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IOT Based Real Time communication and Location Tracking System After Accident Detection

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ABSTRACT

Propose system utilizes smartphone sensing of vehicle dynamics to determine driver phone use, which can facilitate many traffic safety applications. Our system uses embedded sensors in smartphones, i.e., accelerometers and gyroscopes, to capture differences in centripetal acceleration due to vehicle dynamics. These differences combined with angular speed can determine whether the accident occurred or not. Our low infrastructure approach is flexible with different driving speeds.

Keywords: Car Accident Detection, accelerometers and gyroscopes, Notification

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I. INTRODUCTION

Road safety as an important area for research and action programmed has received a great deal of scientific attention in recent years. Progress has been made on several different fronts but in one area there would appear to be a serious lack of interest or, at the very least, a paucity of published information and informed debate. This area concerns the degree to which our thinking and hence our solutions are locked into a particular view of technology and society and thereby condemned to produce incremental improvements but no radical alteration in the magnitude or structure of the problem itself. In the case of road safety it can be argued that solutions which build on the acceptance of life motor car as a major and immutable technology will reinforce that position and generate a primary paradox: solutions designed to reduce a major negative effect of motorized transport contribute to the perpetuation of the circumstances which lead to road traffic accidents.

Traffic accidents are a major public issue worldwide. The huge number of injuries and death as a result of road traffic accident uncovers the story of global crisis of road safety. Road collisions are the second leading cause of death for people between the ages of 5 and 29 and third leading cause for people between 30 and 44. According to statistical projection of traffic fatalities, the two-year comparison of total driver participation in mortal crashes presented a three percent increases.

Problem Statement:
Whenever accident being met, the nearby people call the ambulance. The problem associated with this is that the victims depend on the mercy of nearby people. There is a chance that there are no people nearby the accident spot or people who are around neglects the accident. This is the flaw in the manual system.

II. LITERATURE SURVEY

1. TITLE: Recommendations of the DG eCall for the introduction of the pan-European eCall
Published by: eCall Driving Group

With fatalities on the road across the EU of more than 40.000 people every year, the European Commission recognizes that the current measures towards reducing the fatality number is not enough. In the White Paper on European transport police from 2001, the European Commission proposed that the European Union should set itself the target of halving the number of road fatalities by 2010.

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One of the initiatives from the European Commission is the establishment of the eSafety Forum, which is a joint industry/public initiative for improving road safety by using new Information and Communications Technologies. The overall objective is to join forces and to build up a European strategy to accelerate the research and development, deployment and use of Intelligent Integrated Safety Systems including Advanced Driver Assistance Systems (ADAS) for increasing road safety in Europe.

2. TITLE: Towards Vehicular Sensor Networks with Android Smartphones for Road Surface Monitoring.
Published by: Girts Strazdins, Artis Mednis, Georgijs Kanonirs, Reinholds Zviedris and Leo Selavo
Android is one of the most popular smartphone platforms at the moment, and the popularity is even rising. Additionally, it is one of the most open and flexible platforms providing software developers easy access to phone hardware and rich software API. We envision Android-based smartphones as a powerful and widely used participatory sensing platform in near future. In this paper we examine Android smartphones in the context of road surface quality monitoring. We evaluated a set of pothole detection algorithms on Android phones with a sensing application while driving a car in urban environment. The results provide first insight into hardware differences between various smartphone models and suggestions for further investigation and optimization of the algorithm, sensor choices and signal processing.

3. TITLE: Providing Accident Detection in Vehicular Networks Through OBD-II Devices and Android-based Smartphones.
Published by: Jorge Zaldivar, Carlos T. Calafate, Juan Carlos Cano, Pietro Manzoni
By combining smartphones with existing vehicles through an appropriate interface we are able to move closer to the smart vehicle paradigm, offering the user new functionalities and services when driving. In this paper we propose an Android based application that monitors the vehicle through an On Board Diagnostics (OBD-II) interface, being able to detect accidents. Our proposed application estimates the G force experienced by the passengers in case of a frontal collision, which is used together with airbag triggers to detect accidents. The application reacts to positive detection by sending details about the accident through either e-mail or SMS to pre-defined destinations, immediately followed by an automatic phone call to the emergency services. Experimental results using a real vehicle show that the application is able to react to accident events in less than 3 seconds, a very low time, validating the feasibility of smartphone based solutions for improving safety on the road.

