

# Real Time Pothole Detection and Vehicle Accident Detection and Reporting System And Anti theft (Wireless)

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**Abstract**— One of the increasing problems roads face are worsened road conditions. Many reasons like rains, oil spills, road accidents or wear and tear, make the roads difficult to drive on. Unexpected hurdles on road may cause more accidents. Also because of bad road conditions, fuel consumption of the vehicle increases, causing wastage of precious fuel. All these reasons urge that it is important to get information of such bad road conditions, collect this information and distribute it to a Government body. It also becomes important to report accidents and accurate location of vehicles for life saving and property security purposes.

**Keywords**— Real time tracking, accident detection, reporting, traffic, safety, anti theft, potholes, security, vehicle accident.

## I. INTRODUCTION

There are various challenges involved in this. First of all there should be a way to get information about road conditions. Then the location of the pothole must be identified. Lastly the information must be conveyed in a manner which can be understood and used by Government body. We in this project try to design and build such a system. In this system the wireless access point collects the information about potholes in its vicinity and distributes this information to BMC using wireless broadcast. This same system is applied for accident detection too! Detection of an accident and sending the real time location to nearest helping body can save lives. Anti-theft in cars can help saving million of dollars.

## II. LITERATURE SURVEY

### A. Automated Pothole Detection Using Wireless

#### Sensor Modes

One of the sensor boards that we used for collecting environmental data also has an accelerometer that can measure both the vertical and the horizontal acceleration. We realized that this accelerometer can be used to detect the road surface condition. For example, when a bus goes over a pothole there would be a significant change in the vertical component of the acceleration (and also in the horizontal component due to braking etc.) [6] They were developing a road surface condition monitoring system that used acceleration sensors mounted on public transport buses to monitor the road surface condition with only a few sensors. These bus mounted sensors gathered vertical and horizontal acceleration data on its route together with the GPS coordinates of the data collection points.

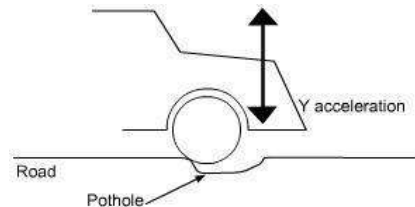


Fig. 1 Pothole level detection concept

These road surface conditions monitoring system is in fact piggy backed on an environmental pollution monitoring system called BusNet that uses the sensors mounted on the public transport buses to collect data on environmental pollution. Thus, they presented a technique that was developed to identify potholes on roads by analysing the acceleration data.

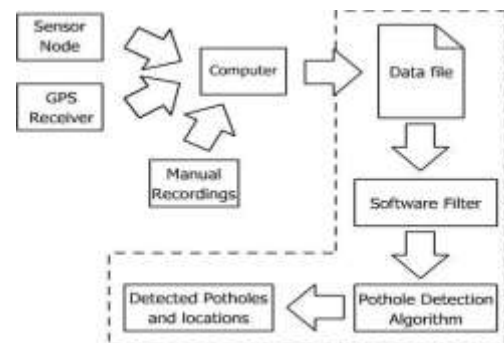


Fig. 2 Block diagram

### B. Continuous Road Damage Detection Using Regular Service Vehicles

We outlined an affordable system that continuously monitors the road network for surface damage like potholes and cracks [7]. The system consisted of a structured light sensor mounted on vehicles that travelled the roads on regular basis. It made use of sensors and equipment already present on the vehicle, like GPS on transit buses. The data was collected from many vehicles, aggregated and analysed at a central location and the assessment results were displayed interactively to facilitate road maintenance operations. Thus, they described in detail the key sensor, the data it collects and the algorithm to detect cracks and potholes.

*C. Accident Detector Using Wireless Communication  
(An Emerging Trend In Communication System)*

According to this project when a vehicle meets with an accident immediately Vibration sensor will detect the signal or if a car rolls over, and Micro electro mechanical system (MEMS) sensor will detects the signal and sends it to ARM controller[8]. An automatic alarm device for vehicle accidents was introduced in this paper. This design was a system which could detect accidents in significantly less time and would send the basic information to first aid centre within a few seconds covering geographical coordinates, the time and angle in which a vehicle accident had occurred.

