**IOSR Journal of Engineering (IOSRJEN)** **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
PP 07-10

# A situation aware emergency response smartphone Application using sensor Networks

Sakthi.G[1], Praveen.J[1], UG Students, Rajeswari.G[2],Assistant Professor
[1]*(Dept of Computer Science and Engineering, Surya Group of institution, Vikravandi)*
[2]*(Dept of Computer Science and Engineering, Surya Group of institution, Vikravandi)*

***Abstract:*** *Social media now plays a important role in how the public communicates during an emergency. The* ***First2Recognize Emergency Support System*** *influence existing social media technologies to greatly improve emergency preparedness and management in the Vancouver Sound. Responders can use the First2Recognize portal to gather and view large amounts of data from popular social media sites. First2Recognize uses advanced technology to compile this data into filterable and editable categories. Data can also be viewed in tabular and map format. Tabular view lists abbreviated data in expandable columns and gives the status and importance of each listing. Map view gives a real-time overview of locations and incident types.*

## I. Introduction

**A**CCORDING to statistics provided by World Health Organization (WHO), road accidents have become one of the top 10 leading causes of death in the world. Specifically, road accidents claimed nearly 1.25 million lives per year (2015). Studies in show that most road accidents are caused by poor condition of roads. Bad roads are a big problem for vehicles and drivers, this is because the deterioration of roads leads to more expensive maintenance, not only for the road itself but also for vehicles. Accordingly, road surface condition monitoring systems are very important solutions to improve traffic safety, reduce accidents and protect vehicles from damage due to bad roads. Both road managers and drivers are interested in having sufficient information concerning road infrastructure quality (safe or dangerous road). Consolidated approaches for monitoring road surface condi-tions involve the adoption of costly and sophisticated hardware equipments such as ultrasonic [2] or specific accelerometersManuscript received March 13, 2017, A. Allouch is with the National School of Electronics and Telecommuni-cation. These approaches incur a high installation and maintenance cost and require large manual effort, which can induce error while deploying or collecting the data. Another alternative is to use sensing technologies to gain this information to solve the problem of road surface condition monitoring. These days, smartphones are widely utilized. The greater part of them are equipped with various sorts of sensors like camera, accelerometer, GPS, gyroscope, microphones, etc. Thus, smartphone based road condition monitoring is one of such helpful applications to monitor street conditions.This paper introduces a road condition monitoring frame-work which is based on sensors (accelerometer, gyroscope and GPS) built in smartphones to give us the quality of different road sections using machine learning techniques. The contributions of this paper are manifold and can be summarized as follows: As a first contribution, we design a machine-learning algorithmto classify road segment as compared to previous works that use simple thresholds, SVM and fuzzy logic. Our tests show that our system is able to detect and classify events related to road conditions with an accuracy of 98,6%.Our proposed system, unlike existing solutions that re-quire external hardware, is an inexpensive simple yet efficient solution that is able to monitor road quality. It is realized on Android smartphones and is highly portable and easy to maintain. Our application provide constructive feedback to drivers and local authorities by plotting the evaluated road location on a Map and saving all recorded workout entries.Creating an Android application that allows real-time and automatic collection and analysis of accelerometer and gyroscope data in order to get reliable road surface labels in contrast to previous works that mostly use offline methods (videos, images for data labeling).While most of previous works employ unimodal ac-celerometer data, we are using gyroscope sensor in conjunction with accelerometer sensor to derive more accurate road quality prediction.The rest of this article is organized as follows. Section II presents a background on the three machine learning algo-rithms used in the paper. Section III introduces some recent research works related to the monitoring of road surface conditions. Section IV describes the general idea and theproposed architecture. Experimental results of the proposed work are presented in Section V. In Section VI, we conclude the paper and we give some perspectives.

## II. Background

In recent years, road condition monitoring has become a popular research area. There has been some works in this field.The Pothole Patrol is a sensing application that reports the road surface conditions. It require the integration of particular hardware equipment; for each vehicle an embed-ded computer running Linux is used for data processing, a Wi-Fi card for transmitting gathered data, an external GPS for localization, and a 3-axis accelerometer to monitor road surface. It uses machine-learning algorithm to detect potholes. Nericell [3] is a system developed by Microsoft to monitor roads and traffic conditions. It requires a very complicated hardware and software setup. It uses several external sensors such as a microphone, GPS, SparkfunWiTilt accelerometer. The detection is not very accurate (False positive rate less than 10% and false negative rate between 20% and 30%), the system may confuse between smooth, uneven and rough roads. Mednis et al. [5] proposed a real time system for detecting potholes. The system employs Android OS based smartphones having accelerometer sensor and simple algorithms to detect events from acceleration data. Experimental results show a true positive rate equal to 90%. The drawbacks of this work is that the system uses only accelerometer sensor and data are collected through specialized hardware.Perttunen et al. [6] use a Nokia N95 mounted to a rack on the wind-shield, with accelerometer and GPS to collect data. Labeling is done with a camcorder attached to the headrest of the front passenger seat. However, labeling driving data using video is a time consuming and error prone work. The author [7] describes a pothole detection system. The neural network technique is used for justifying the threshold values and the accuracy is from 90% to 95%. Smartphone accelerometers and gyroscopes are used in [8], [9] to detect road surface anomalies, using an audiovisual data labelling technique with a labeller sitting beside the driver inside the car to mention everything relevant he saw or felt. Then, SVM is used for anomaly detection and classification with an accuracy of 90%. Moazzam et al. [10] used a low-cost Kinect sensor to capture and calculate the approximate volume of a pothole. The use of infrared technology based on a Kinect sensor for measurement is still a novel idea, and further research is needful to decrease error rates. For methods by image processing, Zhang et al. [11] have made use of stereo camera images coupled with a disparity calculation algorithm to identify potholes. Although camera-based approach have been popular in the general field of pothole detection.

