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Monitoring the Over Speed of Vehicle and Ambulance Management with Arduino Sensor on Android Platform

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Abstract:
People may not get the first aid immediately after the incident or they may not noticed by others and also they may not aware of the speed limit for each road. So in this paper we provide the extensive solution for the accident detection and ambulance management. Whenever the accident is happenes, this system will identify and confirm it with driver, it informs nearby ambulance. Also it provides an alert whenever the driver exceeds the speed limit.

Keywords: GPS, Bluetooth

I.INTRODUCTION

Rash and careless driving continue to be the leading cause of road accidents, and while enough has been said and written about driving safely, sometimes these issues need to be addressed with some humour. In India, 1 person dies in a road accident every 4 minutes. Road accidents cause more deaths than natural disasters, diseases, and terror attacks. Road accidents are a leading cause of death. Those killed on the roads in India came down by 4,560 or 3% in 2017 from 1.51 lakh the previous year, the Supreme Court Committee on Road Safety said in a report to the apex court The highways ministry has approved increasing the speed limit of cars plying on national highways from the existing 80 kmph to 100 kmph. On expressways, the maximum permissible limit for cars will be 120 kmph. For trucks and buses 90 kmph on expressway and 80 kmph on national highways. The state and local authorities including the traffic police will decide the speed limit for state and local roads, which will be much less than the limit set for national highways. Union government revises speed limit from time to time as the road infrastructure improves. While increasing the speed limit may be just an official procedure, highway users say people often drive at more than 120-130 kmph and there is hardly any enforcement of speeding on NHs. So this system provides efficient solution for this problem by enhancing the availability of ambulance at the site of accidents. Also in case of over speed, the driver will be warned automatically.

II.LITERATURE SURVEY:

Hari Sankar S et.al [2016] proposed and investigated that the problem of delay minimization, right from the detection of an accident till the victim is safely handed over to the casualty. The dedicated in–vehicle accident detection module automatically informs the server whenever an accident happens. The design of the main server, which tracks the ambulances and dispatches the nearest ambulance to the accident spot. The android application, which guides the ambulance driver to the accident location. The dedicated accident detection module can be directly retrofit to vehicles that do not have it when manufactured. The possibility of a false alarm is reduced with the help of a user input switch. The presence of a server with secured log–in for administration staff, lets us keep an eye on ambulance dispatch services for multiple accidents at the same time. It is easy to monitor the performance of ambulance drivers too.With the android application, navigating through the heavy traffic becomes easy for the ambulance driver, as routes with less traffic are automatically suggested. The adoption of a comprehensive package for both road traffic accident detection and ambulance management helps save crucial time towards post traumatic medical care and reduce mortality rate. Standardization of service delivery process is achieved here with the involvement of less human element. A fully automated system like this can work wonder during natural disasters also.

Ravi Kishore Kodaliet.al [2016] proposed and investigated thatDrivers should not exceed the speed limit when they drive on the highways. Generally, drivers have to check their speedometers and reduce their speed if they were exceeding the limit. However, accidents are happening as some of them cross the limit. This proposed system monitors the speed of the vehicle continuously and alerts the driver if he exceeds the over speed limit and message will be sent to the traffic authorities with the help of GPS and GSM technology if the driver still ignores. The advantages of this system are remote monitoring, wide coverage, high reliability and low cost. The limitation of this system is sufficient signal must be present continuously to monitor the speed which is not possible in some remote areas. Also, if the SIM 908 module gets damaged, it needs to be identified and replaced immediately. Otherwise, it may calculate wrong values and alert the traffic authorities. It requires two different power supplies, one for microcontroller (5V) and the other for sim908 module (12V).