4. TITLE: Fail Silent Road Side Unit for Vehicular Communications.
Published by: Joaquim Ferreira, Arnaldo Oliveira, João Almeida, and Cristóvão Cruz
Wireless vehicular networks for cooperative Intelligent Transport Systems (ITS) have raised widespread interest in the last few years, due to their potential applications and services. Cooperative applications with data sensing, acquisition, processing and communication provide an unprecedented potential to improve vehicle and road safety, passenger's comfort and efficiency of traffic management androadmonitoring.Safety,efficiencyandcomfortITSapplicati onsexhibittight latency and throughput requirements, for example safety critical services require guaranteed maximum latencies lower than 100ms while most infotainment applications require QoS support and data rates higher than 1 Mbit/s. The mobile units of a vehicular network are the equivalent to nodes in a traditional wireless network, and can act as the source, destination or router of information. Communication between mobile nodes can be point-to-point, point-to-multipoint or broadcast, depending on the requirements of each application. Besides the adhoc implementation of a network consisting of neighboring vehicles joining up and establishing Vehicle-to-Vehicle (V2V) communication, there is also the possibility of a more traditional wireless network setup, with base stations along the roads in Vehicle-to-Infrastructure (V2I) communication that work as access points and manage the flow of information, as well as portals to external WANs.

5. TITLE: Performance Analysis of Maximum Length LFSR and BBS Method for Cryptographic Application.
Published by: N.S.Abinaya, P.Prakasam
In this paper, 8, 16 and 32 bit maximum length LFSR which can give the maximum states of PN sequence has been implemented. Also presented the comparison of performance analysis of 4 bit LFSR and 16 bit BBS based on synthesis and simulation result on FPGA using hardware descriptive language(HDL) with maximum length feedback polynomial to understand the area, speed and power requirement. The target device we have used is Xilinx Virtex6 XA9572XL FPGA and performed simulation and synthesis using Xilinx ISE 12.l. FPGA is a predesigned reconfigurable. It has the ability to reconfigure its circuitry for a desired application or function at any time after manufacturing. It is an adaptive hardware that continuously changes in response to the input data or processing environment. The FPGA configuration is generally defamed using a hardware description language (HDL), similar to circuit (ASIC).FPGAs can be used to implement any logical function that an ASIC can perform. Because of various advantages and rapid prototype development can possible, so FPGA is chosen.

6. TITLE: Using Smartphones to Detect Car Accidents and Provide Situational Awareness to Emergency Responders.
Published by: Chris Thompson, Jules White, Brian Dougherty, Adam Albright, and Douglas C. Schmidt
This paper shows how smartphones in a wireless mobile sensor network can capture the streams of data provided by their accelerometers, compasses, and GPS sensors to provide a portable "black box" that detects traffic accidents and records data related to accident events, such as the G-forces (accelerations) experienced by the driver. We also present an architecture for detecting car accidents based on WreckWatch, which is a mobile client/server application we developed to automatically detect car accidents. Figure 2 shows how sensors built into a smartphone detect a major acceleration event indicative of an accident and utilize the built-in 3G data connection to transmit that information to a central server. That server then processes the information

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and notifies the authorities as well as any emergency contacts.

7. TITLE: Design and Realization of the Accelerometer based Transportation System.
Published by: Deepak Punetha, Deepak Kumar, Vartika Mehta
An accident is a deviation from expected behavior of event that adversely affects the property, living body or persons and the environment. Security in vehicle to vehicle communication or travelling is primary concern for everyone. The work presented in this article documents the designing of an accident detection system. The accident detection system design informs the police control room or any other emergency calling system about the accident. An accelerometer sensor has been used to detect abrupt change in g-forces in the vehicle due to accident. When the range of g- forces comes under the accident severity, then the microcontroller activates the GSM modem to send a pre-stored SMS to a predefined phone number. Also a buzzer is switched on. The product design was tested in various conditions. The test result confirms the stability and reliability of the system.