## III. System Design

Our goal is to derive a road quality recognition system that detects, analyzes, identifies and predicts the state of road segments using smartphone sensors. Our system does not depend on any pre-deployed infrastructures and additional hardware. In our system, road conditions could be detected and identified by smartphones according to readings from accelerometer and gyroscope sensors. The life cycle of our system is divided into 2 phases: training and prediction. We will detail in this section these phases

**Training phase:**In the training phase, we train the classifier model using machine-learning techniques based on the collected data. During a preprocessing stage, a low pass filter is applied to remove high frequency components, and then we compute magnitude of accelerometer and gyroscope values. In the Feature Extraction stage, effective features are extracted from specific types of road conditions patterns on acceleration and rotation around gravity. Afterwards, the features are selected in the training phase and a classifier model would be gener-ated which can realize fine-grained identification. Finally, the classifier model is generated and saved.

**Collecting Data from Smartphone Sensors:** The Data collection phase is the most important one; since it is respon-sible for collecting road information. We develop an Android-based App to collect readings from the 3-axis accelerometer and gyroscope sensor. The sensors data of road surface quality were collected using accelerometer and gyroscope sensors built in the Galaxy mobile phone, mounted on the car dash-board as shown in Fig. 2, along the vehicle path. The sampling frequency of the sensors was 50 Hz. Several data collection drives were performed with a varied speed, the road condition label is pre-set before the collection starts. Once the user stops the data acquisition, the application stores the learning data-set as an Attribute-Relation File Format (arff) file.

## IV. Proposed System

The First To Recognize mobile app offers the following profit for the public: Allows users to potentially save lives with smart phone, tablet or laptop. Keeps the group safer by showing anything that looks dangerous or suspicious .Increases the effectiveness of emergency answerer by acting as their “eyes on the Spot”. Allows the public to feel helpful and quick reaction instead of feeling helpless during an evacuation. Trains public users on how to stop and respond to emergencies.

**Advantages Of The Proposed System:**

- Provides responders with tools to quickly gather and sort thousands of social media messages
- Provides information in map and tabular format
- Allows multiple agencies to easily share information during a regional disaster
- Allows new users to be trained in a few hours
- Adds potentially thousands of eyewitnesses during an emergency

**Capture Image or Record Video:**

This Module Performs the Operation to catch the Emergency Incident.This Module is designed in the Home Page of the App.On Clicking in any one Button, it takes us to either to Capture Image or to Record Video of the incidents.Once it is done, it will be shown in slide view.

**Location Identification:**

It locates the latitude and longitude co-ordinates, to make identification for the Admin to provide the service much better.Since by locating latitude and longitude co-ordinates, the mobile is no need to give the entire address of the incidence where it is happening and time could be saved.

**Emergency Manager Decision:**

Based on the request send by mobile user, the admin identifies the location and judge what type of incident happening ?and points it to the corresponding Service.Using latitude and longitude co-ordinates, the admin identifies the location.

**Emergency Manager Decision- Pseudo code :**

i. Based on the received snap, Emergency Manager takes decision by sending mail to relevant service.
ii. Java Mail API is used to implement the process.
iii. By selecting the mail address from table, mail will be shoot to relevant address.
iv. Parallely using SIM number, Emergency Manager sends SMS (Address of Emergency Service as an Acknowledgement) to Mobile User.

## V. Goals:

- Allows users to potentially save lives with smart phone, tablet or laptop .
- Keeps the group safer by showing anything that looks dangerous or suspicious .
- Increases the effectiveness of emergency answerer by acting as their “eyes on the Spot”.
- Allows the public to feel helpful and quick reaction instead of feeling helpless during an evacuation.
- Trains public users on how to stop and respond to emergencies.

