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IoT based Car Accident Alert System using CC3200 Launchpad

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ABSTRACT: In the present day, society, we have seen how bad accidents can be and how much negative effect it can have on a person's life. Despite all the measures and precautions, still, the rate of accidents increases day by day leading to deaths or fatal injuries.

Being from metropolitan cities and most of us have witnessed such harsh tragedies and we can understand how every minute matters and slightest delay in the delivering medical attention could cost us a life in the accident be it for anyone.

It is not necessary that the accident would always take place in the middle of a town or in a human infested dense area and wait till some passer-by would spot and decide to inform can't be the solution.

Therefore, we present an automotive localization system using GPS and GSM and CC3200 with the help of which an alert message would be generated to the police and hospital,

Whenever a car accident occurs, ensuring quick and effective medical attention, thriving to save as many lives as possible.

It is applicable to everyone in the society, be it from the children to the elderly people whoever may be in the car. It boosts the confidence of the driver as well. It evens helps to maintain the decorum of the entire traffic as a whole.

KEYWORDS: GPS, GSM, CC3200, accident alert system.

I. INTRODUCTION

In this era of modernization, there has been an alarming upsurge in the use of vehicles. Such extensive automobile usage has led to increase in traffic which is followed by a rise in the number of road accidents, thereby taking a toll on the property as well as causing fatality because of unavailability of immediate medical attention and relief. An accident may always not take place in the human populated area, it may take place in an isolated place where there is no one to inform the hospital or to the Police immediately.

Thus, complete accident prevention is unavoidable but at least repercussions can be reduced. With the proposed system, an effort has been made to provide the emergency facilities to the victims with minimum time loss in order to avoid fatality. This system can be used for tracking down stolen vehicles.

The proposed system would incorporate a single-board embedded system that would contain a GPS and GSM modems connected with a microcontroller CC3200. The entire set-up will be installed in the vehicle either in a separate black box or along with the preinstalled airbag system so that no additional feature or component has to be separately installed.

The basic idea to prevent the car accident using a TI Wi-Fi module board, GPS and GSM module. As the car moves, GPS keeps track of the location. Whenever there is a sudden deceleration detected,

Accelerometer sends a signal to ACU (Airbag Control Unit) of the car, which is responsible for activating the airbag in case of an emergency. Whenever the airbag of the car gets activated, the GPS locks down the location and sends the physical address to the chip, which will send the location and the SOS message with the help of the GSM module installed with the CC3200 to the registered mobile numbers.

A backup button will also be available for a few seconds which can be manually triggered to confirm your well-being in case of any false signal.



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II. RELATED WORK

In 2011, Victor Olugbemiga Matthews and Emmanuel Adetiba proposed “Vehicle Accident Alert and Locator”. This system used a crash detector with GPS and GSM modules with a MAN network set up for testing purpose around Ogun state in Nigeria. It would send an SMS which would contain the number plate number with the location. The limitation is that this system would be limited to a range of 5-50 km.

In 2012, Md Syedul, Jubayer Jalil proposed “Accident detection and reporting system using GPS, GPRS and GSM technology.” They proposed a system which would use GPS to constantly monitor the speed for accident detection and if there is a change as per the pre-defined algorithm set, it would generate an SMS. This system would primarily depend on the GPRS modem of the MCU and require an alert system center to be established to monitor the system, making it expensive.

In 2015, Hamid M. Ali and Zainab S. Alwan proposed, “Car accident detection and notification system using smartphone”. This system mainly relied on the smartphone accelerometer and GPS to detect an accident and send out the notification. This system is expensive as it requires a smartphone to be installed in the car for its location tracking as well as the accident detection and smartphones are expensive.

III. PROPOSED METHODOLOGY

The figure below represents a flowchart of the automatic car accident alert system.