8. TITLE: Implementation of an Android based teleoperation application for controlling a KUKA-KR6 robot by using sensor fusion.
Published by: Juan C. Yepes, Juan J. Yepes, Jos´e R. Mart´ınez, and Vera Z. P´erez
Tele-operated systems have been used in diverse biomedical applications, from the rehabilitation of patients, the management of biological hazardous material and medication storage, to minimally invasive surgery. This paper, introduces an Android OS (operating system) based application that communicates with an industrial robot Kuka KR-6 through USB to Serial connection, to control it with the on-board accelerometers, and gyroscopes of a tablet or smartphone, intended to be used in telemedicine procedures. Arduino Uno microcontroller board, RS232 Shifter SMD and mobile device were used to develop this work. To evaluate this system a survey was done with engineering related users.

9. TITLE: Mobile Application for Automatic Accident Detection and Multimodal Alert.
Published by: Bruno Fernandes, Vitor Gomes, Joaquim Ferreira and Arnaldo Oliveira
This paper presents HDy Copilot, an Android application for accident detection integrated with multimodal alert dissemination, both via eCall and IEEE 802.11p. The proposed accident detection algorithm receives inputs from the vehicle, via ODB-II, and from the smartphone sensors, namely the accelerometer, the magnetometer and the gyroscope. The Android smartphone is also used as human machine interface, so that the driver can configure the application, receive road hazard warnings issued by other vehicles in the vicinity and cancel countdown procedures upon false accident detection. A prototype implementation was validated via laboratory tests.
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III. PROPOSED SYSTEM

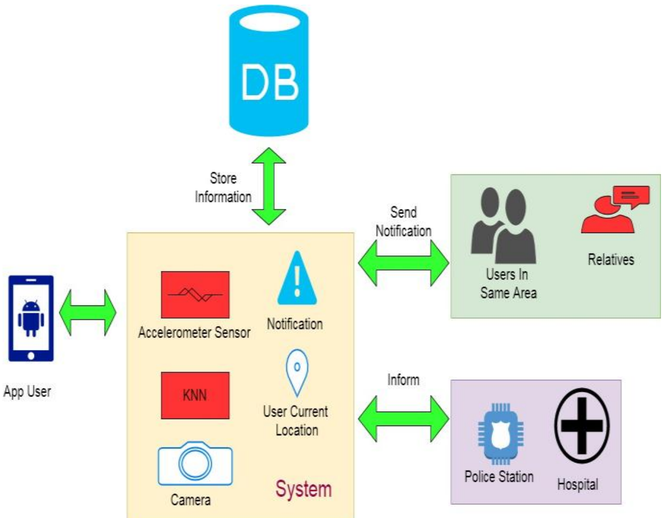

Fig 1. System architecture

Methodologies to implement the system modules:

1. User
2. Accident detection
3. Take photo
4. Inform Nearest Hospital and police station
5. Inform to relatives and other user:

Module Description:

User:
In this module user register into the system. All information of user stored into database. User places the mobile in car.

Accident detection:
In this module accident is detected with the help of accelerometer sensor. After detecting accident, system will alert to user and take the response if user doesn't response to system then system take as accident.

Take photo:
If accident is detected then system takes photo from front camera.

Inform Nearest Hospital and police station:
System at the background searching the nearest location of police and hospital. After searching done system request successfully send to that police station. In this model user current location used to find nearest hospital and police station.

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Inform to relatives and other user:
After detecting accident system inform to nearest user to avoid the traffic. System also inform to relatives by sending SMS. Relative's mobile number is store at user registration.

