SMART ACCIDENT DETECTION AND ALERT SYSTEM

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Abstract : To develop a location based dynamic Accident Detection system for two wheelers in order to pass information to the concerned people automatically on sensing the accident. To bar loss of human life due to accidents we introduce a scheme called RTBT (Real Time Bike Tracking). The main idea of this project is to detect Accident in a two wheeler in time and providing information such as time and Location to the concerned person thus minimizing the delay of Emergency Services to reach the Accident Location. The proposed system is to implement RTBT which would continuously sense the status of the bike along with its location. Many cases of deaths in accidents occur because the Ambulance could not reach the location in time as the information was not passed at the correct time. And also it is very helpful to ensures making emergency facilities available to accident victims as early as possible by letting relatives, hospital or a rescue team know the accident spot with the help of GPS module embedded in the vehicle. Sensors are attached to the microcontroller. In case there is an accident, the sensor gets activated and notification is sent to the nearest hospital, police station or kind of the victim with the location coordinates where the accident has occurred. With the help of space navigation system GPS locates the position of the vehicle where accident has occurred.

IndexTerms - **Accident Detection, Alert System, Android Application, Accelerometer Sensor.**

I. INTRODUCTION

With the increasing number of vehicle population, our roads have become a difficult place to drive. The case is worse when two wheelers are considered. The number of two wheelers plying in our roads have increased at an alarming rate making commute difficult. This boom in vehicular population leads to huge number of accidents both major and minor. There are also cases where Two-wheeler Accidents occur due to the rider's negligence. Immediate medical assistance is required in these cases. When accidents occur in isolated areas, and the rider is knocked out unconscious, the chances of Loss of Life is high without immediate medical assistance.

The proposed system is to keep continuous track of the status of the Two-wheeler, constantly measuring its position around the axis (x, y, z) and also keeping its location in check. By means of the readings of the accelerometer readings it is possible to detect an accident. With extensive reading and analysis of the readings from the accelerometer sensor it is possible to detect an accident with the position of the bike in the tri-axis. Once the accident has been detected the server hosted alert system comes into play. This sends the information to the android device in which the drivers family member is registered. Also a message is sent to the nearest medical assistance centre. With the help of GPS the exact location where the accident has occurred can be determined. All this is carried out autonomously without any interference of the rider. The rider can also choose to supress the message being sent if in an appropriate condition.

II. SYSTEM FEATURES

A. Architecture of the Proposed System

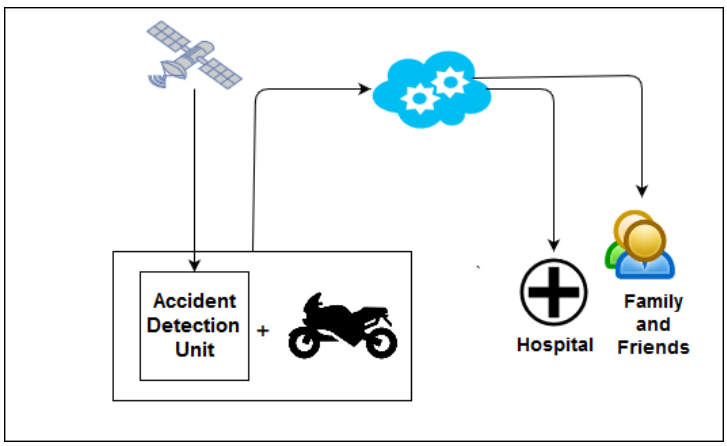


Figure 1: High Level Architecture of Proposed System

The proposed system consists of two main components- Accident Detection Unit, Android Smartphone. The Accident Detection Unit(ADU) consists mainly of the Accelerometer and GPS. The ADU continuously monitors the bike to detect if the bike is in it's normal driving position. If any abnormality is detected in the position of the bike around the axis (x, y, z), The ADU triggers a message to the registered family member along with the location of accident and point it in a Map. The high level architecture of the proposed system is shown in Figure1.

B. Accident Detection Unit

The Accident Detection Unit consists of 3 main components.

- Accelerometer Sensor
- GPS
- Hotspot module

The board used here- **Launchpad CC3200** comes with an inbuilt Accelerometer Sensor which can measure the acceleration of a body around its own tri-axis. It can calculate the position of the Two-wheeler in its own axis. This reading is used to detect if the bike is in its normal position or has fallen down. Once the fall is detected the location co-ordinates are obtained from the GPS sensor. Then the CC3200 micro-controller sends information about the accident to the server.

