AUTOMATIC DETECTION OF ROAD POTHOLE USING RASPBERRY PI AND MOBILE APPLICATION

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AUTOMATIC DETECTION OF ROAD POTHOLE USING RASPBERRY PI AND MOBILE APPLICATION

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ABSTRACT- One of the significant issues in creating nations is support of streets. Very much kept up streets contribute a noteworthy part to the nation's economy. Distinguishing proof of asphalt misery, for example, potholes not just helps drivers to stay away from mischances or vehicle harms, additionally helps experts to look after streets. This paper talks about past pothole identification strategies that have been created and proposes a practical answer for distinguish the potholes on streets and give opportune cautions to drivers to keep away from mischances or vehicle harms. Camera catches the picture of the street, Smart Phone and Raspberry pi with accelerometer sensor and gps sensor are utilized to distinguish the potholes out and about, the land area directions of the potholes are recognized utilizing a worldwide situating framework recipient individually. The detected information incorporates pothole width and geographic area, which is put away in the database. This fills in as a profitable wellspring of data to the society and vehicle drivers. An android application is utilized to ready drivers so that careful steps can be taken to avoid mishaps.

Keywords: Road Surface Monitoring, Accelerometer sensor, GSM Module**,** Raspberry Pi

I.INTRODUCTION

INDIA, the second most crowded Country in the World and a quickly developing economy, is known to have a huge system of streets. Streets are the prevailing method for transportation in India today. They convey very nearly 90 percent of nation's traveler activity and 65 percent of its cargo. Be that as it may, a large portion of the streets in India are thin and congested with poor surface quality and street upkeep needs are not acceptably met. Regardless of where you are in India, driving is a breath-holding, multi-reflect including, possibly life debilitating issues.

The potholes happen because of overwhelming precipitation or because of the substantial vehicles out and about. These potholes turn into the principle purpose behind the street mischances. On major the greater part of the mishaps are because of the potholes and the lessening in the weight of the tire.

Figure1.1 Chart-Indian Population Vs Usage of Vehicle

Street Surface Monitoring (RSM) is the way toward identifying the misery on cleared or unpaved street surfaces. The essential point of this procedure is to distinguish any pain, (for example, street surface splits) at early stages so as to apply upkeep on time. Early recognition of street surface breaks can help support before the repair costs turn out to be too high. What's more, measuring the condition and execution of streets are ceaselessly grown additional time with the new strategies and upgrades.

As of late, numerous scientists have proposed proficient accumulation of asphalt condition information. Noteworthy advance in this field has been made, and new methodologies have been proposed, for example, The obtaining method utilizing pictures is more financially savvy, simpler, more thick (each milli meter), and more exact in measuring the imperfection. There are many picture obtaining strategies are accessible. .Pictures from purchaser cameras on various stages, for example, Unmanned Aerial Vehicles or earthly based versatile framework can be practical contrasted with satellite's symbolism or customary aeronautical photography. Satellite pictures can be another hotspot for observing street trouble. In any case, because of the cost and the constrained spatial determination nature of the picture, it is not favoured.

The identification and estimation of the asphalt breaking gives important data to the nearby experts out and about system condition and decreases support costs. Huge advance has been made as of late in utilizing an assortment of methods for evaluating the asphalt street surface. For proficient gathering of asphalt condition information, distinctive methodologies have been proposed, and different robotized frameworks have

been created world broadly since the 1980s. Past ways to deal with asphalt condition included a work escalated, tedious, and unsafe procedure of information accumulation. A brisk, simple to utilize, and financially savvy strategy for building up a Raspberry Pi based street location technique is proposed in this paper.