Suraja p joyet.al [2010]proposed and investigated that the method to intelligently detect an accident at any place and any

time and report the same to the nearby 'service provider'. The service provider arranges for the necessary help. Accident Detection and Reporting System (ADRS) which can be placed in any vehicle uses a sensor to detect the accident. The sensor output is monitored and processed by the PIC16F877A microcontroller. The microcontroller takes decision on the traffic accident based on the input from the sensors. The RF transmitter module which is interfaced with the microcontroller will transmit the accident information to the nearby Emergency Service Provider (ESP). This information is received by the RF receiver module at the 'service provider' control room in the locality. The RF transceiver module used has a range up to 100 meters under ideal conditions. The service provider can use this information to arrange for ambulance and also inform police and hospital. We used low cost RF modules, a microcontroller by Microchip, LCD module and an accelerometer. This system can be installed at accident prone areas to detect and report the same. MPLAB IDE and Proteus software are used to simulate part of the system. ADRS also implements an intelligent Accident Detection and Reporting Algorithm (ADRA) for the purpose.

Rajesh Kannan Megalingamet.al [2016] proposed and investigated that the Nowadays accidents and vehicle theft cases of two-wheelers are increasing at an alarming rate. In present systems, the speed is monitored by using cameras, speed governors etc. These systems have geographical, visibility and applicability restrictions. These systems can't be used completely for two-wheeler because it will affect the stability of the vehicle and cause accidents. Here we are proposing a Novel Security Enabled Speed Monitoring System for Two Wheeler using Wireless Technology. In the proposed system, we are incorporating both security and speed monitoring in a single system, using wireless technologies like RFID, GPS, ZIGBEE, and GPRS. The RFID tag provided to the owner will help to check the authenticity of the driver, using the vehicle. In case of any unauthorized attempt to drive the vehicle, the GPS and GPRS systems can be used to gather the current information about the vehicle and to inform the owner. When the vehicle is moving without verifying the RFID, the Hall Effect sensor in the vehicle will detect it and alert the owner. A ZIGBEE transmitter Bis placed in each speed zone(National Highways, State Highways, Schools, Hospitals etc). If the speed is increased above a predefined level of that zone, it will warn the driver. If the speed is further increased, the information regarding the position, Vehicle No, Speed, and Time etc. will be stored into an authorized database using GPRS. Thus the proposed system helps to reduce the road accidents by proper monitoring of the vehicle by the authority along with an additional security to the vehicle from being stolen. In the proposed system the speed is continuously monitored without any restriction and thereby, can reduce two-wheeler accidents. Security is also incorporated in this system. Same hardware can be used for both speed monitoring and security thereby, can reduce the complexity

III.PROBLEM DEFINITION

People may not get the first aid immediately after the incident or they may not noticed by others. So this ambulance management system will save more life.People may not aware of the speed limit for each road. This may lead to accident. So this over speed monitoring system will helpful for this case**.**

IV.METHODOLOGY

4.1 ACCIDENT DETECTION ALGORITHM

Both the pitch and roll angles are calculated every 30 seconds from the tri-axis accelerometer and if found above 45◦ for sufficient time, a vehicle rollover is detected and the alarm is sounded. If X,Y and Z are the accelerations in x,y and z axes respectively,

Pitch= arctan(X √Y 2 + Z2)

Roll = arctan(Y √X2 + Z2)

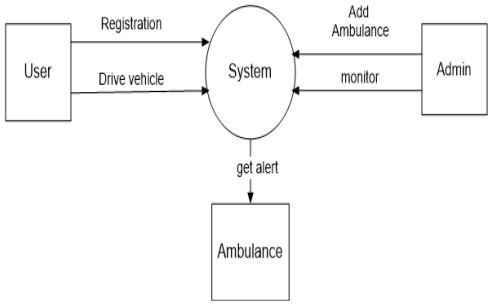
If the acceleration value goes beyond 3g and the vehicle comes to a halt soon after that, then front, side or rear–end collisions are detected. This is a much simpler solution to accident detection.