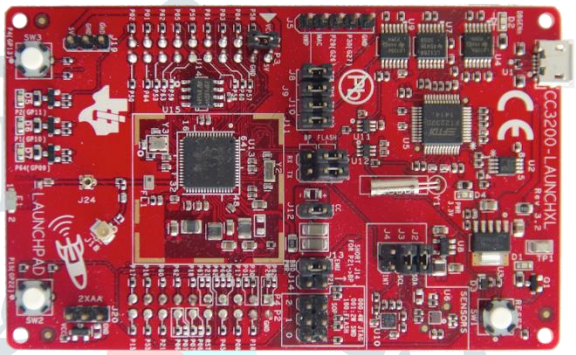


Figure 2: Launchpad CC3200 Microcontroller

C. Android Application

The Android application now fetches data from the server which is basically the location where the accident has occurred, then proceeds to show the location of the accident in a Map. The app user can also choose to send a message to the nearest Medical facility in the vicinity where the accident has occurred.

III. DESIGN OF ACCIDENT DETECTION UNIT(ADU)

This project monitors the bike continuously when the bike is turned on. The power consumption of this module is negligible. It can either be connected to the battery source of the bike with a proper regulator or can also be connected via an external power source. The components used in the ADU are explained briefly below.

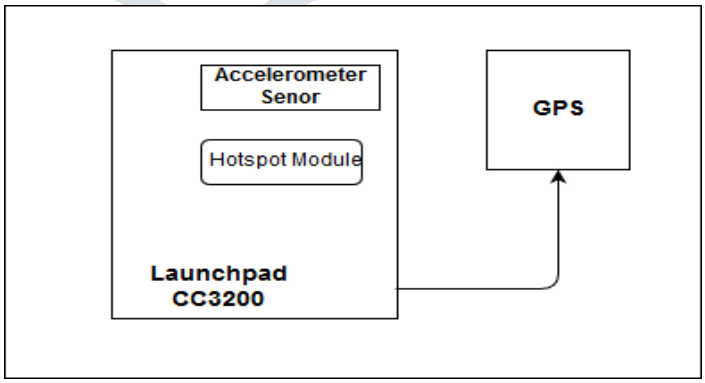


Figure 3: Accident Detection Unit

A. Accelerometer based fall detection module

The fall detection module is basically the accelerometer which continuously monitors the posture of the bike. The 3-axis accelerometer ADXL355 is generally used but in this case the CC3200 Launchpad board has an inbuilt accelerometer sensor. It has 3 pins x, y, z that gives acceleration in terms of voltage. Based on the signal from x-axis the tilt of the bike can be deduced. The

analog signals of the accelerometer are analysed to detect the accident. Once a fall is detected a system interrupt is generated and sent to the cloud server.

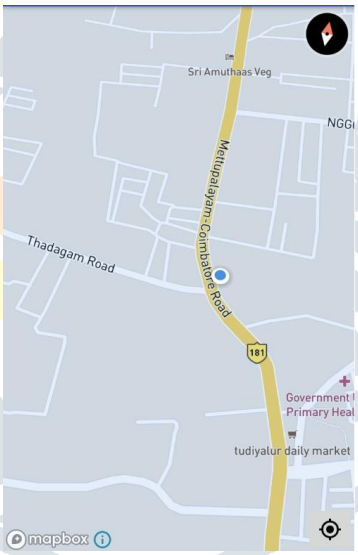
B.GPS Module

The GPS module is used to get the exact location of the accident. It gets its data from the Geo Location Satellites.

Figure 4: GPS Module

C. Android Application

The Android application runs in the background and communicates with the server to check if the accident has occurred or not. Once the accident has been detected it will notify the family member of the accident and also points out the location of the accident in a map. It will also search the accident vicinity for medical assistance centres and send information about the accident.



IV. ACCIDENT DETECTION ALGORITHM

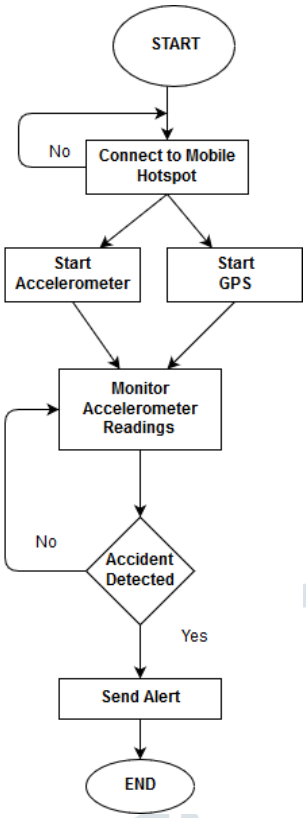


Figure 3: Flow chart of the Accident Detection and Alert System

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