescue the valuable lives of many.

KEYWORDS: Short Message Service (SMS), Global System for Mobile (GSM), Global Positioning System (GPS).

I.INTRODUCTION

With the advance in transportation infrastructure and in-vehicle technology additionally to a meteoric increase within the total range of business and non-commercial vehicles on the road, traffic accidents could occur, that typically cause a high toll. These deaths occur due to a delayed response by medical team and rescue authorities. The probabilities of survival of accident victim might increase drastically if immediate medical help is provided at accident location. Sadly, the arrival of ambulance to the accident spot is delayed as a result of the rescue team isn't well-read in time. Moreover, sometimes, they cannot trace the precise location. Consequently, it causes the loss of life. World Health Organization (WHO) states that a lot of than1, 200,000 individuals die worldwide in road crashes and concerning 5,000,000 are disabled every year. In India, formally according road accidents were 464,910, claiming 147,913 deaths and 470,975injured persons, that is, 405 deaths and 1,290 injuries day after day from 174 accidents. If sure preventive measures aren't taken to beat this proportion, then, by the year 2030, traffic accidents can become the fifth major reason behind deaths.

During this respect, instruments and systematic ways to enhance road safety ought to be developed. And this thrust us to create Automatic Accident Detection and human Rescue System (AADHRS) that detects the accident a lot of exactly. The 2 highlighted points are,

- Providing medical facility to victims of road accidents on time.
- Notification concerning the precise location to the medical team.

The projected system attains these objectives through sensors. Thus, ensures the medical facilities to the accident victim as early as possible. The prime objective is to develop an economical automatic accident detection and human rescue system which will be enforced at an occasional value so it'd be helpful and cheap for all.

II.LITERATURE SURVEY

There are a lot of thoughts and ideas behind every product and application which cause new hope for the betterment of human being. Currently, there are few technologies for accident detection.

Usman Khalil and Tariq Javid et.al [1] published "Automatic Road Accident Detection Techniques: A Brief Survey. Several methods were evaluated in the studies given in it and this gives a brief review on automatic road accident detection techniques which is used to save affected persons. An automatic road accident detection technique based on low-cost ultrasonic sensors is also proposed. A road traffic accident can be classified into the following types: Pedestrians, pedal cyclists, motorcyclists, drivers of cars, commercial and passenger vehicles, animal-vehicle collision,

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mass casualty incident, and Act of God. And types of car accidents include rear-end collisions, side-impact accidents, sideswipe collisions, vehicle rollover, and head-on collisions.

Nimisha Chaturvedi and Pallika Srivastava et.al [2] proposed an "Automatic vehicle accident detection and messaging system using GSM and GPS modem". Even though it provides the scope for improvement, that we can add a wireless webcam to capture the images at the time of the accident which will help in providing accurate help to the victim. But a button sensor is used here as an accident detection sensor. This sensor is pressed when an accident occurs which activates the device and the cost of production of the system is high.

Extending the earlier study, Ali Hassan and M. Shahroz Abbas et.al [3], published "An Automatic Accident Detection System: A Hybrid Solution".This system consists of hardware and software modules. The hardware module is based on the Arduino board with a vibration sensor and the accelerometer is deployed in the vehicle whereas the software part is an Android application that is installed on the user's mobile. The experimental results indicate that the presented system functions well as intended.
In addition to the advanced technology, Vaishnavi Parteki and Tanvi Bopche et.al [4] published "Road Accident Detection and Traffic Congestion Management Using RF Communication, GSM and GPS" which includes traffic congestion management using RF communication. This will minimize the time required by the ambulance to reach the hospital. Although this system is good it required complete automation of hospitals and traffic signals that increased the cost and time of deployment.

Most of the previous systems comprised of multiple sensors for detecting accidents which increased the cost of the project. In the proposed model by Frahim Wadud Taj and S M Taslim Reza et.al [5] in their paper "Automatic Accident Detection and Human Rescue System: Assistance through Communication Technologies" includes only one vibration sensor. Thus it reduces the cost of multiple sensors and the complexity of interfacing. So, it will be affordable for vehicle owners. The presence of an emergency switch for medical emergency sends SMS directly to the hospital with the current location and in case of no casualty, the driver can terminate the alert message by the switch provided in the vehicle. This will save the valuable time of the rescue team. But there was a chance of wrong alarming and also couldn't give any assurance of accident occurrence accurately.

After an extensive literature review, it can be concluded that most of the system uses different methods for detecting accident which also increases the cost of the project. But in this proposed model, a vibration sensor along with an accelerometer sensor is used, which reduces the cost and complexities of interfacing.