Figure 1.2 Pothole And Bumps

II. RELATED WORK

John P.Caffrey et al.,[1] A vision based sensor framework utilizing economically accessible off-the-rack gadgets, for empowering the self-governing information procurement of street surface conditions. Evaluating detailed and enhancements of a different of technical approaches and algorithms for overcoming vision-based measurement distortions induced by the motion of the monitoring platform were conducted. The fundamental difficulties that this review experienced and settled are abridged below: Sunlight obstruction: Based on outside tests, a Kinect unit is effortlessly meddled by daylight. A top-cover sunshade and a full-cover sun-shade were planned and tried. This review utilized this way to deal with tackle the movement obscure issue for the Kinect's color. Futhermost,to build up an asphalt trouble recognition calculation to distinguish, confine, and evaluate asphalt trouble consequently from different procured information. To enhance the information obtaining programming to meld and synchronize diverse sensor informational indexes all the more proficiently.

Mondye Nyode et al.,[5] The signal processing techniques expected to empower a computerized appropriated street surface condition observing framework. Data-collection/interpolation models and signal processing methods and signal processing methods have been produced to mutually synchronize and intertwine various spatially recorded asphalt trademark and vehicle situating estimations caught from reasonable vehicle mounted sensors.

Abhishek Maurya et al.,[6] vibration based street condition recognition gadget, which comprises of an Arduino based detecting module and an Android based UI, is composed and executed. To start with, the Arduino based detecting module is intended to assess the

street conditions progressively and send the assessment result to the Smartphone through remote medium.

Rahul Sagar et al.,[8]The paper is depicting structure for street oddity like street knock and pothole recognition utilizing Android OS this system use accelerometer sensor. The favorable position is that the GPS course of action of phone and sensors like accelerometer of android phone, so we can break down the street and can exchange this information on server so every customer can use this information amid voyaging. Knock is recognized using sensor data gathered from administrator telephone, details of area of knock is put away on the server side different client.

III. COMPONENTS USED IN THE PROPOSED SYSTEM

SOFTWARE REQUIREMENTS
- Windows OS
- JDK 1.7
- Android Studio IDE
- Putty
- VNC Viewer

HARDWARE REQUIREMENTS
- Main Processor : > 2GHz
- Ram : 1 GB
- Hard Disk : 80GB
- GPRS activated Android mobile with Accelerometer Sensor
- Gps Sensor Module
- Accelerometer Sensor
- Raspberry Pi
- Raspberry Pi Camera

IV. ARCHITECTURE & IMPLEMENTATION

System design of the proposed Pothole detection using android is depicted in fig. When the pothole occurs the sensors detect the bumps,sense and capture the pothole image .Then the image is send to the Cloud. The major modules in this system are.

Mobile Application Based Module: Sensor Based Module, Image Capturing, Repository Module, Monitoring Phase

Raspberry Pi Based Module: Sensor Based Module, Image Capturing, Repository Module, Monitoring Phase.

Sensor Based Module:

In Sensor Based Module,We are using accelerometer sensor is used to identify the pothole.An accelerometer is an electromechanical device used to measure acceleration forces. Such forces may be static, like the continuous force of gravity or, as is the case with many mobile devices, dynamic to sense movement or vibrations. A dynamic accelerometer measures gravitational pull to determine the angle at which a

device is tilted with respect to the Earth. Typical accelerometers are made up of multiple axes, two to determine most two-dimensional movement with the option of a third for 3D positioning. Most smartphones typically make use of three-axis models, whereas vehicles simply use accelerometer to determine the moment of impact. The sensitivity of these devices is quite high as they're intended to measure even very minute shifts in acceleration. The more sensitive the accelerometer, the more easily it can measure acceleration. By sensing the amount of acceleration, users analyse how the device is moving. Accelerometers allow the user to understand the surroundings of an item better. With this small application, if an object is moving uphill or angling downward to determine pothole.

Image Capturing :

Using Android Studio ,by Creating Mobile Application to capture image whenever it exits the condition provided.Captured image is stored in sdcard .Stored image is geotagged using geosetter and google earth tool.Using Raspberry Pi, Pi Camera going to capture the pothole image and to store the image in sd card.

