

Real Time Obstacle Detection and Alert System Based On Digital Image Processing For Trains.

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ABSTRACT: The object detection and tracking is an important requirement in battle field. The tracking object is not easy in an real time environment because of continuous changing of location of the object during movement. The proposed algorithm can detect and track the object in an real time environment by using image processing algorithm. The occurrence of rail accident due to the railway track obstacles are increasing in recent years at unpredictable rate. Existing obstacle and derailment detector detect obstacles only after being obstacle is being struck and damage is made. A camera based techniques introduced to detect obstacles from a distance and alert TRAIN CONTROL MANAGEMENT SYSTEM to stop the train. This system prevents accidents in railway sectors. The system provides higher accuracy and timely obstacle detection in order to avoid accidents. Obstacle detection at level crossing, it is determined a vision based whether or not there is an obstacle at the level crossing that is detected by using image processing techniques. Then the calculation of the distance between the obstacle and the camera detected has been done. Once the obstacle is detected the information send to control room through global system for mobile (GSM). The proposed system can achieve good result for object detection and tracking the region of interest. Thus the proposed algorithm can detect and track the object efficiently in dark places using thermal camera.

KEYWORDS: Obstacle Detection, Train Control Management System, Thermal Camera.

I. INTRODUCTION

The current obstacle detection system employed in railways is a reactive mechanical based system. The system for obstacle and derailment detection is called an ODD (Obstacle and Detection Detector) that is attached to the

bogie of the train. The bogie is considered as a framework that contains a set of wheels and axles that are attached to the vehicle. The bogie is responsible for movement of the vehicle and transportation. The ODD is attached to the first axle of the train to detect and remove small obstacle on track as well as to prevent derailment of train from the track. The ODD contains an aluminum beam that is connected to two detectors capable of detecting longitudinal and vertical movements caused by the beam. In case an obstacle is present in the track, the beam gets pushed upward and emergency brake is applied sending signal to Train Control Management System (TCMS). Sensor based obstacle detection also the effective method. Sensor based system has proven to be effective in obstacle detection area over many years. Many approaches were brought forward for detecting obstacle on tracks. One such approach was introduces in novel technology for crack detection and collision avoidance system. The system used ultrasonic waves or sensors to detect cracks on track and a collision avoidance system was implemented at servers' side, track side, and train side. For rail crack detecting vibrating sensor were used that were capable of detecting abnormal vibrations that are communicated to the nearby stations using ad-hoc networks. Track side system mounted in a pole contained sensor, memory, zig bee and a micro controller that detects the abnormal vibrations and send signals to train as well as the control room. The prompt detection of the conditions in rails that may lead to a crack or rather break now plays a critical role in the maintenance of rails worldwide. The understanding of these mechanisms is constantly improving and the evolution of a range of complementary non destructive testing (NDT) techniques has resulted in a number of tools for us to choose. Among the inspection methods used to

ensure rail integrity, the common ones are visual inspection, ultrasonic inspection and eddy current inspection. The ultrasonic inspections are common place in the rail industry in many foreign countries. It is a relatively well understood technique and was thought to be the best solution to crack detection. Arduino is one of the open-source electronic platform. In this proposed method Arduino Uno board is used. ATmega328 micro controller is the heart of this Arduino Uno board. This board contain 14 digital input/output pins, 6 analog inputs, a USB connection, a power jack, an ICSP (IN-CIRCUIT SERIAL PROGRAMMING)header, and a reset button. It can be operated with a clock speed of 14MHz. It has 32kb of flash memory in which 0.5kb used by boot loader. The Arduino Uno can be powered with an external power supply or via the USB connection. Automatically the power source can be selected. A novel approach for obstacle detection for railways has been proposed. The system uses camera mounted on the pole to get input scene in front of the train. The input is given to the processing unit that converts video into frames and process it. The system is implemented to handle different scenario such as if there is a obstacle on track then only alert message is provided to the TCMS since it is possible that the person may move out of the track. System performs true positive elimination to consider the objects permanently placed on track to be considered as background. And it also performs object detection dimensionality test and obstacle classification. The image processing system employed for the detection of obstacle present on the track has found to be effective and it detects the obstacle effectively on the track. In comparison with the existing methods the proposed system is found to be effective.

II. RELATED WORKS OBSTACLE DETECTION SYSTEM

Discussed the detection of obstacle to prevent the accidents in railways. The proposed railway system is fully automated using RFID, Bluetooth, GPS, Wi-Fi and live video streaming. It can be operated only by an authorized user and the communication system will run before the train to detect the smart phone app to cloud. All the information such as the operator of the engine, current location of the communication will be updated to THINGSPEAK API for every 15 seconds. Based on the received data, triggering actions will be performed. If it finds any obstacle, then the system will stop and there after using trigger and react option of things peak an

automated message which consists of latitude and longitude of the system will be sent to train. The train can be stopped to avoid accident.

RAILWAY TRACK CRACK DETECTION AND PROTECTION

Discusses to avoid the train accidents without manual power. The proposed system for railways transportation to identify the cracks in the railway tracks earlier tracks earlier and prevent the accidents. In this paper to use crack detection sensor, this will be placed in train engine. By this, if some crack is detected on the track the train starts to slow and stop at respective point automatically and exact place of crack would be given to control room. Secondly the next cause of accidents is prevented from two trains opposite in same track by using same sensor fitted in the engine, if the sensor sense the same signal from opposite train then it automatically applies the brake at certain distance. The Bluetooth based technology is introduced to prevent train accidents. The Bluetooth device is installed at each front end of locomotive. If the train start to derail, automatically signal is break and an alter given to engine driver and on other emergency brake is applied automatically.