A. BLOCK-DIAGRAM DESCRIPTION

When an accident occurs, the accelerometer detects a sudden deceleration as the car comes to halt. This sudden change detected by the accelerometer sends a signal to the SPS computer chip in the engine which in turn activates the airbag. Once the airbags are activated, a time window of 180 seconds will be allowed to the users to manually turn off the alert system, in case they are safe, else the system gets activated and the GPS module immediately locks on the physical location and sends the coordinates to the cc3200 which is interfaced with a GSM module with a sim containing the emergency contact numbers, it will send the SOS message to with the physical location. Also, in case of any false notification generation, the system can be manually reset.

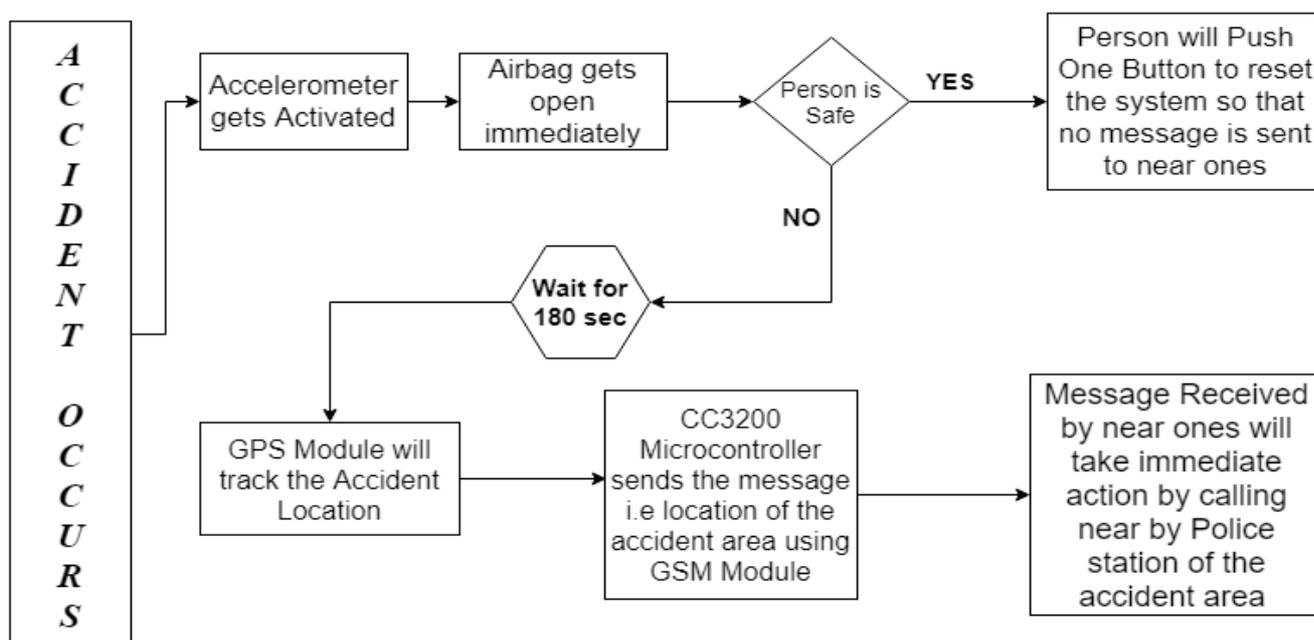


Fig: 1 Block Diagram

IV. SYSTEM DESIGN AND DESCRIPTION

Here, a graphical unit of the circuit has been used. This connection is attached to the SPS computer chip in the car, interfacing the airbag and the accident alert system to each other. The transmitter pin of the GSM module and GPS module are attached to the receiver pins of CC3200 and vice-versa. An additional pushbutton is attached to the digital pin of the MCU board. This button will be present in front of the driver, so that they can reset the system, in case a false alarm is generated or they are safe after the accident.

