



## Design and Implementation Railway of Platform Security System using Image Processing Technique

Jadhav Panchashila

Dept. of Electronics & Telecommunication (VLSI & Embedded System)

D. Y. Patil College of Engineering  
Akurdi, Pune-411044, India

Mrs. P. Malathi

Dept. of Electronics & Telecommunication  
D. Y. Patil College of Engineering  
Akurdi, Pune-411044, India

**Abstract:** Indian Railway is the largest railway system of Asia and also the second largest in the world. Indian Railway is that the biggest sector that provides additional use. The railway could be a convenient and economical transport system. Security of station platform is an important issue in the recent years. The present systems only monitor the passengers and could not provide any warning message for passenger instantly. This paper proposes a unique technique that might observe the passenger moving direction without using any external equipment, and so uses these motion vectors to work out whether the passenger is approaching the warning line. Once passenger is approaching the warning line on the platform, the projected technique can appraise the passenger via broadcasting or speech message to extend the protection within the platform. This technique reduces the complicated method of image recognition system.

**Keywords:** Railway platform, passengers, monitoring equipments, motion vector and security system.

### I. INTRODAUCTION

The research of rail safety measures not exclusively prevent loss of life and property, however conjointly instill bigger confidence in commuters – factors that have rapid return to the eye of governments and rail transport suppliers worldwide. [5], [6] The corresponding maintenance and management task are going to be raised for facility to boot put in, representation sure exclusion impact to budget of the unit. Hence, it's become the main focus of this study if platform safety protection perform is increased while not having to boot install platform safety facility but by creating use of existing instrument or system through novel technology. [7] In the past, studies on platform accidents would mostly focus in the analysis of human error, and it's why each of the operation units would, in steps, increase safety facilities to prevent the occurrence of accident.

The corresponding maintenance and management task square measure increased for facility additionally place in, representing sure exclusion result to budget of the unit. [8], [9] Therefore, it become the most target of this study if platform safety protection perform is raised whereas not having to additionally install platform safety facility but by making use of existing instrumentality or system through novel technology. [10] Basically, motion object as traveler is that the primary subject on station platform and their scope of movement is confined to restricted space or area on the platform.

In addition, image observation system established at the station is usually MPEG-4 or H.264 recording format. These formats region already keep with motion estimation information at intervals image recording file. [11] This would use pictures of the observation system to directly extract information of motion vector, and predict object movement direction therefore on hunt as a significant sort of mass public transit, rail transport isn't exclusively a quick, however additionally economical manner of transporting large lots of individuals and product from one location to a different. However, not sufficient protection from threats like international terrorist activities, that became gradually

widespread and various over the years, that stand to disrupt social stability.

### II. RELATED WORK

In the world various passengers use railway systems on a daily life. On railway platform there are several passengers travel with train, they might extend their head to check if the train has arrived or not and stand within the warning line of platform. [1], [12] thus many incidents have taken place with passengers. In recent years strengthen the protection and security of station platform has become a very important issue. As per the new development there are differing types of security systems. However the most disadvantage of such a system is that it simply might record the video frames and will not provide warning message to passenger in real time.

Hence, we tend to propose a unique technique that might notice the passenger moving direction without using extra passenger detection instrumentality. [2], [5], [13] during this paper they projected a vision primarily based observation system for train station platform. The system promptly perceives dangerous factors of passengers on the platform by using image method technology. [3], [14] This paper analysis the incorporated use of safety observation with the domestic and international latest analysis on rail safety protection system, associate degreed specialize in the implementation of full system, with the observation and early warning, risk assessment, apocalyptical management and emergency rescue system. [4], [15] This literature drawn the different management of rail transportation computer code package and presented the most effective strategy and see of different intelligent decision network supported Petri net. Literature formally shapely definition, style and realization of the self-check perform in automatic driving management computer code. Literature had researched the analysis and style of the train strategic call supporting system by using the strategy facing objects. It optimized the train's initiative driving by using linear quadratic Gaussian (LQG) technique and hereditary algorithmic program. IEEE (Institute of Electrical and natural philosophy Engineers), IEEE standardization committee is chargeable for the survey, impel, management of

