Identifying and Monitoring Manholes to Ensure Road Safety using Image Processing

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Abstract

Now-a-days, road formation is the major requirement for our country. On increasing the many no of vehicles from day to day the road safety plays a isolated role to get safer of vehicles. As the presence of Manholes on the roads is major problem of accidents. These accidents occurs due to its uneven formation and improper maintenance. To control the manhole or pit-hole system, it takes much time and money for long duration in existence. To solve these problem the manhole should be monitored at every period of time with less effort. The manholes monitoring system reduce the loss of lives on the roads, these manholes should be monitored and controlled there paths to maintain road safety of vehicles during nights it is difficult to travel with road safety measurements on presence of manholes on the roads and on its presence the system should be maintained with help of monitoring system. To maintain the safety of vehicles on the roads the manholes must be tracked of its path while travelling with safety measurements.

Keywords—Manhole, Vehicle, Manhole Detection, Image Processing, Road Safety.

I.INTRODUCTION

O n increasing the no of vehicles, the road formation is the major requirement for our Nation. The Manholes on the roads are the main objects to make the road accidence, As due to some of the manholes are uneven and improper. The safety of vehicles is ensured due to rash driving on presence of manholes on the roads. On such condition the manholes should be Identified and monitored on every period of time to travel safer. In these system the manhole presence and absence is identified using image processing to give finite result and to reduce the flaw of output.

During night time on rainy days it is difficult for a vehicle to find for open manholes and ride safety. This system allow us to avoid road accidents during rains. This system will also minimize the death-rate making it safer to prevent loss of lives. The manhole detection using image processing undergoes using Histogram algorithm to find the manhole effective. This reduce the effort and time begin process. By these system the vehicle can travel smoother on identification of the manholes.Therefore it is essential to detect open manholes and sends message to the control room ,and notify the vehicle if there are any open manholes. On Control of these process the man can travel with no accidence and without any pressure of manhole. As These process of identification can also be transferred to the higher official like municipal corporation as there is presence of uneven manhole and to take responsibility to repair the manhole.

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II. BACKGROUND

A. Literature Survey

Gaugyong Jia,was proposed systems, such as drainage system, electric power system, network system, and so on, are laid underground in a modern city. The manhole system is made with covering the manhole with pavement. However, falling in the manhole occurs due to the displacement and uncover of space in the manhole which leads to the threat to the people. Obviously, this is to aim of smart cities.

Manhole accident occurs majorly due to uncover of hole that do not monitor the status of the manhole in real time as the manhole should tracked on daily basis..

[1] The manholes status is tracked and the status of damaged and uneven manholes are sent to the government inspections who are ready to clear the problem. By these accident and loss of life will be protected on the roads. On inspecting the manhole the large no of humans will be safeguarded and

large no of manholes will be detected easily. Moreover, this does not provide real-time performance. It may take one or more days for problems to be found through such inspections,with even a month required in the suburbs. Such delays allow dangers to exist.

[2] As the manhole cover is difficult problem to solve on stolen being with no monitoring method for traditional manhole covers Moreover a manhole cover is easy to carry.

Therefore, such thefts constitute not only public property losses but also an increased risk of uncovered holes.

B. Technology Used :

RFID is an Communication Technology that proposed to communicate among readers and tags. This communication is based on radio waves that creates a way to identify and locate the objects, like people and animals the people that need of technique on line-of-sight methodology [1]. The Reader of RFID contains two types of mode control, the controls are static and fixed mode. The barcode read type of operations are performed by the RFID tags. The wireless tag of RFID is communicated through reader. The System of RFID finds the location and type of object with various conditions of the device. RFID of an system contains three major components: RFID tags of Object; RFID reader of Device, andantenna. Chips contained in microprocessor RFID tags on each it contains integrated circuits with certain memory. On identification of tag, Unique code that stored in memory. This type of Identification is known as tags ID.