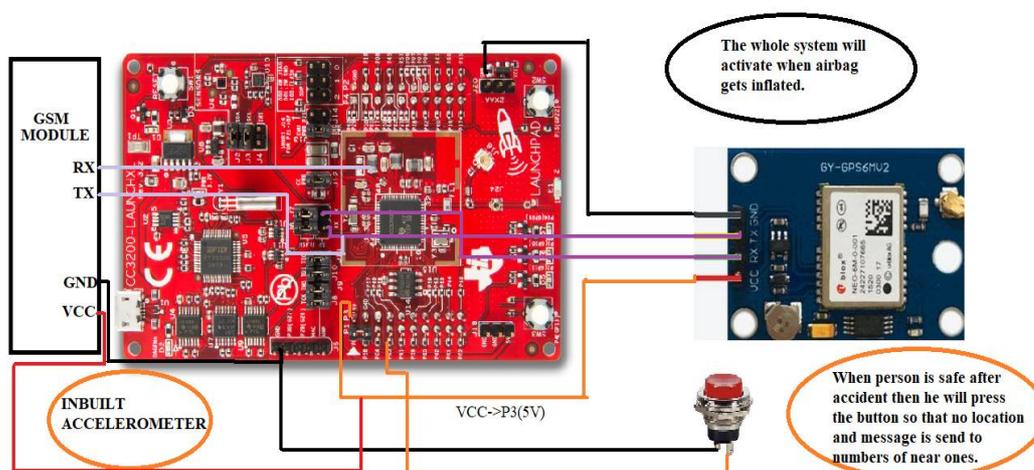


Fig. 2 Circuit connection for the alert system

V. RESULTS

When the system has been successfully installed in the car, it will generate an SOS like shown, in case of an accident, trying to provide fast and effective medical attention, if required

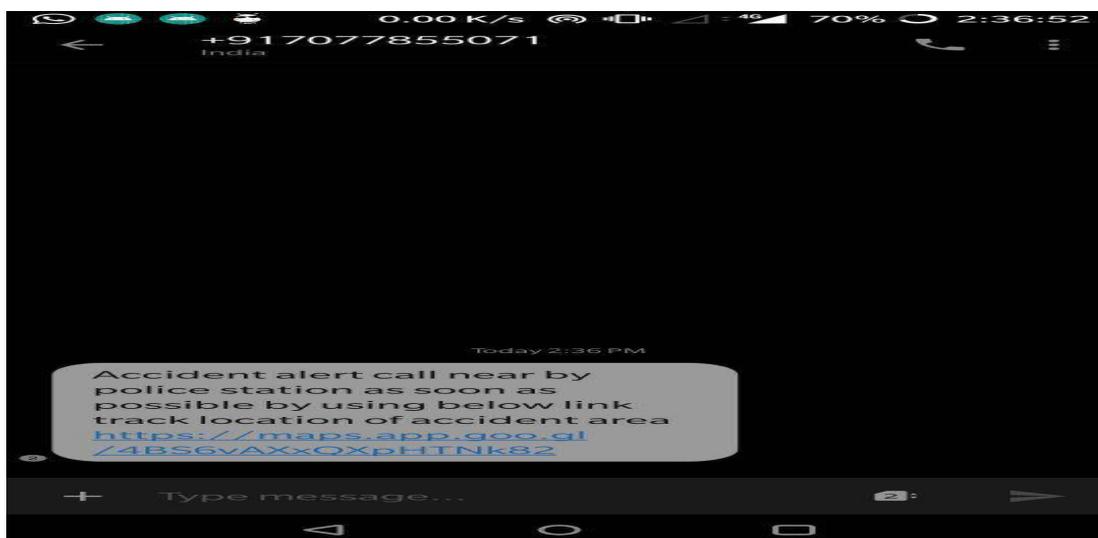


Fig. 3 An SOS message sent to the preinstalled registered number in the car



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VI. CONCLUSION

Thus the above-proposed methodology has been implemented in hardware using the CC3200 MCU. By installing the system in the car, the drivers can feel secure while driving. In case of an accident, their physical location would be sent along with the accident SOS message, thereby helping the concerned authorities to locate them and take the necessary actions with effectiveness.

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