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# A Survey on Smart Level Crossing for Railways

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***Abstract: IoT based Level crossing monitoring system is implemented using Raspberry Pi. The aim is to automatically detect the train arrival and departure and alert the public to ensure public safety. It is also used to make surveillance of the train crossing area using IoT and private cloud. The metal detector is used to check the arrival of the train, if it senses the train the gate will be closed automatically and the red alert light will be set on and makes a buzzer sound continuously till the train departs the level crossing. This is followed by the activation of the PIR sensor which senses the moving objects. If any object tries to cross or struck in railway track the sensor will capture the image and send to server and to the registered website for rescuing the trapped object.***

***Keyword: PIR sensor, IoT, ARM11.***

## I. INTRODUCTION

IoT is tremendously meant for its popularity among automation sector. It gives the platform for communication between interconnected devices and it has the ability to collect the data and transfer information among embedded systems. IoT analytics and IoT security drives the transformational force for achieving better results. In Smart railways, verdict the train arrival and departure moment on the side of Level crossing (LC) and surveillance the area using USB camera, ARM11, MCP3008, camera, load cell, buzzer and LEDs. Surveillance the area and also monitoring train departure part using metal Detector sensor metal Detector sensor is placed side railway track of level crossing before certain meter. The train is detected when sensor value is high for 10 sec and alert the people through Red led, buzzer and parallel monitoring the another end load cell when its goes to high it identify, the train was arrived from LC and immediately switched to green led, And the person stuck in track, it'll send the image to server using Wi-Fi Module.

## II. LITERATURE SURVEY

*A.* The concept discussed is all about variance based method, in this variance of video frames are calculated. With frame differencing, the object detection is done. Mainly the position of the moving object and the tracking of the objects are done with the video surveillance for better acquisition. The primitive goal is object analysis using morphological operation. The marking of danger area was done by two methods like five frame differencing and background subtraction which is considered as binary fission and morphological since this lead to variance calculation and iteration. Whenever the object is detected in danger it bounces to the red bounding box or else to the green bounding box. This visual surveillance implements various parameter analysis for betterment.

*B.* With the references laser range finders are proposed in this safety system for managing the local situations in Korea. The system shows enhanced adaptability to weather changes and high maintainability by minimising the blind spots to the greater extent. By the utilisation of Radar type laser rangefinder it may scan the entire level crossing. It has the high range for obstacle detection. This manages the domestic situations very well.

*C.* Here it provides an attractive environment by integrating several communicational Technologies between the train and the people who uses the level crossing. The new security about the French operator SNCF is implemented. Many servers are enabled to dissemination of all Road users. This system ensures the radio coverage area among the approach area and the announce area effectively. Certain degraded modes are invoked here. This launches simulator tests currently in virtual reality.

*D.* The basic ideology behind this is background subtraction method. The linear and nonlinear motion of any object is tracked here by Ensemble kalman filter with improvised technique. The analysis on made with the different gents by comparing various criteria in crossing the field to check the safe zone of the object. The major foreground detection is carried out by EM algorithm with underneath calculation. The stages of process include video surveillance along with the frame conversion for pre-processing with segmentation leads to the Blob analysis under morphological operation to ensure the Ensemble kalman filter further leads to the situation analysis.

*E.* This system consist of a hidden Markov model developed to estimate ideal trajectories which discards dangerous situations. The level of risk at each target is monitored and estimated by the Dempster-shafer data fusion technique with greater accuracy. The system utilizes the wireless Access for vehicular environment provides dynamic updation in hazardous scenarios. In image

processing, after object detection it carries out to the optical flow propagation. Kalman filter is tracked with intensity difference in research area. The targets are extracted from various frames. It has higher possibility to generate the status immediately.

*F.* Streaming video analytical approach is automatically is embedded for detecting and localising the vehicles with inbuilted cameras on train for detecting the near miss events accurately. The major use of convolution neural network (CNN) for the classification of vehicles positioning. Hear the superpixel segmentation with SLIC algorithm are used to generate the desired superpixels that need to be specified. More data sets have been analysed and computed as training data set. Moreover intersection over Union (IoU) is used to calculate the measurement of detectors. Hence the near miss event detection are made accurately.

*G.* Here IR sensors are implemented along with the crack detection system which combines the use of GPS tracking system and GSM for communication. Microcontroller used in this system have higher computational performance. This interfaces changing from a USB full speed device makes the system efficient one. There is a major use of XAMPP server here. This module Singh should be cheaper and have less analysis time and more advantages bearing with others systems.

*H.* In this proposal, the parameters are considered for the safety of a level crossing which includes the train traffic count, road traffic count and number of lanes and tracks which are taken into the consideration before the analysis. Many countermeasures are introduced to reduce the effects of accidents. After the hazard identification two analysis for undergone namely casual analysis and consequence analysis. After the detection of countermeasure it provides the impact analysis which makes the demonstration of ALARP compliance. Here the prediction rates are appreciably fine.