The RFID detection technology helps to find the object as easier and effective with help of the tagged component. It provides the way to identify the object easier and quicker. According to the division of tags, the tags are two types. They are: Active tags and Passive tags. The difference between them are Power type of value, Distance Communication, Circuit Size. The size of Passive tags are smaller in size and more cheaper. Moreover other tag, the active tags provides self source of communication power source RFID Technology. It provides effective solution of finding the required objects.[2] The RFID is helpful for finding the displacement of object.[3] On Covering the manhole with RFID tag is that help provide the System intelligence.

The IMCS system has certain advantages.[1] Attaining Self Perception: By this the manhole can cover the performance to monitor the whether tilted, displaced or damaged as it has the ability to locate on its own. [2] Real Time Active Alarm: The each and every manhole provides the real time alarm system in real time as damaged, displaced or tilted with certain angle. [3] Realtime Response Of Every Request: It Provides the Realtime response of each time. The IMCS provides the response to manhole on covering it in Realtime. [4] Low Cost Management System: The IMCS aims on low Cost and effective resource development.[5] Quick Time Repair: It also aims on major Quick repair on displaced, damaged and tilted of the surface with falling of humans into the manhole.

III. PROPOSED SYSTEM

A. Overview

This proposed system ensures purpose of road safety and manholes control and monitoring system. There are two major usage of manhole control system is performed as such as with vehicles and pedestrians.

As shown in figure 1, the open manholes leads to accidence of vehicles. During nights and rainy season, it is not easy to detect the manholes while walking on the pedestrian path. On such cases the manhole monitoring system is much more effective to detect and control the manhole location. This System also Provides the Message transfer among Vehicles by using the LED Back Light Signal, such that the person who travelling Infront of other person will send message through LED as the manhole is present in this Location. On Identification Manhole in that Location the Next Traveller get Alert and The Traveller can Travel Safely. The detection of man hole can be performed effectively using Image processing Technique on Detection and Processing of Image.

On Identification of manhole Image, the message of "Manhole" transferred to the user on Voice Message to Mobiles using Application. The Vehicle Traveller will Receive Buzzer Sound and LED Lights of Vehicle get ON (Front Light and Back Light) automatically. So, that the Traveller can Travel Safely on presence of Manhole. Hence, the Vehicle can travel Safely without any accident or any hazards during Nights.

The Speciation of Components are:.

Arduino UNO: ATmega328P, 5V, 7-12V, 6 Analog andDigital Input Pins.

LCD Unique TFT Shield: 9.7 x 6.9 x 2 cm, 4-wire Resistive touchscreen.

Camera OV7670: 10 x 7.5 x 4 cm, 2.5V to 3.0V.

LED Lights: 5MM, 3.2V.

Buzzer: Continous Beep, 4-8V.

Software Component: MATLAB R2019a.

This process of implementation uses less cost and effect in result with high effeciency. The system is highly controllable in maintenance and monitoring the system with locally without any network usage. By these process the accuracy of the proposed system increases than the existing system.
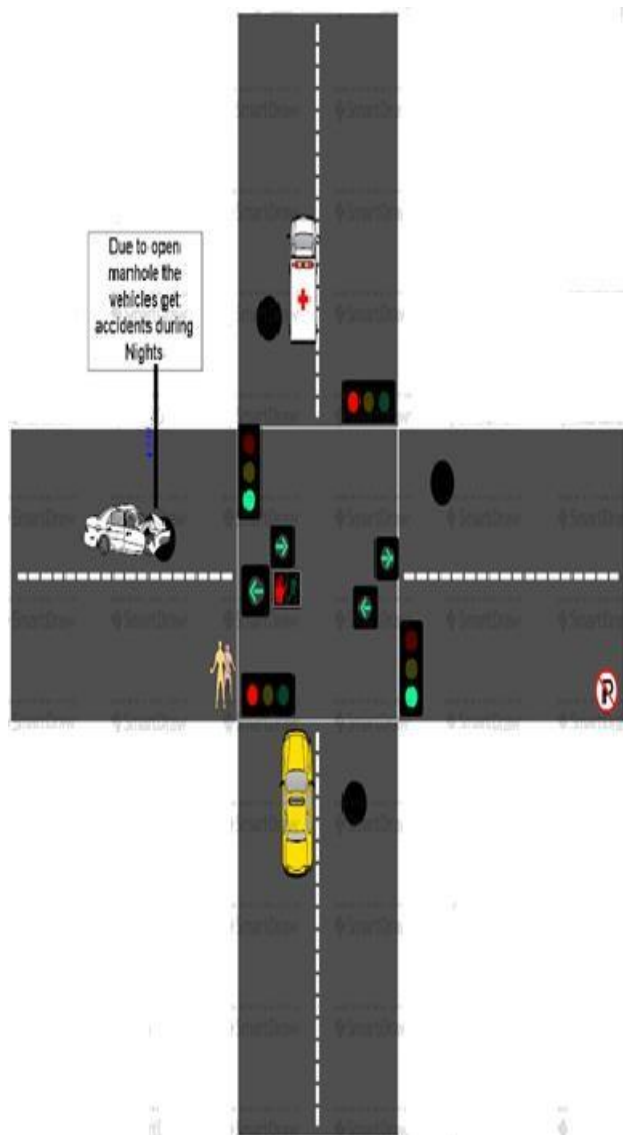
Figure 1 : The accidence occur due to open manhole holes during nights.