III.PROPOSED METHODOLOGY AND DISCUSSION

The system's key components include a microcontroller, vibration sensor, accelerometer sensor, GSM module, GPS, and a user interface. The Microcontroller in this system is powered by a 5 volt DC source. It is obtained by employing an IC 7805 Voltage Regulator, which regulates a 12V battery source input. With the h, the GSM, GPS, and other components are powered by their needed voltage. With the help of a DC-DC buck converter module included in the circuit, the GSM, GPS, and all other components are powered by their needed voltage. After the sensors have been calibrated, the input and output ports are prepared, and the accident detection procedure begins. GSM is now enabled, and the system is waiting for a GPS signal. While the GPS continuously delivers data to the microcontroller, the vibration sensor and accelerometer sensor collect vibration data. In the case of the vibration sensor, the sensor provides logic Low when there is no vibration and logic High when vibration is detected.
A piezoelectric sensor is another name for a vibration sensor. In tilt-sensing applications, an accelerometer sensor measures the static acceleration of gravity, as well as dynamic acceleration caused by movement, shock, or vibration. The microcontroller's condition is now satisfied. After the criteria are met, GPS determines the current latitude and longitude. A message will be displayed on the LCD screen at this time, and a buzzer will beep three times. For medical emergencies, there is an emergency switch. It sends an SMS with the current position to the hospital. If there are no casualties, the driver can turn off the alert message by pressing the Reset/Acknowledgement switch on the car. The proposed model's block diagram is presented in FIGURE 1.
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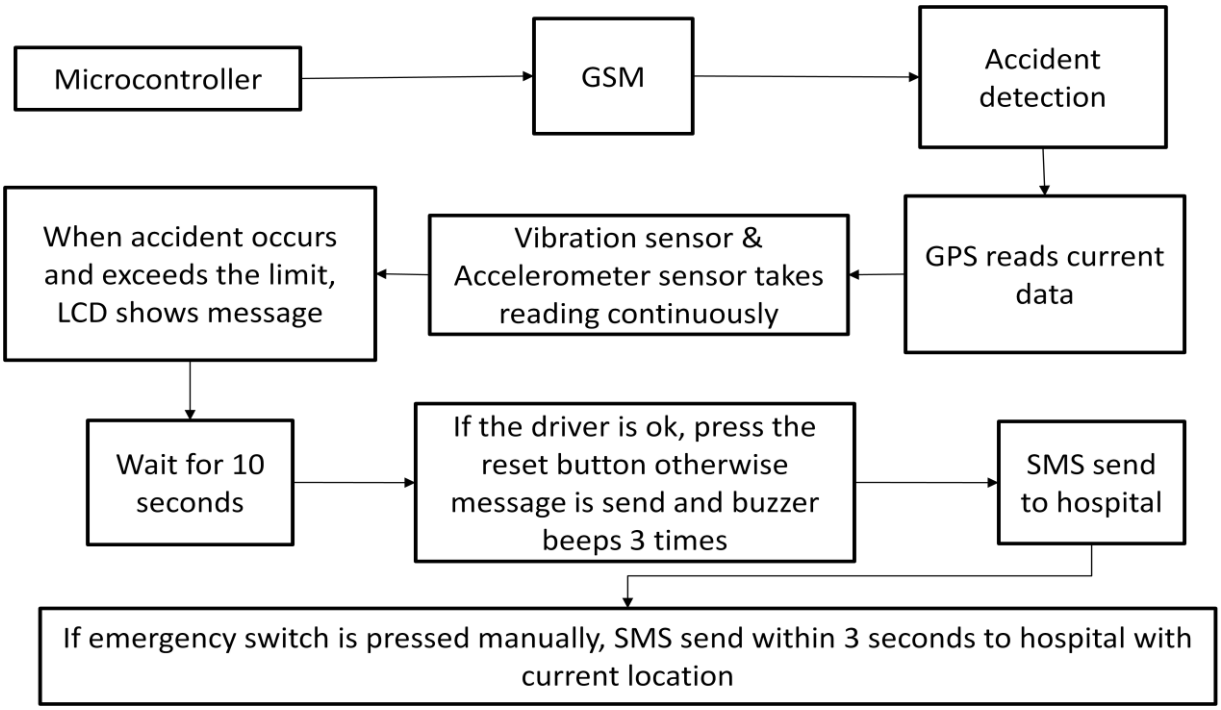

Fig 1. Block Diagram.

A power supply, an Atmega 328P in an Arduinonano, a SIM 800L GSM module, a SIM 28ML GPS module, a 16 x 2 LCD, an accelerometer/ tilt sensor, and a vibrational sensor make up the Automatic Accident Detection and Human Rescue System. TXD, RXD, VCC, and ground are the only four pins on the GPS module. The GPS TXD pin is connected to the Arduino RX pin, while the GPS RXD pin is connected to the Arduino TX pin. The TX pin is the GPS transmitter, and the RX pin is the GPS receiver (UART Tx, UART Rx). Both pins can be logic high level (up to 3.3V) logic. Figure 2 depicts the system's hardware blockdiagram.