*I.* In this level crossing surveillance, imposing the capability of detecting, localising and discriminating the vehicle server object is considered as obstacle in level crossing area. In order to save lives the system has been proposed in European safety regulations. The most enhanced UWB radar Technology is imposed. Most particularly FOS algorithm perform main five phases in LC surveillance system. The commonly used remote processing using the optical fibre infrastructure possess the whole system effectively.

*J.* The main prototype is radar system for level crossing obstruction detection. The main principle used here is Multiple in multiple out (MIMO) principle. The MIMO exposes the position of the element in a descriptive way. The system signal processing is done by beamforming technique with full efficacy. It ensures be controlled environment in level crossing with full potential.

*K.* The smart Railways with obstacle detection is carried out by laser scanner for reliable performance in railroad transportation. The main objective of obstacle detection is point to point laser beams is penetrated through objects. The effective performance verification is done by field test here. The communication status is checked periodically between the control unit and the sensor unit effectively with lock saving and replay functions being checked consecutively.

*L.* In this intelligent level crossing safety control system the accidents are prevented in higher rates comparing to the previous systems. The main highlight is immediate notifications and safety measures are taken in advance. The main layout of the system use of control system design and simulation followed by intelligent traffic light signal control. This prevents alleviate collision accidents with more reliability.

*M.* This scenario supply to multitrack level crossing, this compresses of Magnus ability of discrete event systems making a pathway to tackle the combinatorial explosion problem. Many Risk analysis have been analysed and gone through various measures to implement smart Railways. The major preliminaries of PN based fault diagnosis further by diagnosability of LPN's which makes the system efficient.

*N.* Hear it provides be smart level crossing by fixing or of tax on each level crossing to communicate with one another which gather ups the information regarding the level crossing train current location, train timings and the specification of vehicles passing through the level crossing. There is a major role of using MQTT protocol standardized one in IoT.

*O.* The author developed a new obstruction detector based on ultrasonic obstruction detector to bring out the full efficacy in linear manner. Here the ultrasonic vibrator plays a key role with an attached antenna to it. This is proposed to non-electrified railroad lines in later 1997. But this paper was referred more for this current Technology hike.

## III. FUTURE SCOPE

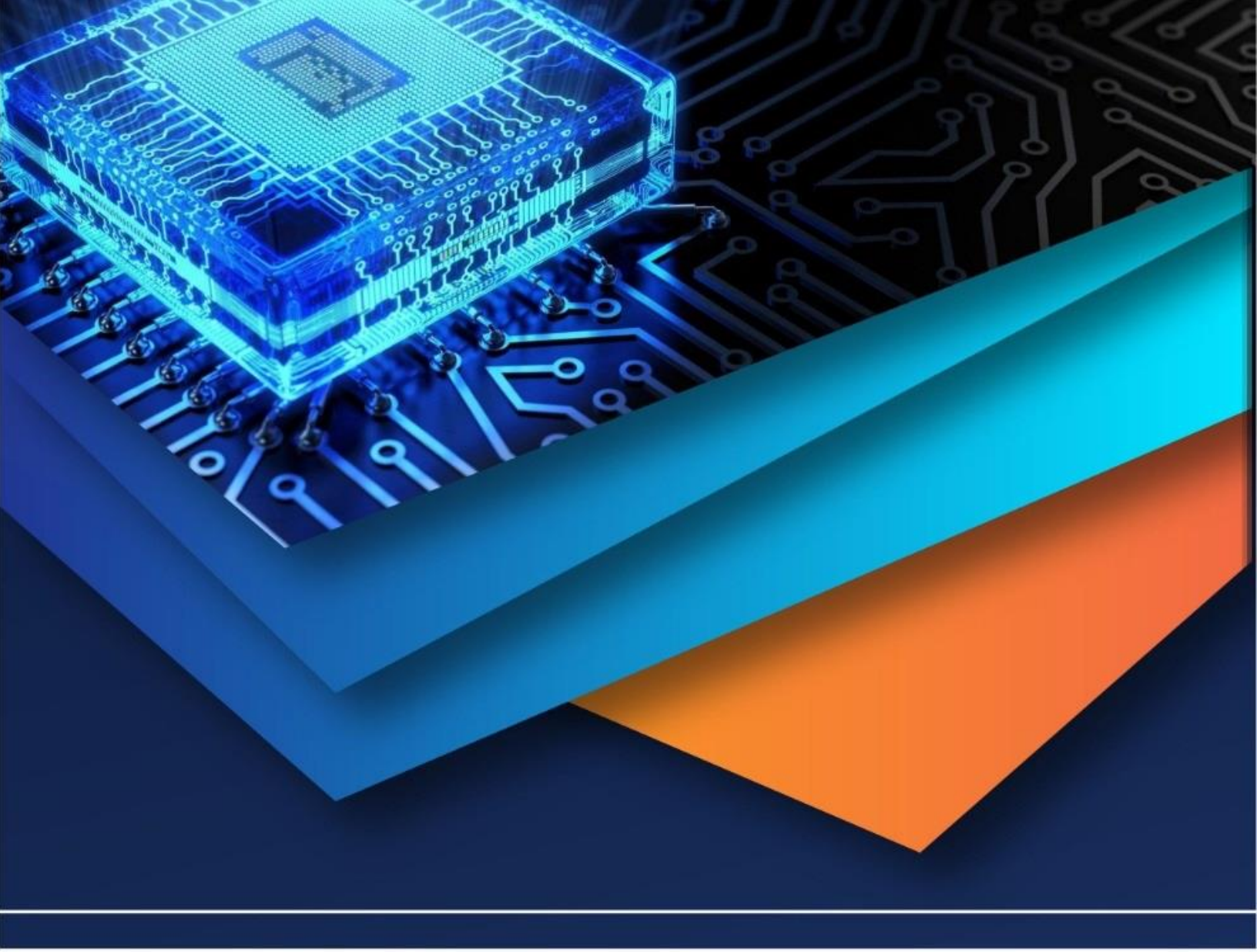
In future vision, the accuracy may be enhanced with efficacy of considering minute approximation. Many smart railways with higher technology of passing information through voice notifications and virtualization of images to create awareness about the danger in level crossings.