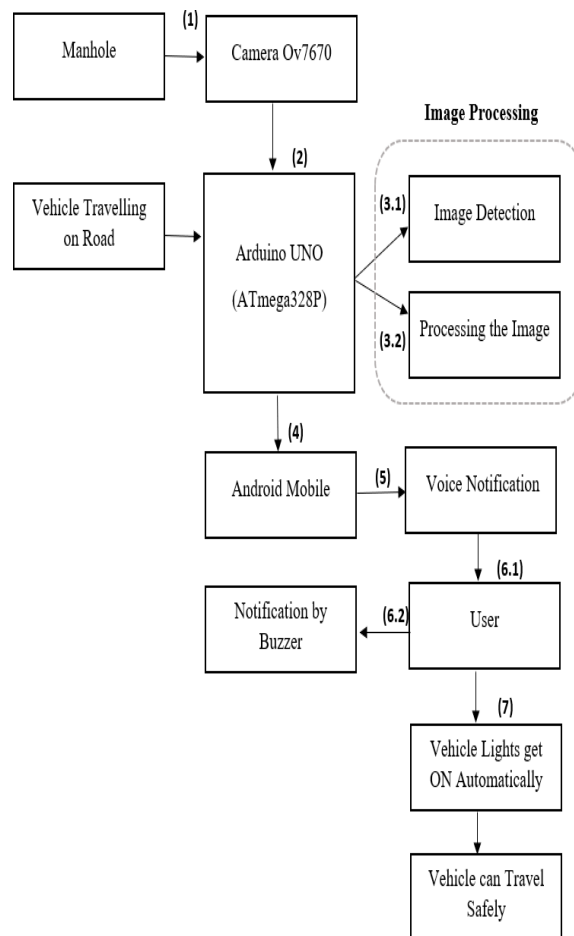*Figure 2 : uneven manholes on the roads.*

B. System Architecture

Figure 3 : Architecture diagram on Manhole Identifying and Monitoring using Image Processing

Work Flow :

According to the Architecture flow diagram as shown in figure 3, the manholes are detected through the camera. The camera collects the information of manhole existence at every time period with help of image processing technology. The Image Processing undergoes two module functioning they are : 1. Image Detection, 2. Image Processing.

The collected information is send to the Buzzer, Android and LED with help Arduino. The Buzzer gives immediate response with buzzer message as the manhole is arriving towards them. The LED receives the message and response as LED light glow with high intensity. On increasing the LED light intensity and glowing extra light at the back of the vehicle helps to know the manhole is present to backside vehicles on the roads. So one vehicle can safe guard other as chain sequence process The light gets off as the manhole is

passed away. These process is performed as continues at day and night. But it choose to be effective at night times. On additional voice message is send to the Android mobile to know whether " what kind of obstacle are facing on ".
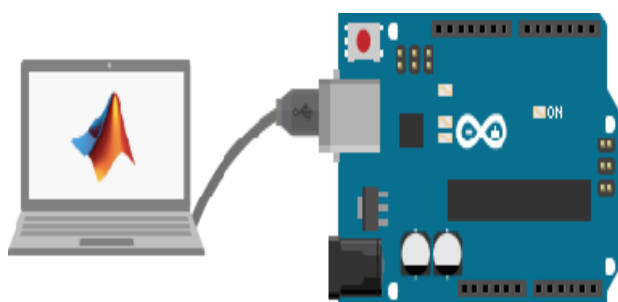
IV. MODULE IMPLEMENTATION

Figure 4 : Integration of Arduino and MATLAB

A. Configuration of MATLAB with Arduino

To configure the MATLAB

- Here, we will transmit data from MATLAB to the Arduino Uno as shown in figure 4.