**III. IMPLEMENTATION**

Microcontroller, GPS, GSM are the fundamental components of the proposed project. They are used for all three purposes i.e. Pothole detection and reporting, accident tracking and reporting and anti theft. The project kit will be mounted below the vehicle. Refer the following block diagram for the following mentioned purposes.

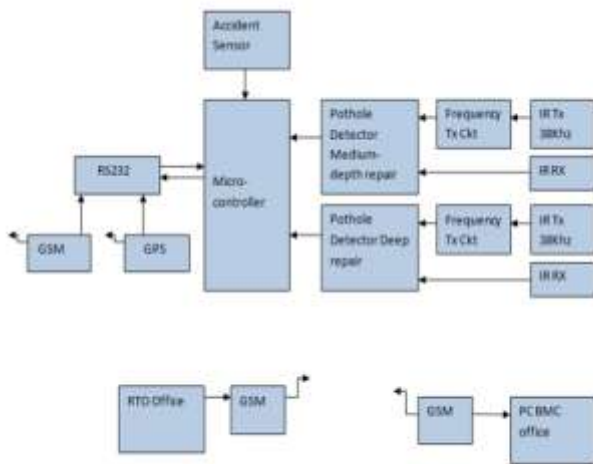


Fig 3. Block Diagram of proposed system

*A. Pothole Detection And Reporting*

The components that take part in detection and reporting are IR transmitters, microcontroller, GSM, GPS. The two IR transmitters operate at 38 KHz frequency. We are using two IR transmitters in order to detect two types of potholes. One pothole has less depth and is not dangerous. The other pothole is the dangerous one and which requires immediate repairing as the depth of this pothole is large. The IR transmitters are calibrated on the basis of ground clearance of the vehicle. The calibration is done with the help of potentiometers which can vary the height to which IR's can detect. Thus after a certain threshold depth, the IR transmitters will get triggered and it will perform the following functions.

1. As soon as any one of the IR gets triggered, the microcontroller will be notified that the IR has sensed a pothole.
2. The microcontroller will immediately make the GPS to take coordinates of that particular location and this information of the location will be the current location of the pothole. This location data will be stored inside the memory of the microcontroller.
3. The microcontroller then uses the GSM kit to send an SMS to predetermined number say, a government body responsible for road maintenance. The SMS body consists of the exact location of that detected pothole.

Thus, in this way, detection and reporting of the potholes is done in real time. Through software programming, the database of such potholes detected in various parts of the city can be kept so that the government body can address these potholes and repair them at a later stage. This will also enforce them to take actions as the database will be managed by some higher authority that will enforce these actions.

*B. Accident Tracking And Reporting*

For detecting an accident, we are using a bump sensor as an accident sensor. Whenever the bump sensor gets triggered, it performs the following functions.

1. As soon as the bump sensor gets triggered, it will send the microcontroller the information that it has sensed an accident.
2. The microcontroller will immediately make the GPS to take coordinates of that particular location and this information of the location will be the location of the place where the accident took place. This location data will be stored inside the memory of the microcontroller.
3. The microcontroller then uses the GSM kit to send an SMS to predetermined number say, a hospital. The SMS body consists of the exact accident location.

Thus, in this way, accidents can be detected and immediately reported to a hospital. This way, many lives that are lost due to delay in time can be saved as there is no need of other people that witnessed the accident to call an ambulance.

