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POTHOLE DETECTION SYSTEM

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Abstract

Aging roads and poor road-maintenance systems result a large number of potholes, whose numbers increase over time. Potholes jeopardize road safety and transportation efficiency. Moreover, they are often a contributing factor to car accidents. To address the problems associated with potholes, the locations and size of potholes must be determined quickly. Sophisticated road-maintenance strategies can be developed using a pothole database, which requires a specific pothole-detection system that can collect pothole information at low cost and over a wide area. However, pothole repair has long relied on manual detection efforts. Recent automatic detection systems, such as those based on vibrations or laser scanning, are insufficient to detect potholes correctly and inexpensively owing to the unstable detection of vibration-based methods and high costs of laser scanning-based methods. Thus, in this paper, we introduce a new pothole-detection system using a commercial black-box camera. The proposed system detects potholes over a wide area and at low cost. We have developed a novel pothole-detection algorithm specifically designed to work with the embedded computing environments of black-box cameras. Experimental results are presented with our proposed system, showing that potholes can be detected accurately in real-time.

1. INTRODUCTION

Dangerous road surface conditions are major distractions for safe and comfortable transportation. Both drivers and road maintainers are interested in fixing them as soon as possible. However, these conditions have to be identified first. A prime concern of the current transport industry is the provision of sustainable transport through the improvement of efficiency, quality, safety & the reduction of the impact of energy use on the environment. It is estimated that more than 30% of the accidents are caused by

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environmental conditions. Therefore, in order to achieve a good environmental protection, and to keep a low accident rate, especially in large towns, having a healthy road infrastructure is a major first step forward. Road humps are made to curb vehicle speed, but many humps are made with uneven and unscientific heights and in unexpected intervals. Sometimes timely road signs are not provided to warn drivers to slow down for an upcoming road hump, which results in accidents or vehicle damage. The system is made to also detect road humps and provide timely alerts to drivers.

2. RELATED WORK

One of the major problems in developing countries is maintenance of roads. Well maintained roads contribute a Major portion to the country's economy. Identification of pavement Distress such as potholes and humps not only helps drivers to avoid accidents or vehicle damages, but also helps authorities to Maintain roads. This paper discusses previous pothole detection methods that have been developed and proposes a cost-effective solution to identify the potholes and humps on roads and provide timely alerts to drivers to avoid accidents or vehicle damages. Ultrasonic sensors are used to identify the potholes and humps and also to measure their depth and height, respectively. The proposed system captures the geographical location coordinates of the potholes and humps using a global positioning system receiver.

3. IMPLEMENTATION

India, the second most populous Country in the World and a fast growing economy, is known to have a gigantic network of roads. Roads are the dominant means of transportation in India today. They carry almost 90 percent of country's passenger traffic. However, most of the roads in India are narrow and congested with poor surface quality and road maintenance needs are not satisfactorily met. No matter where you are in India, driving is a breath-holding, multimirror involving, potentially life threatening affair. Over the last two decades, there has been a tremendous increase in the vehicle population. This proliferation of vehicles has led to problems such as traffic congestion and increase in the number of road accidents. Pathetic condition of roads is a boosting factor for traffic congestion and accidents. Researchers are working in the area of traffic congestion control, an integral part of vehicular area networks, which is the need of the hour today. Roads in India normally have speed breakers so that the vehicle's speed can be controlled to avoid

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accidents. However, these speed breakers are unevenly distributed with uneven and unscientific heights. Potholes, formed due to heavy rains and movement of heavy vehicles, also become a major reason for traumatic accidents and loss of human lives. According to the survey report "Road Accidents in India, 2011", by the ministry of road transport and highways, a total of 1,42,485 people had lost their lives due to fatal road accidents. Of these, nearly 1.5 percent or nearly 2,200 fatalities were due to poor condition of roads. Figure 1.1 portrays the condition of roads with killer potholes. To address the above mentioned problems, a cost effective solution is needed that collects the information about the severity of potholes and humps and also helps drivers to drive safely. With the proposed system an attempt has been made to endorse drivers to ward off the accidents caused due to potholes and raised humps.

Aging roads and poor road-maintenance systems result a large number of potholes, whose numbers increase over time. To address the problems associated with potholes, the locations and size of potholes must be determined quickly. Thus we introduce a new pothole-detection system.

Circuit diagram:

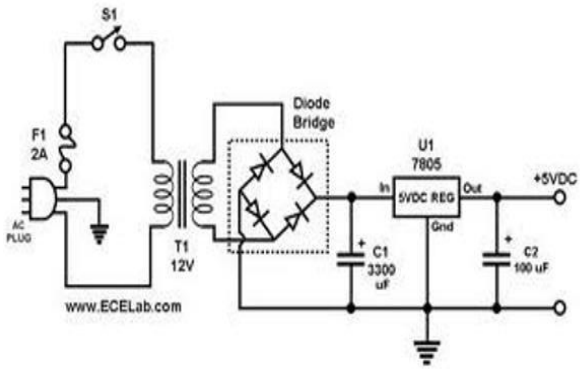

Fig 2.3. Circuit Diagram of power supply

4. EXPERIMENTAL RESULTS

Our task is to design a pothole detection system for effective road maintaining system in order to prevent accidents. Our proposed design is to prevent road accidents caused due to large potholes using few components like =NODE MCU, Ultra sonic sensor, IR SENSOR DC MOTOR, L293D, etc.

Proposed pothole-maintenance system with a pothole detector.

• The collected data is stored in the pothole database, and the pothole-maintenance server uses it for smart pothole maintenance. We developed new software for the pothole-maintenance server based on our previous pothole database system .

• The proposed system detects potholes over a wide area and at low cost. This can be integrated with the vehicle and provide timely information to maintenance

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authorities so that necessary steps can be taken for safety of drivers.

• The pothole's location is visualized on a digital map using the collected GPS data. Thus, users can easily see the distribution of potholes. Furthermore, the software accurately estimates the costs of pothole maintenance in the selected area.

• This way, transportation officials can easily and accurately develop road-maintenance policies and strategies with the software. Potholes can then be repaired smartly using the pothole-maintenance system such as our intelligent asphalt repair systems and pothole information can be extended to other users and services via external connections.

5. CONCLUSION

The pothole detection system detects potholes over a wide area and at low cost. This can be integrated with the vehicle and provide timely information to maintenance authorities so that necessary steps can be taken for safety of drivers. The cost effective system that is being proposed will prevent accidents to a great extent. The proposed solution makes use of a better and more efficient technology to detect potholes and warn the driver about them so that he can be aware of a prior. This type of Pothole Detection system has a good future scope because there is no man power used and it is technology based idea, were a sensor detects the potholes and another sensor detects humps on the road. So, there is no need of any physical presence of any one because it is automatic.

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