- It also sends Buzzer and LED Light Glow message to Buzz and LED using MATLAB as the identification of manhole.

- Data is sent to the Mobile as the manhole is detected through notification.
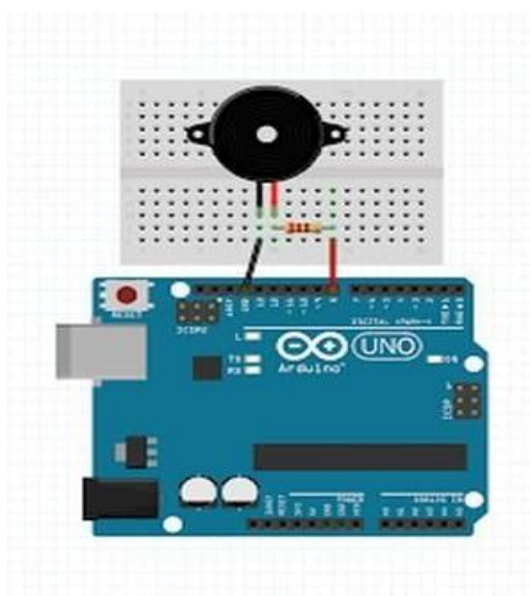
B. Interfacing Buzzer with Arduino

Figure 5 : Integration of Arduino and Buzzer

Steps to Interface Buzzer with Arduino

Step 1: Connect the Negative Pin to the Ground and Positive pin to Digital Pin as shown in figure 5.

Step 2: The Buzzer Receive data using the positive pin, from the Digital Pin with Pin Number.

Step 3: Code the Arduino.
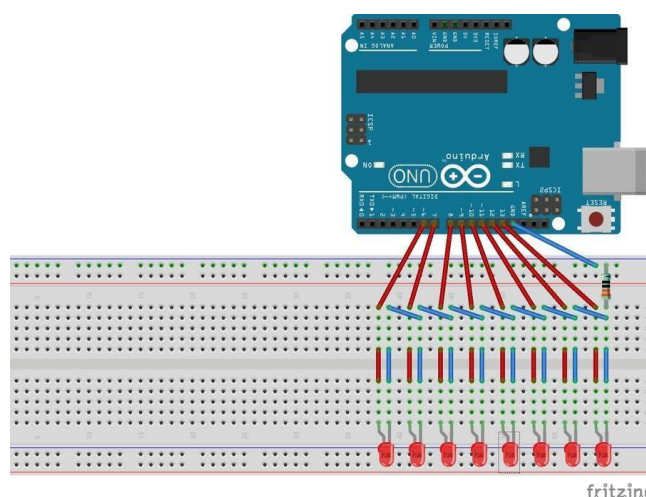
C. Interfacing LED with Arduino

Figure 6 : Integration of Arduino and LED

Steps to Interface LED Light with Arduino

Step 1: Connect the Negative Pin to the Ground and Positive pin to Digital Pin as shown in figure 6   .

Step 2: The LED Light Receive data using the positive pin, from the Digital Pin with Pin Number as D*.

Step 3: Code the Arduino.

D. Implementation:

- In this Implementation the Serial Monitor is used to monitor message of output from the Camera image detection and Processing.
- It uses the Histogram and Euclidean Distance Measurement Algorithm to find Manhole effectively.
- This program uses the Sample Image Data to find the manhole under the given Data Set.