IEEE commonplace, pensive and proposing IEEE commonplace. For the past few years, IEEE standardization committee is extremely active in standardization analysis a part of rail transportation info and management, closely follow once cathartic several standards during this region, and a few elements is said to transportation safety

### III. THEORETICAL BACKGROUND

On railway platform we should avoid the accident by using this planned technology. In our programming we tend to use netbeans that which related to integrated development surroundings (IDE). It includes of a base area related to a extensible plug-in system for customizing the environment and Java development tools. OpenCV contains a structure that implies that the package includes many shared or static libraries.

#### A. Digital Image process Techniques

Digital image method has wide application in various areas. Image process refers to process of image by commonplace algorithms, for example, if  $a(x, y)$  is a picture, then 'a' represents the amplitude (e.g. brightness) of the image at the coordinate position  $(x, y)$ . Modern digital technology has created it potential to regulate multi-dimensional signals with systems that adjust from simple digital circuits to advanced parallel computers.

#### B. Capture Frame:

Video capture refers to storing video pictures momentary in processor. Graphical monitors show video recording by dividing the display screen into thousands (or millions) of pixels, organized in rows and columns. The pixels area unit thus close that they appear connected

#### C. Motion Detection:

In video monitoring system, motion detection refers to the detect motion and capture the events. Motion detection is usually based on a software programming, once it detects motions will signal the camera to start out capturing the event. A classy motion detection television can associate the type of motion to look at if it warrants an alarm associate appliance that allows embedded image capture capabilities that allows video footage or extracted knowledge to be compressed, hold on or transmitted over communication networks or digital link.

#### D. Motion vector

The motion vectors unit compresses video by storing the changes to an image from one frame to successive. The strategy of video compression plays a key role within the motion estimation method. The H.264/MPEG-4 AVC traditional defines motion vector as a two-dimensional vector used for lay to rest calculation that provides offset from the coordinates at intervals the decoded image to the coordinates during a reference image. The motion vectors might even be illustrative by a modification of location model or many different models that will approximate the motion of a real video camera, like rotation and translation and zoom.

In general, a video is formed from a bunch of 2-D continuous footage with regarding thirty frames per second. Other words, the interval of it lapse time is regarding 1/30 second for two continuous frames, and alter of object in between two continuous frames can hardly be forceful in such short-span of it time making use of such a feature, it'll split the images that needed to be encoded into several overlapped blocks, so take reference footage for correlation. Thus, the

foremost ideal approach of correlation is to travel searching for the entire system and resolve the foremost similar block. The particular truth is that two successive frames is extraordinarily similar and apply correlation at the relative position with the encoded frame and system block.

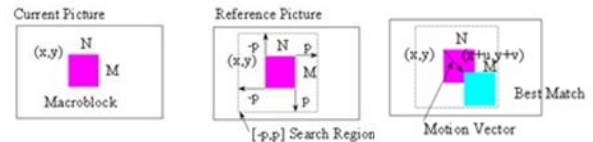


Figure 1. Motion Vector.

Three mathematical calculations like Mean sq. Error (MSE), Mean Absolute Error (MAE) which have usually been wont to confirm the similarity between two frames. These equations area unit represented as follows:

- 1) *Mean Square Error (MSE)*

$$\frac{1}{N * M} \sum_{x=0}^{M-1} \sum_{y=0}^{N-1} (C(x, y) - R(x + u, y + v))^2$$
- 2) *Mean Absolute Error (MAE)*

$$\frac{1}{N * M} \sum_{x=0}^{M-1} \sum_{y=0}^{N-1} |C(x, y) - R(x + u, y + v)|$$
- 3) *Sum of Absolute Difference (SAD)*

$$\sum_{x=0}^{M-1} \sum_{y=0}^{N-1} |C(x, y) - R(x + u, y + v)|$$

In these three equations,  $C(x, y)$  is that the pixel value of the present/current block and  $R(x + u, y + v)$  is that the pixel value of the reference block, whereas  $u$  and  $v$  area unit the corresponding positions for block motion. Among these equations, the impact of MSE is taken into account the most effective. But it wants multiplication and division throughout calculation and has complicated operation. However miserable uses of addition and subtraction, and its calculation is comparatively straightforward in order that it's thought-about as for mathematical calculations during this paper.