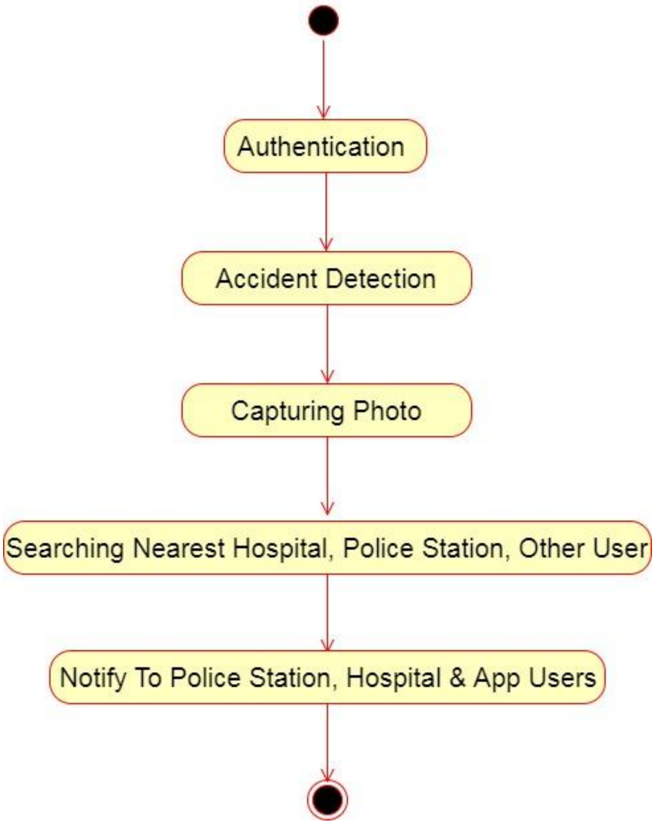

Fig 2.State diagram

IV. MATHEMATICAL MODEL

Let 'S' be the system
Where
S= {I, O, P}
Where,
I = Set of input (information of user and accelerometer data)
O = Set of output (detect accident and inform to nearest police station, hospital, user and relatives)
P = Set of technical processes
Let 'S' is the system
S = {…………
Identify the input data S1, S2, …. , Sn
I = {(current location, accident photo, accelerometer data) }
Identify the output applications as O
O = { detect accident and inform to nearest police station, hospital, user and relatives }
Identify the Process as P
Knn for inform to nearest police station, hospital and other user in same area
For a given query instance xt, kNN algorithm works as follows:

$$y_t = \underset{c \in \{c_1, c_2, \ldots, c_m\}}{\arg\max} \sum_{x_i \in N(x_t, k)} E(y_i, c)$$

Where yt is the predicted class for the query instance xt and m is the number of classes present in the data. Also

$$E(a,b) = \begin{cases} 1 & if a = b \\ 0 & else \end{cases}$$

$$N(x,k) = Set\ of\ k\ nearest\ neighbor\ of\ x$$

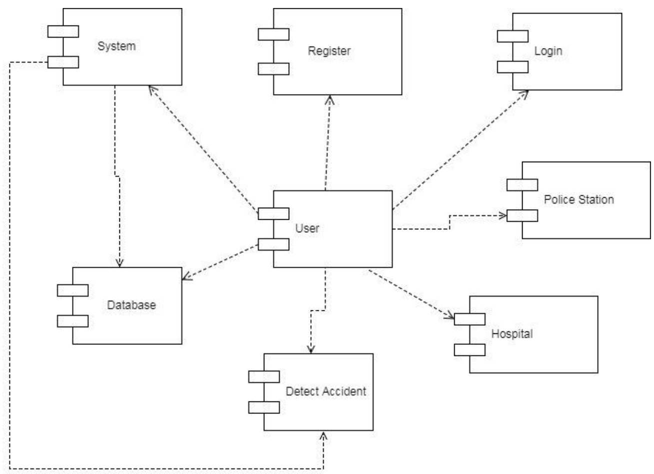

Fig 3.Component Diagram

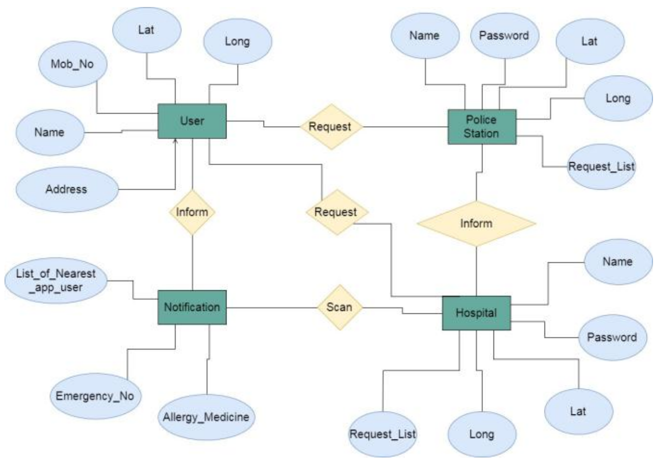

Fig 4. ER Diagram

V. CONCLUSION

Results have shown that the application developed is able to correctly fulfill its purpose within a short time period. Our results show that the total time required to perform all the tasks, including the delivery of an SMS with the accident details, followed by providing the nearby police station and hospital details and sending them an alert message of the user accident with exact location of user, is taking short time period.

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