Histogram and Euclidean Implementation process for image Detection:

- Histogram is the used to give graphical representation for a digital image.
- For each position of index, the graph is plotted using the number of pixels. This graph gives the pixel intensity value.
- It is used to find the damaged manhole from the set of manhole data images and then find the distance between the vehicle and the

manhole, euclidean distance algorithm is used

- Euclidean distance algorithm measures and values the distance between the vehicle an the manhole..

Buzzer Implementation on interfacing Buzz and Arduino using MATLAB:

- The buzzer is used to provide sound notification to the driver if any manhole is ahead of him at a particular distance.
- The buzzer is interfaced with the ardiuno by connecting the supply wire of the buzzer with the digital pin 9 of the ardiuno board.
- The ground wire of the buzzer is connected with any ground pin of the ardiuno board. The power supply is 100 ohm resistor.
- Then the coding is done using MATLAB to implement this setup.

Implementation of LED Light and Arduino using MATLAB:

- The Interfacing LED with Arduino is the process to make the LED to glow when the manhole is detected.
- This can be done by connecting positive pin of LED to the digital pin's of Arduino.
- By these processing of implementation the MATLAB is used to program the Arduino device.
- By these process the light get's off when the manhole is passed away. By this the power consumption can be reduced.

Implementation of Voice Message on Arduino using MATLAB:

- The implementation of voice message helps to identify the type of obstacle.
- These Obstacles is identified using Camera and transfers the data to voice output.
- On Every obstacle face the data is shown to traveller as a voice message.
- This Process helps to alert the traveller with Safety Measurement.

Overall Code of Implementation using Mobile Camera with IP Webcam application:

The Overall Implementation that describes the importance of each component interface on connected with those devices.

- The Manhole Identification process undergoes on training the data with dataset. The trained data set pixels are compared with given dataset to get the required outcome as manhole is identified or

Unidentified.

- These process required training, the data with large amount to get the accurate outcome or result.
- In these process the camera plays major role to detect the object or obstacle by capturing the image detection and transfer's the data to components to perform the operation as individual action.
- By these data, the buzzer gets alerted and the lights start's to glow to indicate the obstacle is arriving towards the traveller.
- On Processing, the voice message is also show to know the type of obstacle that may arrival on travelling path.
- On Continuous the data is checked to detected the manhole on travelling path.
- The LED on detection of obstacle light start glow and transfers to sleep state. By these the Power Consumption can be performed.

By these System the traveller can be identified the obstacle or manhole with effective manner and it achieve the safety during nights and make the thing easier.

Output:
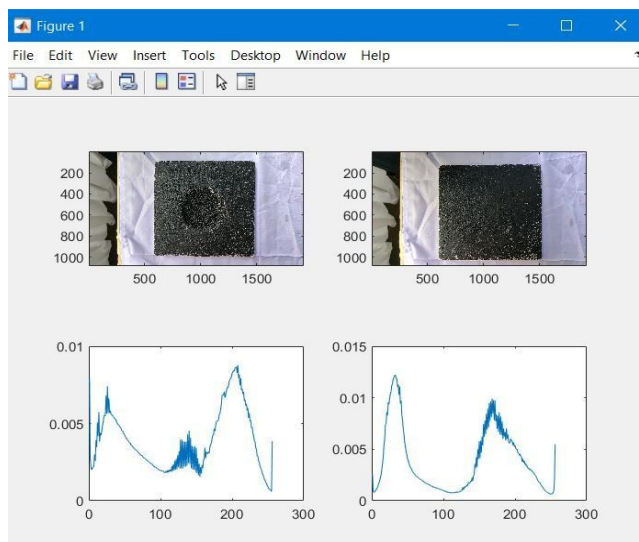
Figure 7 : Presence and Absence of Manhole using Image Processing by deviation graph.

V. CONCLUSION

This System Can handle the Identification and Monitoring of manholes to Ensure Road Safety. This System provides effective usage during Nights and rainy Seasons. It Senses the data and transfer the data

locally so the security of the System is performed effectively. It Provides the sleep of function system. So, that during absence of manholes the system will get to sleep mode to Save the power of Vehicle. It also helps to send the message of mail to anyone forwhom need to compliance. This is Under control of User. So, User need not be fear of it. The System provides low Cost and High Performance.

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