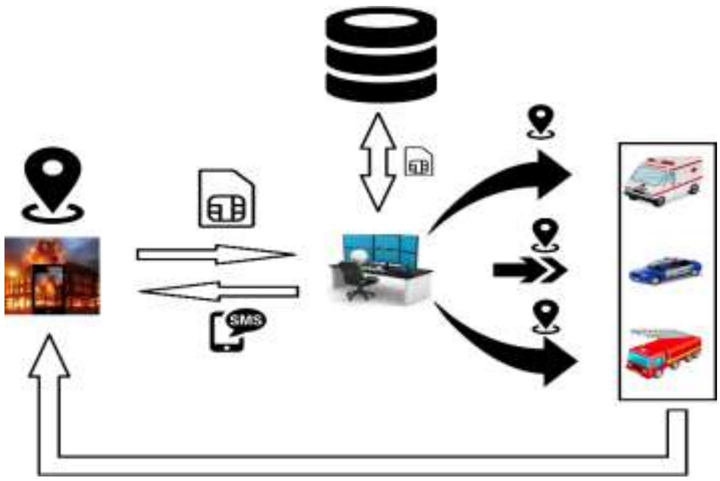


**Fig (1)** System Architecture.

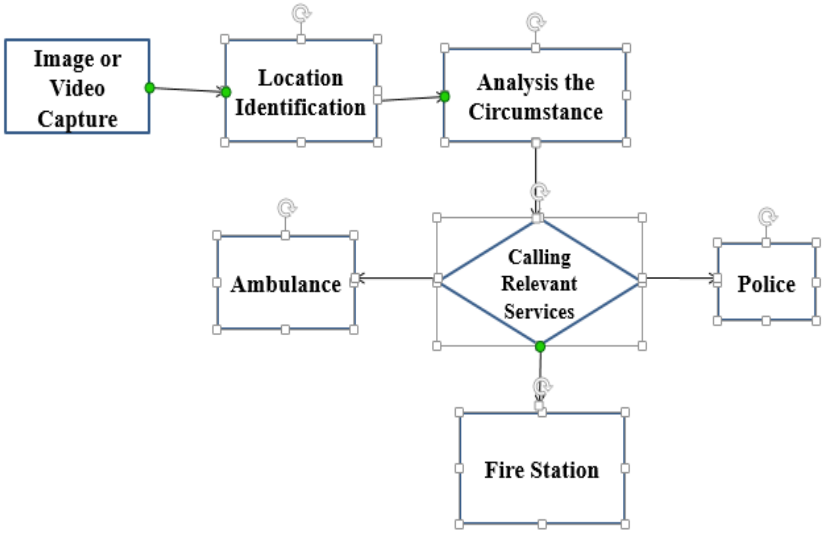


**Fig (2)** Data flow diagram

## VI. Conclusion

It locates the latitude and longitude co-ordinates, to make identification for the Admin to provide the service much better. Since by locating latitude and longitude co-ordinates, the mobile is no need to give the entire address of the incidence where it is happening and time could be saved. Based on the request send by mobile user, the admin identifies the location and judge what type of incident happening ?and points it to the corresponding Service. **Future work:**in future we include video concept to shot the incident to send it to emergency team.

## References

[1] N. Balasubramanian, A. Balasubramanian, and A. Venkataramani. Energy consumption in mobile phones: a measurement study and implications for network applications. In Proc. of the ACM SIGCOMM Conference on Internet MeasurementConference (IMC), 2009.
[2] J. D. Banfield and A. E. Raftery. Model-based Gaussian and Non-Gaussian clustering. Biometrics, 1993.
[3] J. Biagioni and J. Eriksson. Map inference in the face of noise and disparity.InProc. of the International Conference on Advances in Geographic Information Systems, 2012.
[4] L. Cao and J. Krumm. From GPS traces to a routable road map. In Proc. of the ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems, 2009.
[5] J. Davics, A. Beresford, and A. Hopper. Scalable, distributed, real-time map generation. IEEE Pervasive Computing, 2006.
[6] D. Douglas and T. Peucker. Algorithms for the reduction of the number of points required to represent a digitised line or its caricature. The Canadian Cartographer. 1973.
[7] DummyNet.http://info.iet.unipi.it/_luigi/dummynet/.
[8] S. Juan, Y. Chung, C. King, and C. Hsu. CEGF: Corner extraction by GPS filtering for power-efficient location uploading. In Proc. of the International Conference on Mobile Systems, Applications, and Services (MobiSys), 2013.
[9] Y. Lou, C. Zhang, Y. Zheng, X. Xie, W. Wang, and Y. Huang. Map-matching for low-sampling-rate GPS trajectories. In Proc. of the ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (GIS), 2009.
[10] J. Macqueen. Some methods for classification and analysis of multivariate observations. In Proc. of Berkeley Symposium on Mathematical Statistics andProbability, 1967.
[11] O. Mazhelis. Using recursive Bayesian estimation for matching GPS measurements to imperfect road network data. In Proc. of International IEEE Conference on Intelligent Transportation Systems (ITSC), 2010.
[12] N. Meratnia and R. By. Spatiotemporal compression techniques for moving point objects. In Proc. of International Conference on Extending Database Technology (EDBT). 2004.