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SMARTPHONE APPLICATION TO ESTIMATE ROAD CONDITIONS USING SENSORS: ROAD SENSE

[1]Prof.Pragati kinage,[2] Sana Pathan, [3]Pooja Pawar, [4]Shraddha Ambre

1Project Guide, Prof.Pragati Kinage, ICEM, Pune, Maharashtra, India
2BE, Sana Pathan, ICEM, Pune, Maharashtra, India
3BE, Pooja Pawar, ICEM, Pune, Maharashtra, India
4BE, Shraddha Ambre, ICEM, Pune, Maharashtra, India

Abstract :*Smartphone's square measure doubtless helpful to be adopted as a cheap and simple to implement tool for the mensuration of paved surface roughness condition, that is incredibly essential for road observation and maintenance coming up with. During this study, an experiment has been distributed to gather information from accelerometers and gyroscopes on Smartphone's. The collected information is processed within the frequency domain to calculate magnitudes of the vibration. Road roughness condition that's sculptured as a linear operate of each information form measuring because the average speed, achieves higher estimation than the model that takes into consideration the magnitude from the measuring instrument and also the average speed alone. The finding is doubtless important for the event of a additional correct model and a more robust Smartphone app to estimate road roughness condition from smart phone sensors.*

I. INTRODUCTION

To properly monitor, set up for maintenance and manage road infrastructure, substantial quantity of information is often required, notably statistic and up to now road condition knowledge. Road condition knowledge changes over time; since it additionally sometimes needs significantly vital investment and time to gather the information everyday basis on an, getting such knowledge is usually a challenge that a lot of governments face, particularly in countries wherever budget is proscribed and advance technology remains unaffordable. paved surface roughness is thought to be one amongst the foremost vital road conditions, as a result of it affects vehicle maintenance prices, fuel consumption, comfort, and safety. Road measuring is often done either by one or a mixture of 2 main approaches, that embody a subjective rating or a visible review, Associate in Nursing approach that's labor intensive and really time consuming; and therefore the use of refined profilers, that square measure extremely correct however expensive to get operate and maintain needful skill operators still as cumbersome standardization before preparation. within the smart phone era, wherever the amount of smart phone users is increasing steady, victimization smart phones to gather road condition knowledge and estimate road roughness condition might modification the means the govt monitor, set up for maintenance and manage the road infrastructure forever, as a result of the prospect of getting lots of up to now knowledge with cheap investment is large. On the opposite hand, today's smart phones sometimes go with sensors that square measure capable of recording helpful signal for paved surface condition estimation equally to those employed in several instruments. There square measure some studies that square measure relevant to the current work, like the utilization standalone, mobile and smart phone sensors to assess and monitor road and traffic conditions, discovered road bumps/anomalies and their locations, and analyses events/features of various road defects; in simulation and real-life traffic conditions more development includes the introduction of smart phone apps that claim to figure in detective work road bumps and roughness condition. The ultimate goal of this project is to develop a considerable less complicated app that identifies road condition and inform alternative application user concerning traffic update.

II. LITERATURE SURVEY

According to literature survey after studying different IEEE paper, collected some related papers and documents some of the point discussed here:

1. Paper name: Road Condition observation mistreatment On-board Three axis Accelerometer and GPS sensing elementIndex (IRI) has been wide accustomed measure pavement smoothness as a result of it will give a homogenous rating for totally different measure tools. However, existing measuring tools supported IRI area unit sometimes terribly pricey. during this paper, we present a affordable vehicle-based resolution, Road Condition Monitoring with Three-axis Accelerometers and GPS Sensors(RCM-TAGPS), by employing a low-cost three-axis measuring device and a GPS sensing element embedded in a very vehicle to observe the road condition. We analyze the ability Spectral Density (PSD) of pavement roughness, estimate IRI, and classify the pavement roughness level into four levels in line with a Chinese trade customary . Experimental results show that RCM-TAGPS will evaluate pavement roughness level properly, even beneath some interference like potholes, manholes and decelerating belts, and the total value of RCM-TAGPS in every

vehicle isn't any quite 50dollars, that is concerning 1/4400 to 1/160 of the prevailing system used in engineering science and municipal engineering.
Advantages: Authors gift a affordable vehicle-based resolution, Road Condition Monitoring with Three-axis Accelerometers and GPS Sensors (RCM-TAGPS), by employing a low-cost three-axis measuring device and a GPS sensing element embedded in a very vehicle to observe the road condition.