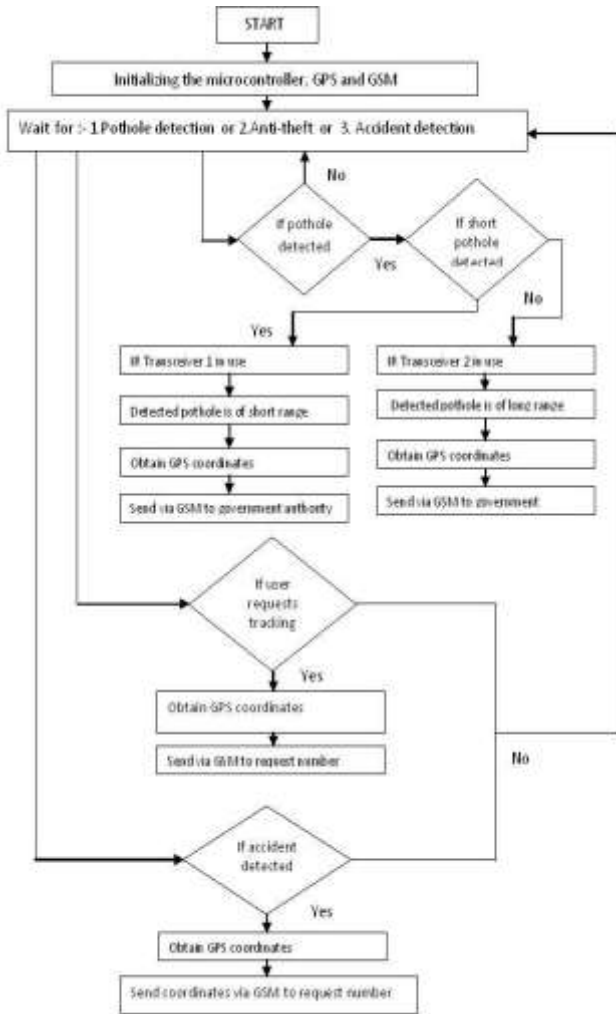
*C. Anti- Theft Security*

This is done through software programming. Whenever the owner of the car sends a pre determined message to the project kit mounted under the car, the following functions take place.

1. When the microcontroller detects the pre determined message contents set for anti- theft purpose, it immediately makes the GPS to take co-ordinates of the current location of vehicle. These location co-ordinates are stored in the memory of the micro controller.
2. The microcontroller then uses the GSM kit to send an SMS to the number from which the message was sent. The SMS body consists of the exact accident location.

Thus, in this way, protection of your vehicles from thieves can be done. The real time movement of the vehicle can be tracked through this.

**IV. FLOW CHART**



**V. EXISTING SYSTEM**

In current scenario, there is no automated system present, which does the versatile job of detecting potholes as well as accidents. Everything is done on a manual search and repair basis using human resources.

Presently, there is no way a stolen vehicle can be traced without the involvement of police.

*A. Limitation Of Existing System*

1. Since pothole detection is done manually through human eyes, the chances of missing out a pothole are high.
2. Due to lack of an automated system to detect and notify accidents immediately, precious time which can decide life and death is wasted.

3. There is no Anti-Theft system present which will enable an owner to track its stolen vehicle.
4. There is no organized database for the Regulating authority to follow to act upon.

**VI. ADVANTAGES OF PROPOSED SYSTEM**

1. The proposed system does the work of detecting a pothole as well as an accident simultaneously.
2. It is fully automated and its very time saving and efficient.
3. It offers an organized database which contains the location of all potholes present in a particular area.
4. It offers an extensive and affordable anti-theft system which can track the current location of the vehicle on which it is installed.

**VII. COMPONENTS USED**

- Micro – Controller – P89v51\_RD2.
- IC 555
- LM324
- MAX232
- CD4066
- GSM SIM900
- GPS SIM28

**VIII. APPLICATIONS**

1. With Pothole tracking and reporting, the Road Authorities will get timely updates about Potholes and can take measures to act on it at the earliest.
2. Due to Real time Accident detection, it can get immediate help like Ambulance.
3. Anti- theft system is capable of tracking vehicle without the help of police.
4. Database of road conditions will be maintained with the government body.

**IX. FUTURE SCOPE**

Our project is implemented by keeping future in mind. As of today, such a system which can do all three things i.e Pothole Detection and Reporting, Accident Detection and Reporting and anti theft system is not available. We dream about a future where this project would be implemented in each and every vehicle. Further, it could be given Wi-Fi or Bluetooth connectivity to create a network of vehicles. This network would intelligently notify other vehicles present inside it about road conditions and traffic analysis. Also, our aim is to make security systems affordable as currently only high-end vehicles boast this technology.

**X. CONCLUSION**

This Project will serve as a useful approach to automate pothole and accident detection and reporting. It will enable to

create and maintain updated database of detected potholes. It serves as a helpful approach for the government authority. It reduces the time taken to manually search and locate potholes. The project provides a user friendly interface. Our goal is to focus on customers, services and integration for end users. It reduces the man power required. It provides accurate information about the location.

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