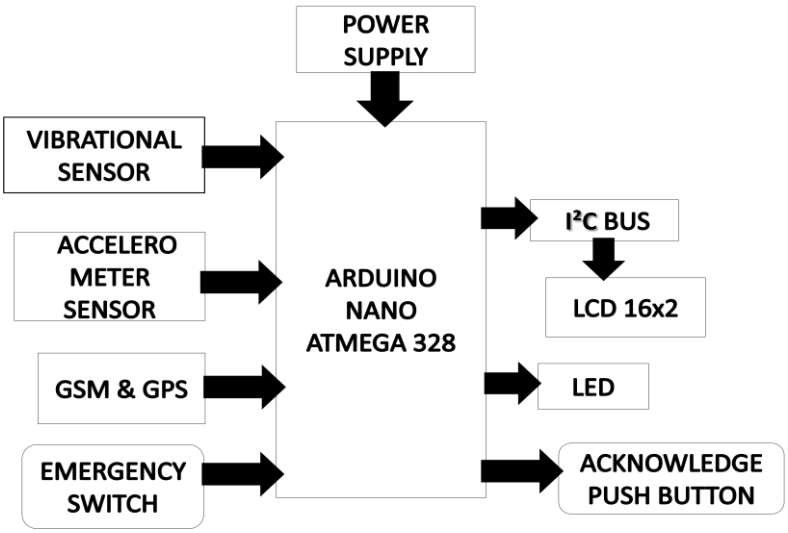

Fig 2.Hardware Block Diagram.

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VI. RESULT AND DISCUSSION

In the fig 3, the outlook of the automatic accident detection system has been given.

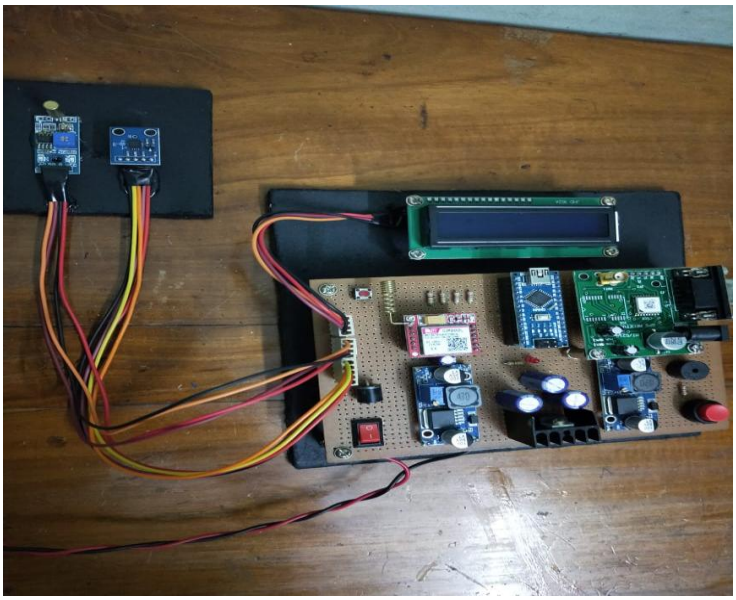

Fig. 3.Overview of the project

The entire process is controlled by the Arduino nano microcontroller, which has processed the programme in a sensible manner using the vibration and accelerometer sensor readings. The vibration sensor and accelerometer sensor values will be less than the allocated value obtained via testing in typical situations.

If a vehicle is involved in an accident, a signal conditioner sends an electric signal to the microcontroller through a vibration sensor and accelerometer. Then, through GSM, GPS sends latitude and longitude information about the vehicle's location to the control section. And the notification is instantly delivered to local medical services within 10 seconds.

The driver can engage the automated rescue system by pushing an emergency button in the event of an emergency. As a result, within 3 seconds. In the event that there are no casualties, the driver can end the message by pushing the reset/acknowledgement button.

V.CONCLUSION

To identify road accidents more precisely, the automatic accident detection and human rescue system employs accelerometer sensor, vibration sensor, GSM module, and GPS module. The use of two sensors lowered the difficulty of integrating several sensors while also lowering the system's cost. The location and information acquired from the sensors are relayed to the main controller unit. This ensures that the resue team arrive on time.

Due to the complexitiesof interface, the Automatic accident detection and human rescue system is missing some functionalities. In the future, real-time GPS monitoring could be used to display car movement on a Google map.

REFERENCES

[1] Usman Khalil and Tariq Javid,"Automatic Road Accident Detection Techniques:A Brief Survey",IEEE 2017.

[2] Nimisha Chaturvedi, Pallika Srivastava,"Automatic Vehicle Accident Detection and Messaging System Using GSM and GPS Modem",in International Research Journal of Engineering and Technology (IRJET) Volume: 05 Issue: 03,March 2018.