Disadvantages: want further hardware

2. Paper name: Associate in Nursing Estimation of paved surface Conditions mistreatment democratic Sensing
Author name: Yukie Ikeda, Masahiro Inoue
Explanation: When natural disasters occur, some roads may well be blocked and can't be used. paved surface conditions conjointly deteriorate. Thus, collection and providing the data on usable roads and paved surface conditions will enable folks to be exhausted safely. during this study, we have a tendency to planned Associate in Nursing estimation system of the paved surface conditions by collection measuring device information from pedestrians' smart phones. the strategy estimates whether or not the paved surface condition may be a flat pavement road, a rough road, a slope or a support by mistreatment supervised machine learning technique. From the results of experiment, we have a tendency to found that the system will estimate six kinds of paved surface conditions with a high accuracy once coaching the model with the information from the users.

Advantages: found that the system will estimate six kinds of paved surface conditions with a high accuracy once coaching the model with the information from the users.

Disadvantages: System style for walking persons and not for cars

3. Paper name: Towards a sensible Crowdsensing System for paved surface Conditions observation
Author name: Amr S. El-Wakeel, Abdalla Osman, Aboelmagd Noureldin and Hossam S. Hassanein
Explanation: The Internet of Things (IoT) infrastructure, systems, and applications demonstrate potential in serving good town development. Crowd sensing approaches for paved surface conditions observation will profit good town road data services. Deteriorated roads induce vehicle harm, holdup, and driver discomfort that influence traffic management. during this paper, we have a tendency to propose a framework for observation paved surface anomalies. we have a tendency to analyze the common paved surface sorts and irregularities furthermore as their impact on vehicle motion. additionally to the normal use of sensors obtainable in good devices, we have a tendency to utilize the vehicle motion sensors (accelerometers and gyroscopes) presently obtainable in most land vehicles. varied land vehicles were utilized in this analysis, spanning totally different sizes, and year model for intensive road experiments. These trajectories were accustomed collect and build multiple tagged information sets that were utilized in the system structure. so as to reinforce the performance of the sensing element measurements, riffle packet de-noising is employed during this study to alter economical classification of paved surface anomalies. we have a tendency to adopt applied math, time domain and frequency domain options {to distinguish |to totally differentiate |to tell apart} different road anomalies. The descriptive information sets collected during this study area unit accustomed build, train, and check a system classifier through machine learning techniques to sight and multiple road anomalies with totally different severity levels. moreover, we have a tendency to analyze and assess the capabilities of the good devices and also the different vehicle motion sensors to accurately geo-reference the paved surface anomalies. many tryout experiments examine the advantages and assess the performance of the planned design.

Advantages : System work use image process to sight road condition.

Disadvantages: want further camera that is attach to wind protect

4. Paper name: Mahalanobis Distance-Based Road Condition Estimation Methodusing Network-Connected Manual chair
Author name: Kazuyuki Kojima, Hiroke and Junichi Kaneko
Explanation : This paper describes a way to estimate road condition mistreatment our developed network-connected manual wheel chair. we've got been developing the chair on which torque sensors, Associate in Nursing measuring device and a GPS receiver area unit enforced, for gathering the road condition information onto our server PC. Our final purpose is to develop a system that display traffic disturbances for manual wheelchairs on the digital map automatically. For this purpose, this study aims to associate the sensor values with road conditions mistreatment distance. In this paper, firstly, our developed chair is explained briefly. Then, characteristics of non heritable information is shown. After that, definition of unit area for this downside and calculation of distance area unit delineate. Finally, risk of categorizing road conditions mistreatment the distance defined by significance level is explained thoroughly with the experimental information.