Repository Module:

Repository used here is google repository(i.e)Google Drive API to upload image in google drive.In this module,integration to be done between android and Google API console.in that we have to identify the SHA-1 Fingerprint from coding and Key id is generated dynamically for the new projects created in android. we have to add keys to the android code for migration. In API console we have to provide SHA-1 Finger Print along with package name in order get the trusted and authenticated project. After that, store our data in google API console

Monitoring Phase:

In monitoring phase captured pothole image will be automatically send to our twitter account by using twitter API. Using that information government authorities can monitor the road information
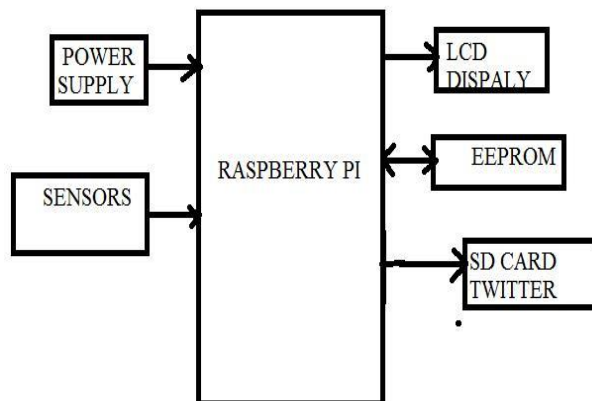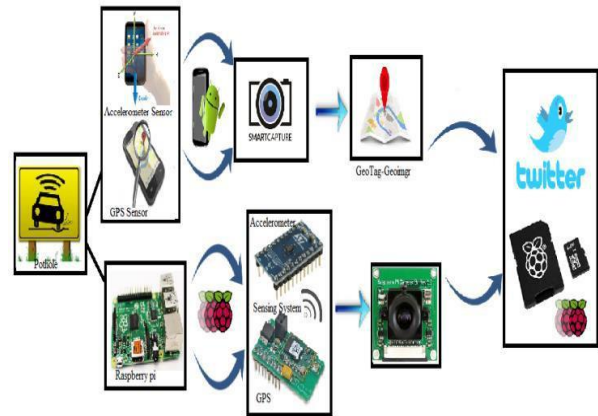

Figure 4.1

Figure 4.2

Figure 4.1 and**Figure 4.2** shows that the overall architecture diagram of the Automatic Pothole Detection using Raspberry pi and Mobile Application.
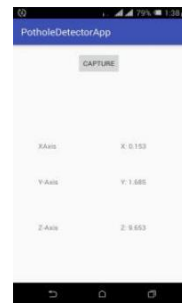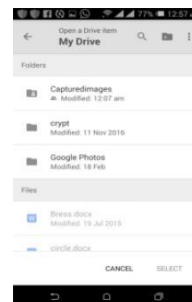
V RESULT

Figure 5.1   **Figure 5.2**   **Figure 5.3**

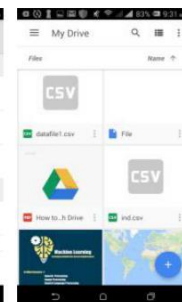**Figure 5.4**   **Figure 5.5**   **Figure 5.6**
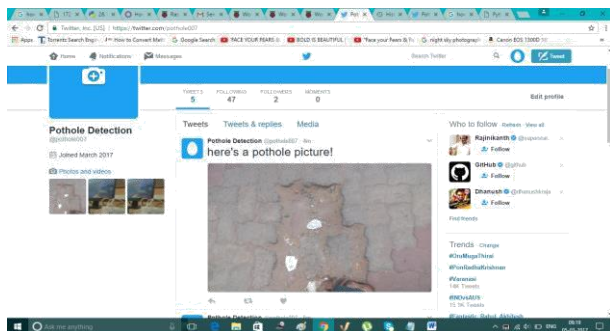

Figure 5.7

Figure 5.8

Above figure describes the result of the proposed system for pothole detection.

VI CONCLUSION AND FUTURE WORK

Sharing data in twitter is the major advantage because it is viewed by government authorities. The maintenance of road becomes easy and accidents can be avoided. In future, by using various algorithms for the development of self-calibration functionality for further analyzing and quantifying the distress in an engineering manner.

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