ACCIDENT AUTO-DIALER

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PROBLEM INTRODUCTION

- The aim of the project is to create an accident autodialer.
- The autodialer will be detecting an accident and its location and sending the corresponding data through cellular network. It will also provide a driver’s rating based on the driving related data.

Task specifications

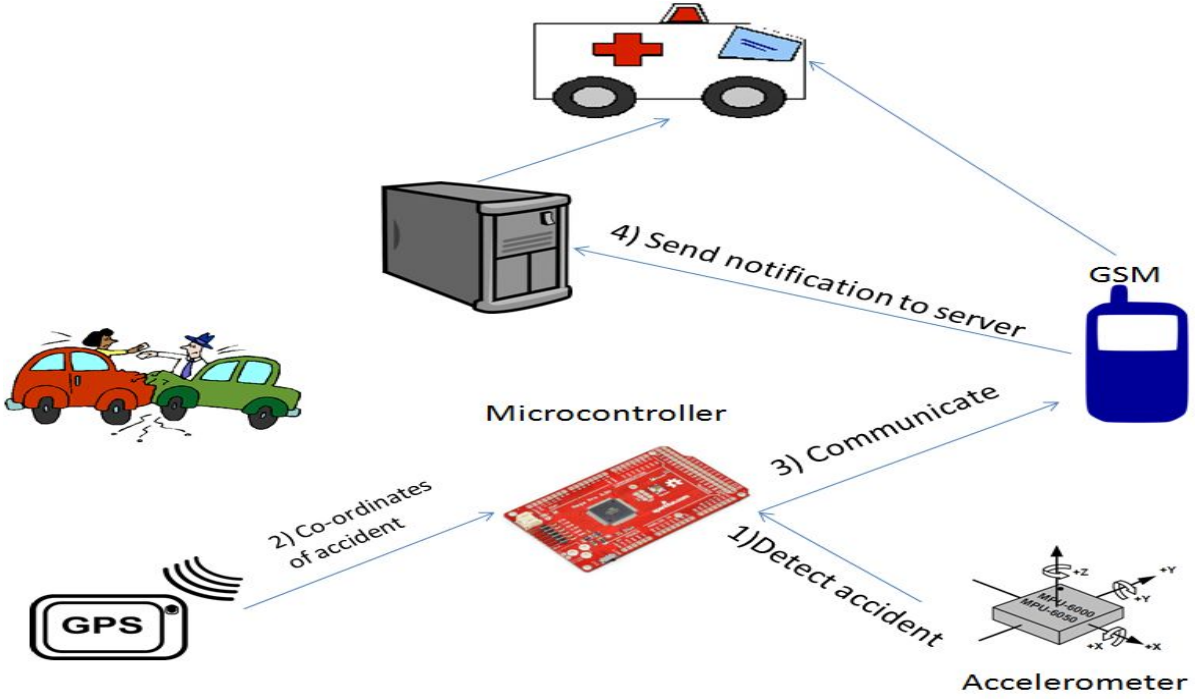
- Accident and driver rating detection - Use changes in linear and angular acceleration, detect appropriately whether an accident has occurred. The frequency and severity of jerks or momentum changes also provide a basis to judge the drive rating.
- Location detection - The location of the accident, in terms of GPS coordinates has to be relayed .
- Communication - Via cellular network as WiFi networks cannot be expected in the car using 2G/3G networks with the occasional use of SMS messages to relay messages for emergency contacts.

Project Plan

- We started with working on Accelerometer together from second week of march. The ccs code for accelerometer (MPU 9250) was complete by the first demo (March 23).

- By the next demo we had worked together upon the GPS, GSM and android.

WorkFlow Diagram



Innovation and Challenges

- We had to optimize the memory usage in our code due to memory constraints of microprocessor.
- Due to lack of public IP we had to set a new remote server which facilitated communication between both the device and the android application
- I2C was something new and challenging.
- Integrating all the modules together was also a difficult task.

Task Completed

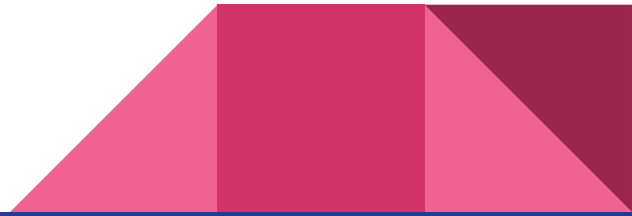
- Successfully able to
  - detect momentum using MPU9250
  - send SMS and GPRS data using GSM module
  - obtain location from GPS
  - create and algorithm and calibrate it for RC car to correctly judge accidents

Task Completed (Contd.)

- Added features (as per investor’s pitch)
  - create an Android app which displays relevant data from the system
  - provide a drive rating based on how many jerks there were or how smooth the ride was
  - obtain an estimate of which side the accident has taken place (sometimes not accurate)

Test Cases

Various features had to be tested for the functioning of this device but we mention only the main tests which occur after the whole device was composed.



Test1 : Accident and Side Detection

The three test scenario are mentioned below

- Running the RC car into a wall at max speed:
- Tapping the MPU9250 attached to the RC car from the side
- Running the RC car at full speed and then braking it to a stop

Test2: Driver Rating Detection

The scenarios are mentioned below

- Crashing the car every now and then (worst drive)
- Sudden brakes and starts (average drive)
- Smooth drive (best drive)

Reusability Features

- MPU9150 Library
- TIVA Libraries
- Android Libraries

Future Enhancements

- Accident detection algorithm can be improved by using Machine learning.
- Avoid button press for hardware by connecting to car battery.
- Power-conservation by switching the GPS and GSM module on only after the accident
- Google maps with the Android app to provide better location
- Generate a voice message using the location and contact the emergency hotline numbers.