TRIBHUVAN UNIVERSITY

INSTITUTE OF ENGINEERING

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[Subject Code:EX654]

A MINOR PROJECT PROPOSAL ON

"Crash Detection System"

Submitted by

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CHAPTER 1: INTRODUCTION

1.1 Background

Every day thousands of human lives are lost because they don't get medical assistance in time. This module helps them to get medical assistance by calling an ambulance and informing their relatives.

1.2 Problem Statement

The use of vehicles increases in the proportion of the population. Due to the traffic congestion, the accidents are also increasing day by day. This causes the loss of life due to the delay in the arrival of ambulances to the accident spot or from the accident spot to the hospital. So, it is necessary to take the accident victim to the hospital as soon as possible. Whenever an accident occurs, it has to be informed to the investigation unit. So, it is also beneficial if the intimation is reached to the enquiry section so that the time for the investigation can be minimized.

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1.3 Objectives

1.To provide the spontaneous message and exact location to police and ambulance in order to recover victims if accidents occur.

1.4 Applications

I. It can be used in a variety of applications, including: Automobiles: Crash detection systems can be installed in cars, trucks, and other vehicles to detect collisions and trigger an emergency response.

II. Crash detection systems can be used on safety helmets to help protect riders in the event of a crash. These systems may send an alert to emergency services, activate emergency lights, or provide other assistance.

1.5 Project Features

1. Sends the location of the crash or accident of the vehicle to hospital and police using GPS.
2. Call the emergency contact mentioned in the GSM module.

1.6 Feasibility Analysis

The project is feasible in every scenario.We can complete the project within the given time stamp of 4 weeks.

1.6.1 Technical Feasibility

All the technical resources required for the project including hardware parts and software are easily available in the market. And there must not be a problem for us to get those things that are required for the project.

1.6.2 Operational Feasibility

This project is quite a complex system which needs some extra time to work properly as it is expected to assemble a large number of components like Arduino,Gsm module,Gps module. But once all the criteria of the system to operate gets fulfilled then, there would not be a problem for anyone to make the use of the system and the Automatic crash detection work exactly how it should do.

1.6.3 Economic Feasibility

Also, this project is economical too.

Cost of each product we used :

1. GPS module ::1100
2. GSM module ::1400
3. Accelerometer GY-521::510

4. Arduino::1700
5. Breadboard::140
6. Jumpers::220

1.7 System Requirement

1.7.1 Software Requirement

1. Android application
2. Web application for hospital management System using nodejs

1.7.2 Hardware Requirement

1. Arduino: The Arduino UNO is a widely used open-source microcontroller board based on the ATmega328P microcontroller and developed by Arduino.cc. The arduino is the major control unit to detect or alert when an accident occurs. It collects the data from accelerometer sensor, GPRS and GSM modules and sends the message to the receiver through the GSM module.GSM modules sends messages to nearby hospitals and police offices.

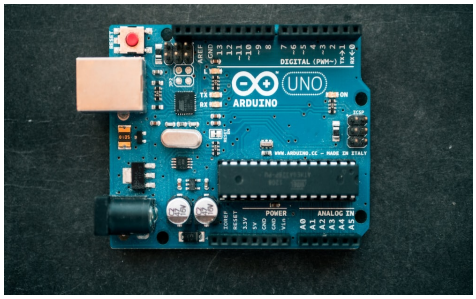

fig 1.7.2.1 Arduino UNO

2. GSM Module:For providing communication between the GPS, GSM and the allocated mobile number GSM SIM900 module is preferred. The name SIM900 says that, it is a triband work ranging a frequency of 900MHz to 1900 MHz such as EGSM900 MHz, PCS 1900MHz and DSC 100 MHz Receiving pin of GSM module and transmitting pin of GPS module are

used for communication between the modules and the mobile phone.