### IV. METHODOLOGY

Generally a video is formed from a group of 2-D continuous pictures with concerning thirty frames per second. The interval of time lapse is concerning 1/30 second for 2 continuous frames, and alter of object in between of two continuous frames will hardly be extreme in such short-span of your time. Creating use of such a feature, it will split the images that required to be encoded into variety of overlapped blocks, and then take reference footage for correlation. Thus, the foremost final manner of correlation is to look for the whole organization and verify the foremost similar block. Due to that two adjacent frames are often extremely similar; the final observe is to conduct correlation at the relative position with the encoded frame and reference frame block.

The test videos are taken from Sony digital camera with MPEG-4 format. Furthermore, frame rate is ten frames per second, and also the resolution is 320x240. Primary frame (reference frame) and secondary frame (current frame) area unit compared and result's keep within the memory. By using tripwire analytics technique we tend to notice the motion between the frames.

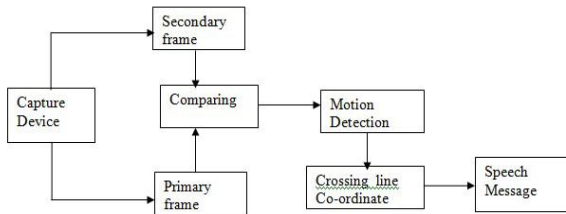


Figure 2. Motion Detection.

1) Algorithms:

The algorithmic program for detection the motion object is shown in Fig. 3

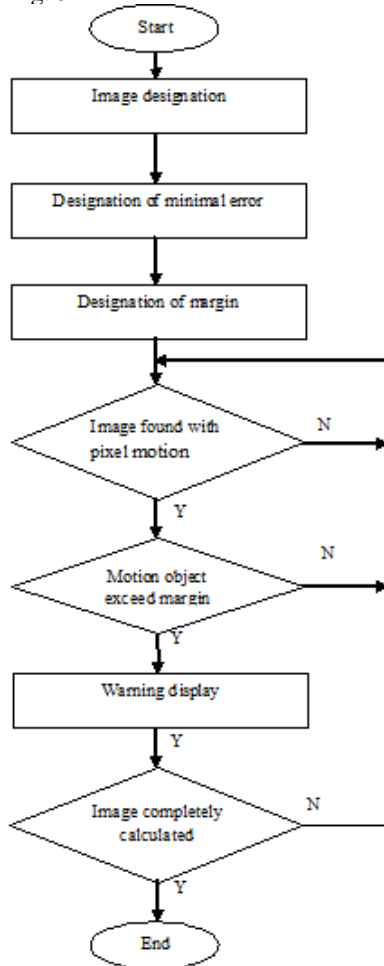


Figure 3. Flow chart for motion object.

2) Image designation:

The process within which the system performed on the pre-recorded videos of varied types of simulation contexts with relevancy one-side and two-side line-crossing of passengers on station platform that we tend to utilize as a reference frame block.

3) Designation of least error:

The least error must be pre-decided and is due to the impact of camera shock or image shadow; the element value might be modified. Thus least error is meant therefore on cut back the possibility of misjudging object motion when the system is placed at totally different space or interface. Specific margin may be chosen on each aspect of the platform

4) Designation of margin:

As per the protection purpose the system interface will select its specific margin on each side of the platform

5) Image found with constituent motion:

In this method if there is modification in constituent coordinate of current and reference block and its quantity of modification has exceeded the minimum error that was initially designed , it was often programmed at its best in order that the system will perform a more effectively.