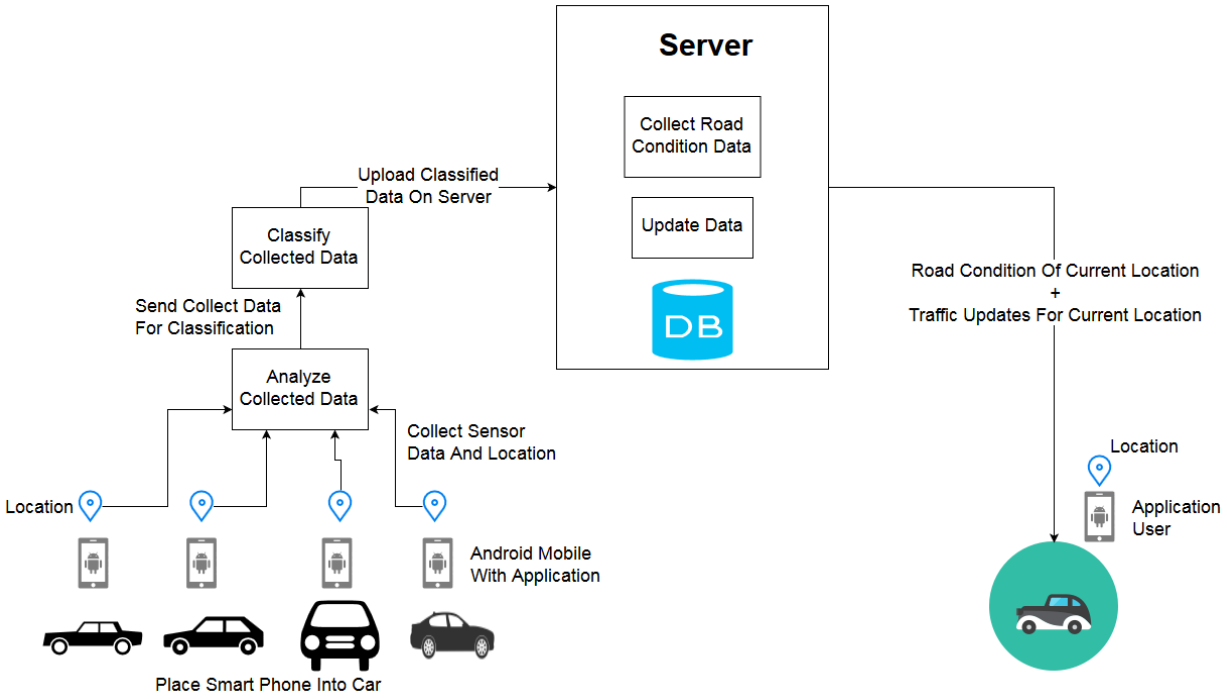
III. PROPOSED SYSTEM

We proposing system to observe the rash driving if somebody detected as rash driver then system can advise to nearest police headquarters concerning driver. we have a tendency to area unit reaching to use measuring device to induce the reading measuring device offer worth of X, Y, Z as per the motion of mobile in step with reading we have a tendency to area unit reaching to classify the motive force is rash driver or not.

ADVANTAGES

- Propose system don't need any extra hardware.
- Propose system utilize inbuilt mobile sensor.
- Propose system inform traffic updates to nearest users.

IV. SYSTEM DESIGN



V. CONCLUSION

Propose system uses AN measuring device and gyroscope sensing element for assortment of knowledge and GPS for plotting the road location trace in Google map. we have a tendency to area unit reaching to implement call tree algorithmic program. Our greatest results are obtained due to a grouping of 2 sensors; accelerometer and rotating mechanism. we have a tendency to conjointly reaching to inform nearest user concerning traffic. The smart phone-based technique is extremely useful because it removes the necessity to deploying special sensors in vehicle it's the advantage of high quantifiability as smart phone users will increase day by day. Thus, we've got developed a smart phone application Road Sense. The Road Sense application is an conceive to offer its users with higher data about the routes of their transportation.

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