4.2 AMBULANCE MANAGEMENT

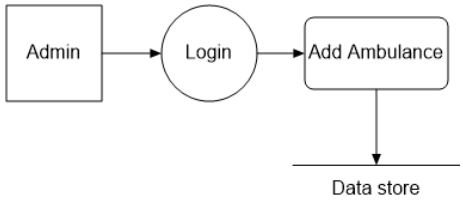
The nearest ambulance is found by using a simple insertion sort on the transit times. The term "nearest" is defined in terms of time required to reach the accident spot. It is to be noted that the transit time for each ambulance suggested by Google Maps API web services depends on the prevalent trafficconditions

4.3 *FLOW DIAGRAM:*

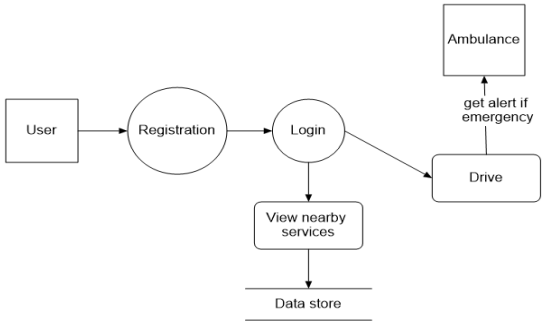
Level 0 DFD:



LEVEL 1 DFD:



LEVEL 2 DFD:



V.SYSTEM IMPLEMENTATION

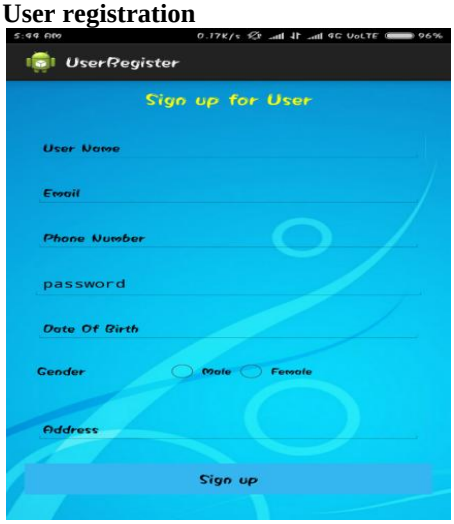
5.1 MODULES

5.1.1 Registration & Login

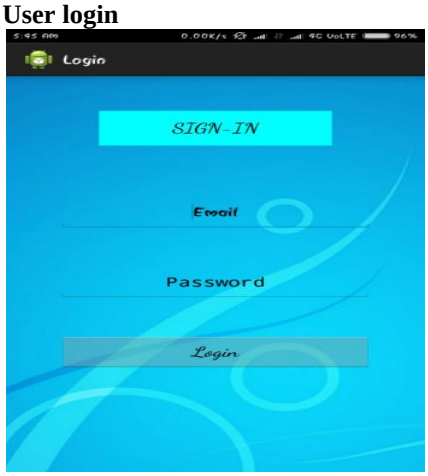
A registration user is one who uses a program or an application and provides his credentials. In this registration we will store user specific information like username, mobile number, emailid, address & password.User can login to the system by specifying unique email id & password. Admin has direct

authority to access the system. In this project only admin is responsible for adding the ambulance details. The admin adds the details about ambulance like driver & vehicle details. The form automatically fetches your current latitude, longitude & stores it into the database. This data is further used to find the nearby ambulance services.