## IV. CONCLUSION

Major significant layers contributing the IoT solution are specifically enhanced design features and evaluated for smart railways. The efficacy of the design is corroborated by the empirical results. The compelling profounding of observations further ascertain the applicability and potential of the proposed IoT solution for smart railway. And the evolution of IoT technologies will continue creating new and innovative application further.

## REFERENCES

[1] VIRTUe:Video Surveillance for Rail-Road Traffic Safety at Unmanned Level Crossings - Pranjali Gajbhiye , Ch. Naveen-2017 IEEE.
[2] Design of Safety Equipment for Railroad Level Crossings using Laser Range Finder - Gonyop Kim, Jonghyun Baek, Hyunjung Jo, Kangmi Lee, Jaeho Lee - 2012 9th International Conference on Fuzzy Systems and Knowledge Discovery (FSKD 2012).
[3] Smart level crossing - Virginie Taillandier - 2017 IEEE.
[4] Object Tracking and Analysis for Detecting Various Situations at Level Crossings of Railway-Road - Shruti s. mane , Sanjeevani k. shah - 2017 IEEE.
[5] A Video-Analysis-Based Railway–Road Safety System for Detecting Hazard Situations at Level Crossings - Houssam Salmane, Louahdi Khoudour, and Yassine Ruichek - IEEE transactions on intelligent transportation systems .
[6] Improving Near-Miss Event Detection Rate at Railway Level Crossings - Sina Aminmansour, Frederic Maire , Gr´egoire S. Larue, Christian Wullems – IEEE 2016.
[7] Unmanned Level Crossing Controller and Rail Track Broken Detection System Using IR Sensors and Internet of Things Technology-Bharti S.Dhande , Utkarsha S.Pacharaney - International Conference on Inventive Communication and Computational Technologies - (ICICCT 2017)
[8] Application of Safety Management Process for the Safety Analysis of Level Crossing - Eui-Jin Joung – IEEE 2017.
[9] Ultra-Wide Bandwidth Systems for the Surveillance of Railway Crossing Areas - Marco Govoni, Francesco Guidi, Enrico M. Vitucci, Vittorio Degli Esposti, Giovanni Tartarini, and Davide Dardari - IEEE Communications Magazine • October 2015.
[10] Railway Level Crossing Obstruction Detection Using MIMO Radar - Arvind Hari Narayanan, Nadia Mazzino - Proceedings of the 8th European Radar Conference
[11] Field Test of Safety Monitoring System for Railroad Level Crossings using Laser Scanner - Gonyop Kim, Hyeon Yeong Choi, Jong Hyen Baek, Yong Kyu Kim - 2014 IEEE.
[12] Intelligent Level Crossing Safety Control System - Chih-Wen Li, Chia-Cheng Chu, Wei-Lun Fong, Hwang-Cheng Wang - 2014 Tenth International Conference on Intelligent Information Hiding and Multimedia Signal Processing.
[13] Model-Based Diagnosis of Multi-track Level Crossing Plants - Baisi Liu, Mohamed Ghazel, and Armand Toguyéni- IEEE Transactions on intelligent transportation systems .
[14] Automatic level crossing gate with Database collection - Priyanka , Saranya , Shanmathi ,Baranikumar - 2015 International conference on computation of power, energy, information and communlcation.
[15] Obstruction detector using ultrasonic sensors For upgrading the safety of a level crossing - Kazutoshi , Hideki ARAI - International Conference on Developments in Mass Transit Systems, 20 - 23 April 1996, Conference Publication No. 543 OlEE 1998.



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