DETECTION OF CRACKS AND RAILWAY COLLISION AVOIDANCE SYSTEM

This system proposed the detection of cracks can be identified by using vibration sensor. This system detects while breaking the tracks by the miscreants. The vibration sensor detects the abnormal vibration. Whenever vibration comes it tries to communicate with the train and identifies that it is the vibration by train and if it can't communicate with the train then the node identify it as abnormal vibration. Then the track-side node passed this information to the nearby station using ad-hoc network methods. Then the station-side admin person can pass this node information with latitude longitude position to the main control room or server. Later the server side admin department can communicate with other servers for tracking purpose such as GPS satellite and monitoring etc.

III. SYSTEM ANALYSIS

Objectives:

- To Prevent the Accidents by detecting the Obstacles by using Image Processing.
- To Determine the presence of obstacle in the form of Frames.
- To provide alert to the Train Control Management System by controlling the unit using Microcontroller.

One among the most important sectors that account to the country's development is transportation sector. The trains are one of the most important and fastest form of transportation that allows people and goods to be transported between distant places. Over the past few years it is notices that rail transport has been getting busier with increased speed, axle load etc. Now a days, many accidents are taking place in rail is observed that most of the accidents on railway track are due to obstacles present in the track, which results in the derailments of the train killing life.

To prevent the railway accident the proposed system uses a camera to get input scene in the pole. The input taken from the camera is passed on to a processing unit the real time data is divided into frame. The frame first examine to determine the area of interest which in this case the area bounded by the track.

After the track is being detected, the system determines the 2D or 3D obstacle in the track check it dimensionality of an object and classify it to be an obstacle or not. If it is obstacle send an alert to the TRAIN CONTROL MANAGEMENT SYSTEM. Here the micro controller is used to control the unit and GSM is used to indicate the control unit. Producing alarm is detected.

IV. BLOCK DIAGRAM



REQUIREMENT ANALYSIS

Requirement analysis determines the requirements of a new system. This project analyses on product and resource requirement, which is required for this successful system.

The product requirement includes input and output requirements it gives the wants in term of input to produce the required output. The resource requirements give in brief about the

software and hardware that are needed to achieve the required functionality.

HARDWARE ENVIRONMENT

Hardware is the collection of physical parts. This includes Arduino, Buzzer, UART, GSM, power supply etc. Hardware is typically directed by the software to execute any command or instruction. A combination of hardware and software forms a usable computing system, although other system exists with only hardware.

SOFTWARE ENVIRONMENT

A device which detects or measures a physical property and records indicates or otherwise responds to it. We use MATLAB and Embedded C for getting the desired output.

IMPLEMENTATION AND RESULT:



Fig. Obstacle Spot

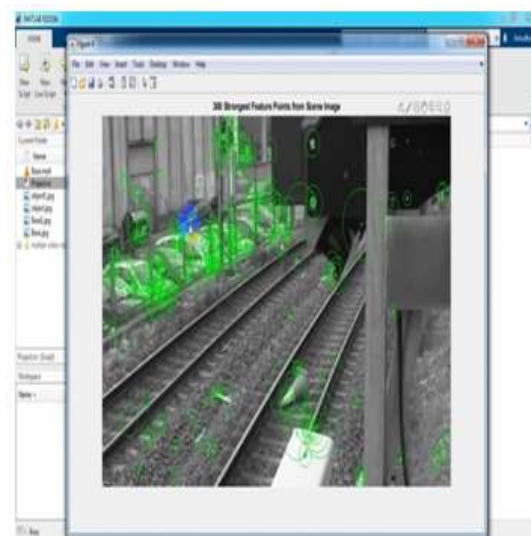


Fig. Highlighting the Obstacle



Fig. Dimensional View of Obstacle.

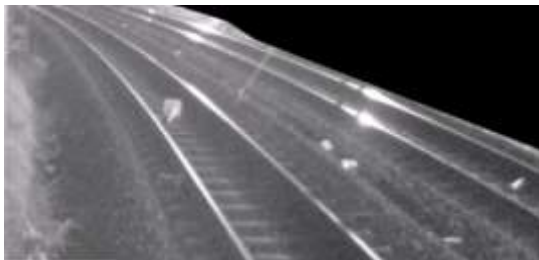


Fig. Obstacle during night.

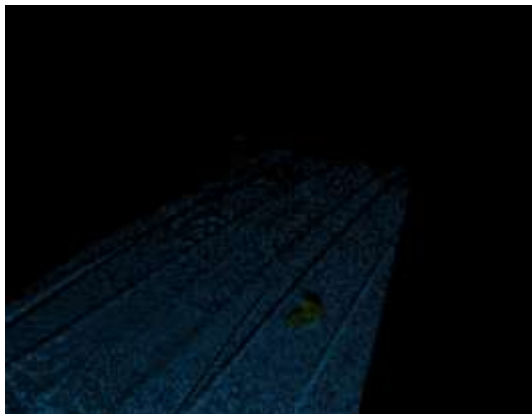


Fig. Camera view of Obstacle at night



Fig. Hardware Model

This output analysis section prints out the representation on how the system set up is done using the hardware components.

V. CONCLUSION

The image processing system employed for the detection of obstacle present on the track has found to be effective and it detect the obstacle to be effective on the track. TRAIN CONTROL MANAGEMENT SYSTEM help to stop the train based on information passed by communication system. In comparison with the existing method that detected obstacle only after it is being struck, but the proposed system is found to be effective as early detection of obstacle and it ensures the safety of passengers in railway transportation. The safe distance is considered to be well enough to stop the train before it hits the target .

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