Chapter 6
Effective Prevention and Reduction in the Rate of Accidents Using Internet of Things and Data Analytics

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ABSTRACT

Hundreds of lives in India are lost each day due to the delayed medical response. In the present scenario, the victims completely rely on the passersby for almost every kind of medical help such as informing the hospital or ambulance. This project aims to automate the process of detecting and reporting accidents using accident detection kits in vehicles. The kit has a system on chip and various sensors which sense various parameters that change drastically during the occurrence of accidents such as the vibration levels, orientation of vehicles with respect to the ground. The accident is said to occur when these values cross the permissible threshold limit. As soon as this happens, the latitude and longitude of the accident spot is tracked using the GPS module present in the kit. The nearest hospital and police station is computed by the GPS module, which uses the latitude and longitude values as the input. The accident notifications are sent to the concerned hospital and police station

over the web interface accordingly. The assignment of particular ambulance and the required traffic policemen to the accident cases is done using the web interface. The android application guides the ambulance driver as well as the policemen to the accident spot and also helps in the detailed registration of the accidents. The closest doctor facility and police headquarters is processed by the GPS module, which utilizes the scope and longitude esteems as the information. The accident warnings are sent to the concerned healing facility and police headquarters over the web interface as needs be. The task of specific rescue vehicle and policemen to the accident cases is finished utilizing the web interface. An intelligent analysis of the last five years' rich dataset uncovers the patterns followed by the accidents and gives valuable insights on how to deploy the existing resources such as ambulances and traffic-police efficiently. Various types of analysis are done to identify the cause-effect relationships and deal with this in a better way. Such technical solutions to the frequently occurring problems would result in saving many lives as well as making the cities safer and smarter.

1. INTRODUCTION

Hundreds of accidents occur in the country everyday causing an immense damage to lives and property. These accidents go unnoticed and unattended by the police and medical help such as ambulance all over the world. This is due to the absence of a mechanism, which can detect the accidents, notify all the nearest concerned authorities such as the police station, hospitals, insurance agents etc. Things haven't changed much in the context of accidents in the last few decades.

The product which is proposed as the solution is Accident Detection Kit, which has a Raspberry Pi as the System on Chip and some of the sensors such as Vibration or Shock sensors, Tilt sensors, Fire and Smoke sensors etc. each dedicated to the sensing of certain parameters which help in the detection of accidents further. The values sensed by them are continuously monitored and on encountering that they have crossed the threshold, the accident is said to occur. The threshold is set based on the testing which was performed on a model car which has undergone certain conditions which could be considered to be as accidents such as extreme vibrations, tilting of vehicles to an angle that sliding or falling becomes very likely, release of smoke/fire near the engine of the vehicle etc. On detecting the occurrence of accident, the location of the accident spot is tracked in terms of latitude and longitude using GPS Module.

The EC2 instance of Amazon Web Services as in is deployed to collect the data from the Raspberry Pi as discussed by (Ignacio, Stefano, Marco, & Maurizio, 2013). The cloud computes the nearest police station as well as the nearest hospital

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