IoT based Automated Accident Prevention, Detection and Recovery System

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Abstract **- Vehicle accidents are considered as one of the most destructive phenomena. Though, there are many different reasons behind vehicle accidents, most accidents occur due to driver's unawareness and driver health issues. Also, there seems to be a problem of reaching the accident spot in time due to lack of awareness. As a solution, the advent of Internet of Things (IoT) technologies can reduce the number of accidents. In prevention phase, this system uses driver health monitoring setup, which can detect the state of drowsiness of driver by using eye blink sensor and observe the heartbeat of driver to know about physical fitness. Detection phase comprises of sensors such as Impact sensor and MEMs sensor to know whether accident had occurred. By using GPS location tracking exact location of the accident can be found and called for help. Based on these technologies, proposed IoT based smart system can prevent, detect accidents & monitor driver's health status and send alert to hospitals and family members for help.**

1.INTRODUCTION

Nowadays, there is an increase in the number of accidents that happen in the world. As the population is increasing, there is the number of vehicles increasing on the road that contributes to severe accidents that happen daily. Around 80 percent of accidents contribute to the loss of many lives. Mostly, the growing countries are being targeted by the day-to-day road accidents. The major reason is the lack of infrastructure, lack of traffic control and accident management.

Out of all the developing countries, India has been listed as the country with a higher number of accidents. The most prominent reason for the loss of a life during an accident is the unavailability of immediate help that can save a person's life by a few seconds. The moment an accident has occurred, the life of all passengers travelling in the vehicle is at stake. It all depends on response time that can save their lives by a few minutes or seconds.

According to the statistics, reducing accident delay time by even 1 minute can save 6 percent of lives. Hence, this response time is very crucial, and it needs to be reduced or at least either improved to save their lives. To contribute to our society and reduce the number of accidents happening in our day-to-day life, there are several techniques and mechanisms that can drop down the rate of accidents and can save lot lives. Living in a tech world that is growing day by day with new technologies, we can apply recent technologies in our society and help them to overcome such problems. The significance of accident detection and notification system is very prominent for our society. Imagine a situation where an accident happened, it is immediately notified to the emergency services. This will result in the rescue of injured people involved in the accident. As the Internet of Things has witnessed fast growth these days, it has the power to bridge these two situations. For the IoT paradigm be effective, it should have the capability to track the location of the vehicles which can serve to be useful for the ambulances to reach the location on time.

2.OBJECTIVE OF THE PAPER

- Primary objective is to design a system that uses IOT technology to prevent, detect and recover from accident.
- Secondary objective is to design the prevention module of the system that uses driver health monitoring setup,

- which can detect the state of drowsiness of driver by using eye blink sensor to know about physical fitness if necessary and pulls off alarm to wake up the driver.
- One more objective is to design the detection module with impact sensor and MEMs sensor to know whether accident had occurred.
- Another secondary objective is to design the recovery module that uses latest GPS technology such as Galileo and GLONASS to get the accurate location of the accident and make use of it in control room through SMS and E-mail.

3. IMPLEMENTATIONS OF AUTOMATED ACCIDENT PREVENTION, DETECTION AND RECOVERY SYSTEM

A. ARDUINO UNO

Arduino is simply the computer brain of the proposed system; it takes control of all the data flow and logical operations taking place. The Arduino Uno is a microcontroller board based on the ATmega328.

B. SW-420 VIBRATION SENSOR

Accidents can be detected by the vibrations produced at the force of impact. If we are able to measure the vibrations produced during the time of accident, then the level of accident is simply detected. We have used SW-420 vibration sensor is used in the system. Piezoelectric sensor can be used as a replacement. But it will increase cost of the setup.

C. MPU 6050

MPU6050 sensor module is complete 6-axis Motion Tracking Device. It combines 3-axis Gyroscope, 3-axis Accelerometer and Digital Motion Processor all in small package.

D. 3-Axis Gyroscope

The MPU6050 consist of 3-axis Gyroscope with Micro Electromechanical System (MEMS) technology. It is used to detect rotational velocity along the X, Y, Z axes

E. 3-Axis Accelerometer

The MPU6050 consist 3-axis Accelerometer with Micro Electro Mechanical (MEMs) technology. It is used to detect angle of tilt or inclination along the X, Y and Z axes

F. NEO 6M GPS MODULE

GPS uses a lot of complex technology, but the concept is simple. The GPS receiver gets a signal from each GPS satellite. The satellites transmit the exact time the signals are sent. By subtracting the time, the signal was transmitted from the time it was received, the GPS can tell how far it is from each satellite.

G. EYE BLINK SENSOR

Accidents due to drowsiness can be controlled and prevented with the help of eye blink sensor using IR rays. The transmitter transmits IR rays into the eye. If the eye is shut, then the output is high. If the eye is open, then the output is low.

4.CONCLUSION

As vehicle accidents are considered as one of the most destructive phenomena, most accidents occur due to driver's unawareness and driver health issues, and also there seems to be a problem of reaching the accident spot in time due to lack of awareness, A solution based on the advent of Internet of Things (IoT) technologies that reduce the number of accidents has been designed. Based on these technologies, proposed IoT based smart system is able to prevent, detect accidents and monitor driver’s health status and send alert to hospitals and family members for help which has been tested with a prototype of the proposed system. As a future work, an efficient timing and accuracy-based system may be designed and developed based on the proposed system.

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