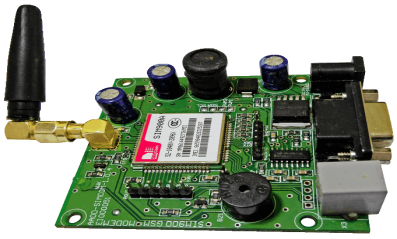

fig 1.7.2.2 : SIM900A GSM Module

3. GPS MODULE: To find the location on the earth the whole earth is divided into some coordinates where the location can be easily captured by a module called GPS module. Here the GPS used is SIM28ML. This GPS module will find the location of the vehicle and the information fetched by the GPS receiver is received through the coordinates and the received data is first send to arduino and the information is transmitted to the saved contact through GSM module.The frequency is operated in the range of 1575.42 MHz and the output of the GPS module is in NMEA format which includes data like location in real time.

fig 1.7.2.3 : GPS module

4. ACCELEROMETER: An accelerometer is a device that measures acceleration and gravity-induced reaction forces. It is commonly used in electronic devices such as smartphones,

tablets, and laptops to detect changes in movement and orientation. In a crash detection system, an accelerometer can be used to detect sudden, high acceleration forces that may indicate a collision or crash. In a crash detection system, the accelerometer can be used to monitor the acceleration forces experienced by a vehicle during a crash. By analyzing the data from the accelerometer, the system can determine the severity of the collision and trigger an emergency response if necessary.

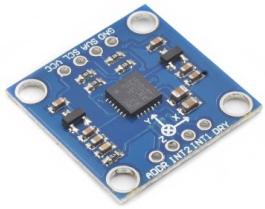

fig 1.7.2.4 : 3-axis ACCELEROMETER SENSOR LSM303DLH

CHAPTER 2: LITERATURE REVIEW

Crash detection systems are designed to detect and report crashes or other traffic accidents in real-time, with the aim of improving emergency response times. This system uses a variety of technologies, including sensors, communication and network.

There is growing research going on these crash detecting systems and also has been implemented on some daily machines. One study found that crash detection systems can significantly reduce the time it takes for emergency services to be notified of a crash, which can improve the chances of survival for crash victims.

However, there are also limitations to the effectiveness of crash detection systems. One challenge is the accuracy of the systems in detecting and reporting crashes, as they may not always be able to accurately differentiate between a crash and other types of incidents (e.g. a vehicle going off the road without a crash)

In addition to these challenges, there are also some ethical and moral challenges like the privacy of the person. Camera, voice detection modules are used which continuously checks the environment around the user thus creating a deepened network with a person's daily errands. A lot of personal information can get leaked if this type of module gets hacked.

Overall, the literature on crash detection systems suggests that these systems have the potential to improve safety and reduce the severity of injuries in traffic accidents. However, further research is needed to address the challenges and limitations of these systems, and to ensure that they are implemented in an ethical manner.

CHAPTER 3: METHODOLOGY

The methodology for a crash detection system typically involves the following steps:

3.1 Data Collection

The system collects data from various sensors, such as accelerometers, GPS, to gather information about the speed and impact on the accelerometer and location of the vehicle.

3.2 Data Processing

The collected data is processed and analyzed by the system's software(Arduino) to determine the severity of the collision and the likelihood of an emergency response being needed.

3.3 Decision Making

Based on the processed data, the system makes a decision about whether or not to trigger an emergency response. This decision is typically based on a predetermined threshold of sensitivity of the accelerometer.

3.4 Emergency Response

If the system determines that an emergency response is necessary, it may send an alert message to emergency contact and call nearby hospital.

Overall, the methodology for a crash detection system involves collecting and analyzing data from an accelerometer to determine the severity of a collision and trigger an appropriate response if necessary. This helps to ensure that appropriate action is taken in the event of a crash, potentially saving lives and minimizing damage.