User registration



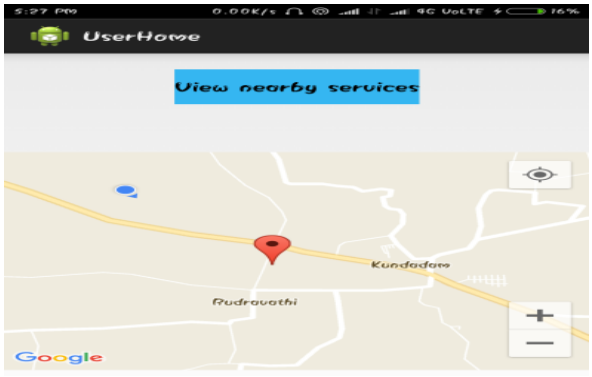
User login



Ambulance Registration

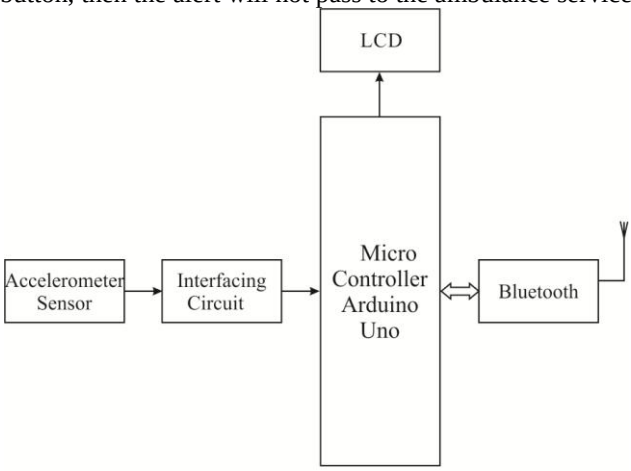
5.1.2 View available ambulances

Initially, after login through the app user can view their own location. When pressing the view nearby services, the ambulance service which is available in the user location will be displayed to the user.



5.1.3: Hardware attachment

When the car met with accident, it will rotate or get vibration. So that time the accelerometer will identify it.After identifying the accident, user will get alert through the LCD display which display it as "Accident Detected". If the driver is safe, he can press the button. So that no such alert will pass to the nearby ambulance. Suppose if he is not safe and he didn't pressed that button, then the alert will not pass to the ambulance service.



*Output in Bluetooth Terminal .

Accelerometer

An accelerometer is a device that measures proper acceleration, the acceleration experienced relative to freefall. Single- and multi-axis models are available to detect magnitude and direction of the acceleration as a vector quantity, and can be used to sense orientation, acceleration, vibration shock, and falling. Micro accelerometers are increasingly present in portable electronic devices and video game controllers, to detect the position of the device or provide for game input.

Arduino Uno:

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P . It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

Technical specs

Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328P) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328P)
EEPROM	1 KB (ATmega328P)
Clock Speed	16 MHz
Length	68.6 mm
Width	53.4 mm
Weight	25 g

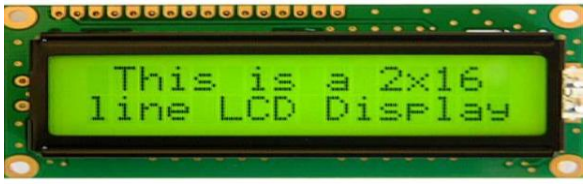
Bluetooth

Bluetooth uses a radio technology called frequency-hopping spread spectrum, which chops up the data being sent and transmits chunks of it on up to 79 bands in the range 2402-2480 MHz. This is in the globally unlicensed Industrial, Scientific and Medical (ISM) 2.4 GHz short-range radio frequency band.

Class	Maximum Permitted Power		Range (approximate)
	mW	dBm	
Class 1	100	20	~100 meters
Class 2	2.5	4	~10 meters
Class 3	1	0	~1 meters

lcd

For 4-bit data interface, the bus lines DB4 to DB7 are used for data transfer, while DB0 to DB3 lines are disabled. The data transfer is complete when the 4-bit data has been transferred twice. The busy flag must be checked after the 4-bit data has been transferred twice. Two more 4-bit operations then transfer the busy flag and address counter data.For 8-bit data interface, all eight-bus lines (DB0 to DB7) are used.



5.1.4 GET EMERGENCY ALERT & OVER SPEED ALERT:

When an accident occurs its location was fetched and the system looks for nearby ambulance service. After finding the nearest ambulance location an alert will be sent to the particular registered ambulance. Then the ambulance gets ready to go to the emergency zone as soon as possible. When the vehicle crossed individual speed which is previously recorded for each road, alert will be given to them.

VI. RESULTS

The accident detection module within vehicle automatically informs the server whenever an accident happens. The design of the main server, which tracks the ambulances and dispatches the nearest ambulance to the accident spot .The android application, which guides the ambulance driver to the accident location. Nearest ambulance is traced using the Hashing techniques. If the nearest ambulance is busy, it trace for next nearest one after getting acknowledgement from ambulance driver.

VII.CONCLUSION

This system provides alert to nearby ambulance immediately whenever an accident occurs. This app helps ambulance driver to locate the accident spot using GPS.Individual speed limit is recorded for each area of road. When the vehicle cross this limit, a warning is given to the driver through this app.

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