[3] Ali Hassan, M. Shahroz Abbas, Muhammad Asif, Maaz Bin Ahmad and M. Zubair Tariq,"An Automatic Accident Detection System: A Hybrid Solution", 2019 4th International Conference on Information Systems Engineering (ICISE).

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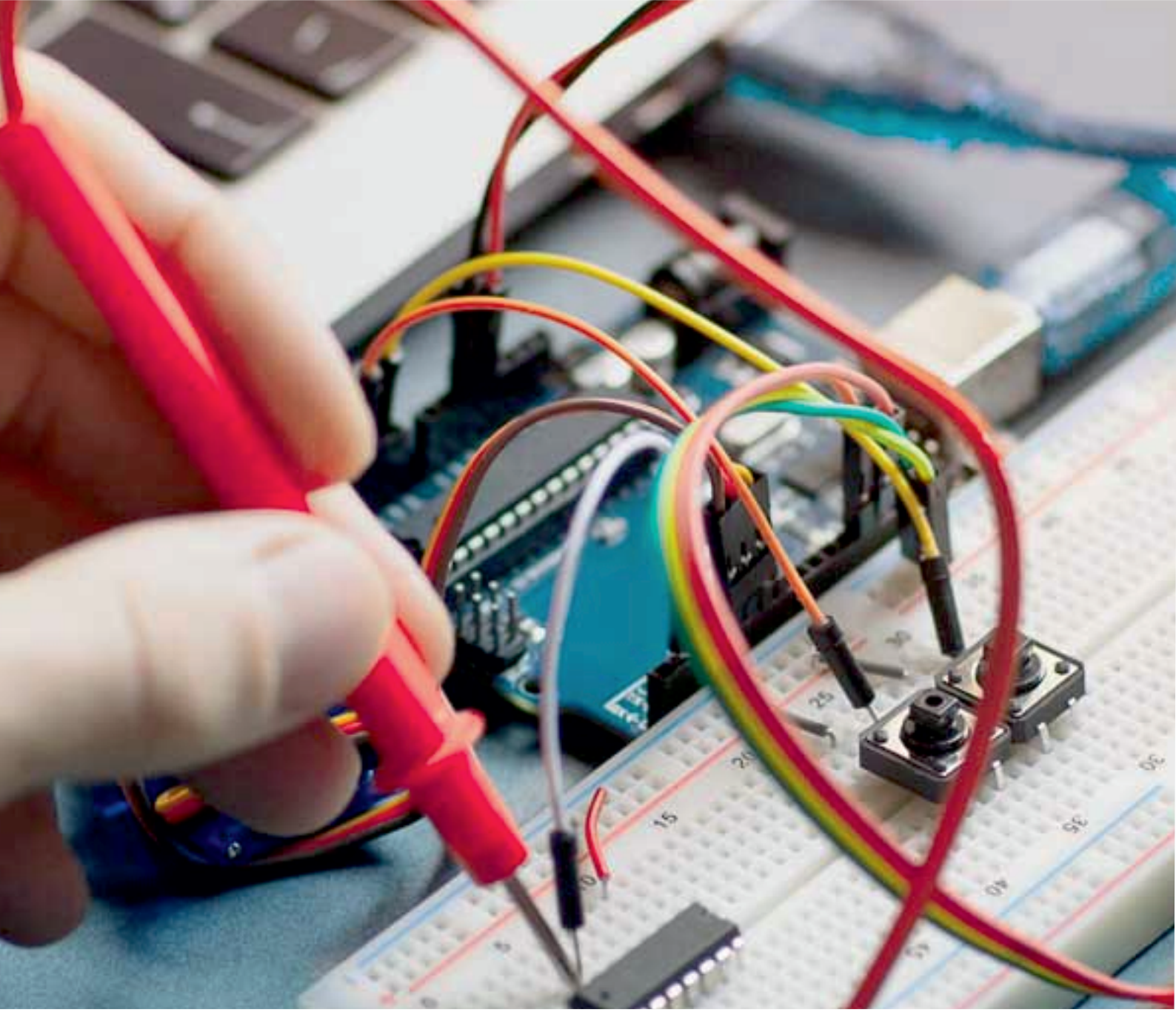
[4] Vaishnavi Parteki, Tanvi Bopche & Sharvari Urane ,"Road Accident Detection and Traffic Congestion Management Using RF Communication, GSM and GPS" in 9th International Conference on Emerging Trends in Engineering and Technology - Signal and Information Processing (ICETET-SIP-19),2019.

[5] "Automatic Accident Detection and Human Rescue System: Assistance through Communication Technologies", 2018 2nd Int. Conf. on Innovations in Science, Engineering and Technology (ICISET) 27-28 October 2018, Chittagong, Bangladesh.



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