3.5 Block Diagram of the System

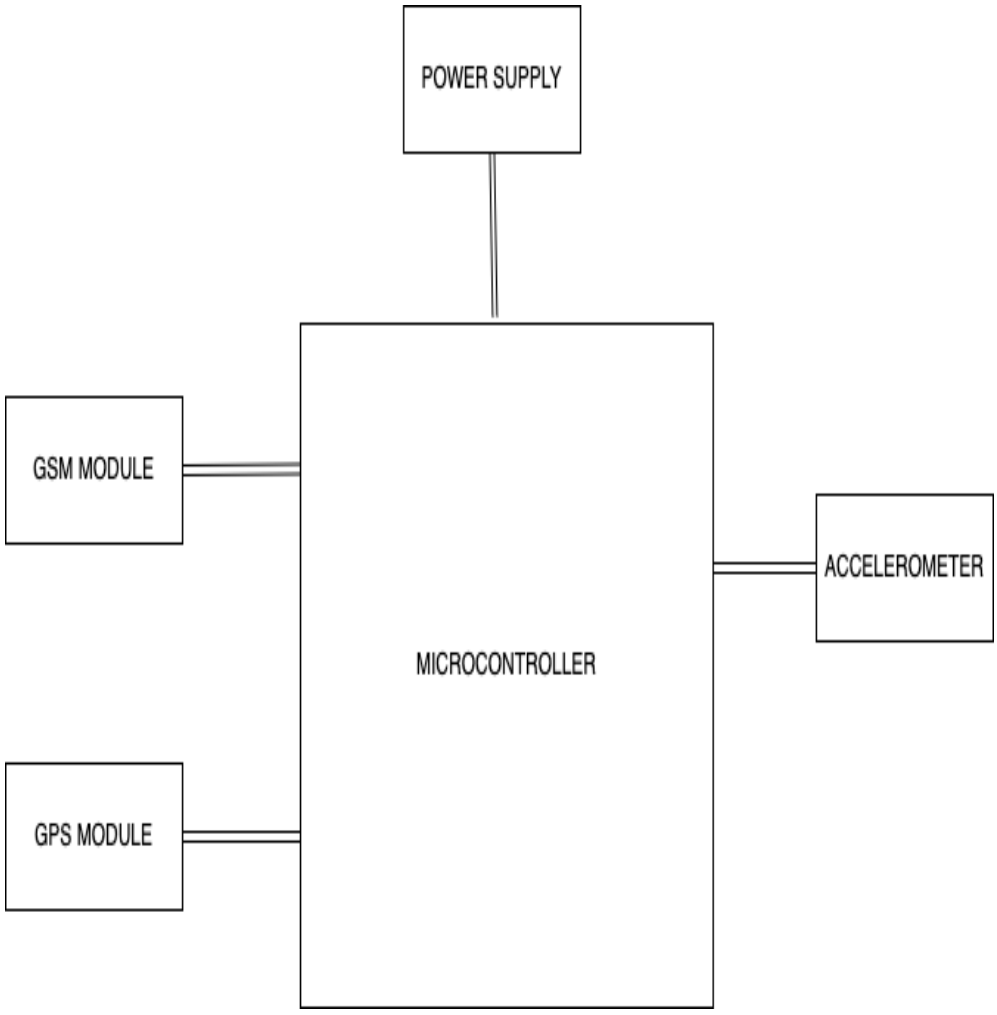

fig 3.5.1 :: Overview of system

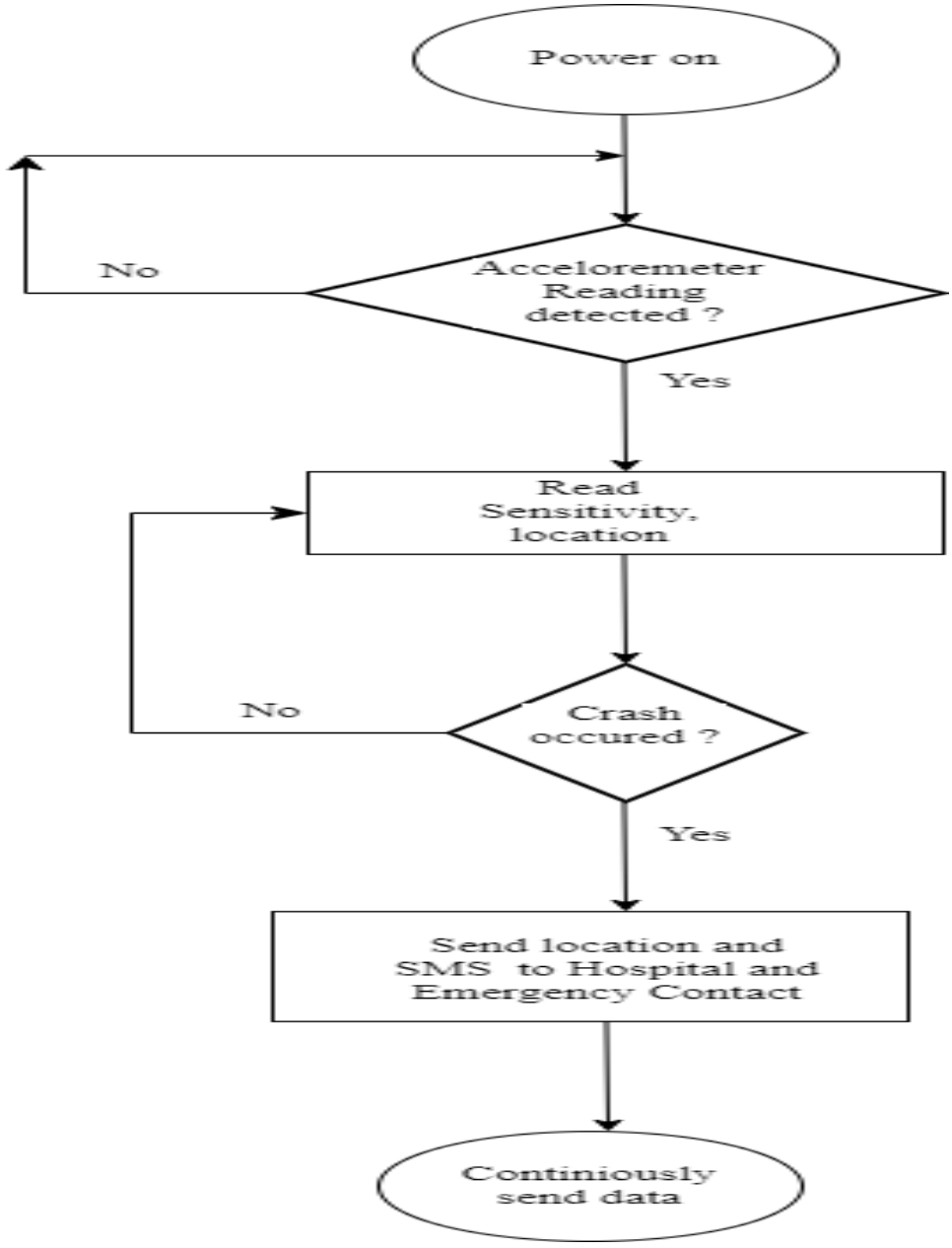

fig.3.5..2:Flowchart of Crash Detection System

CHAPTER 4: EPILOGUE

4.1 Expected Output

This module will detect any crash or accident and notify the nearest hospital and also inform the mentioned emergency contact.

4.2 Budget Analysis

The overall project cost comes around Rs.5070

1. Arduino UNO R3:: 1700
2. GPS module :: 1100
3. GSM module ::1400
4. Accelerometer GY-521 :: 510
5. Bread Board :: 140
6. Jumpers :: 220

4.3 Work Schedule

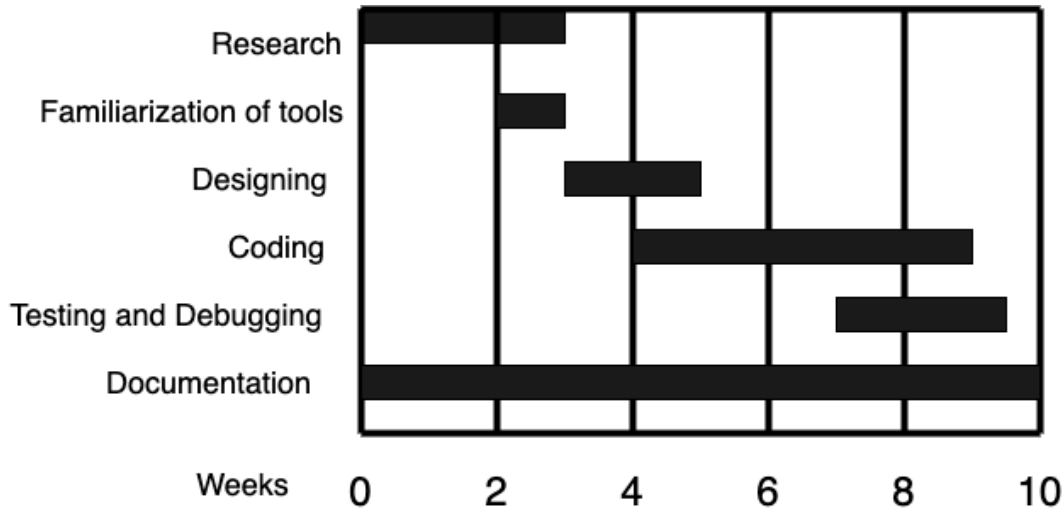

fig : 4.3 Gantt Chart of workflow

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