The following result shows the motion of the object

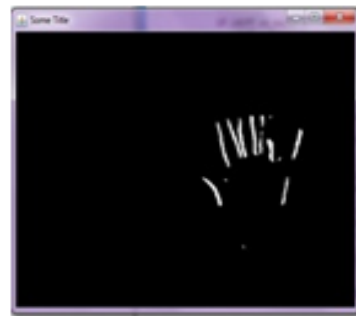


Figure 4. Image found with constituent motion.

6) The motion object exceed margin:

When the motion object has exceeded margin line as pre-decided within the system, the system can show warning message in real time via broadcasting or speech message



Figure 5. Motion object exceed the margin..

7) System works in rainy days and evening.

In rainy days and evening time period the system will successfully extract motion vector, and may predict and follow the position and direction of displacement for the motion object. Once the motion object exceeds the margin destination, the system will automatically show warning message.

V. EXPERIMENTAL RESULT

To verify the performance of the proposed system, the experiment has been simulated by using web camera. Successfully capture image from web camera for processing and got the difference between two images in the form of black and white image as shown in following fig.6. It shows the difference between captured images and original image simultaneously



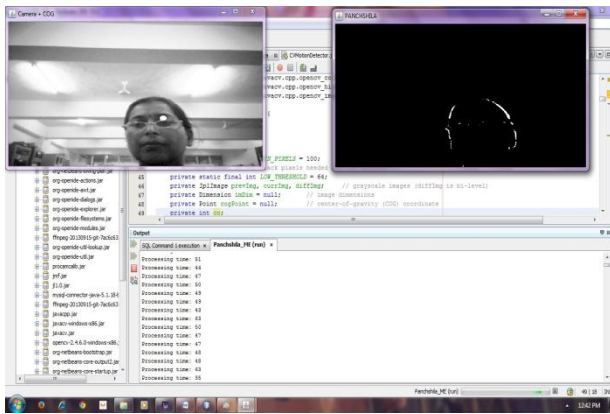


Figure 6. Simulated Result.

## VI. CONCLUSION

In this paper we propose a novel technique that might notice the passenger moving direction without using any extra passenger detection equipment, however uses to motion vectors to work out whether the passenger is approaching railway. Once passenger is just too approaching railway, the projected technique will give the notice to the passenger via broadcasting or speech message to increase the safety on the platform. This technique reduces the complicated method of image recognition system and this technique with success works in rainy days and in night. This project is helpful in railway platform system or any bank security system.

## VII. ACKNOWLEDGMENT

I express my sincere gratitude towards the faculty members who made this project successful. I would like to express my thanks to my guide for her whole hearted co-operation and valuable suggestions, technical guidance throughout the project work. Special thanks to our H.O.D. for her kind official support given and encouragement. I am also thankful to our PG coordinator for her valuable guidance. Finally, I would like to thank all our faculty members of E & TC Department who helped us directly or indirectly to complete this work successfully.

## VIII. REFERENCES

- [1] "A Study of Station Platform Security Using Digital Image Processing Technology" Chih-Hsiang Wen ; Shi-Huang Chen ; Po-Chuan Lin Computing, Measurement, Control and Sensor Network (CMCSN), 2012 International Conference on DOI: 10.1109/CMCSN.2012.54 Publication Year: 2012 , Page(s): 210 – 213.
- [2] "Vision Based Platform Monitoring System for Railway Station Safety". Sehchan Oh, Sunghuk Park and Changmu Lee Advanced EMU Research Team, Korea Railroad Research Institute, 360-1, Woulam-Dong, Uiwang-City, Gyeonggi-Do, South Korea.
- [3] <http://www.rssb.co.uk/Library/risk-analysis-and-safety-reporting/2013-report-risk-at-the-platform-train-interface.pdf>.
- [4] "Research on Rail Safety Security System" Cai Guoqiang, Jia Limin, Zhou Liming, Liang yu and Li xi. World

Academy of Science, Engineering and Technology Vol:4 2010-08-29.

- [5] Railway platform monitoring system using stereo vision algorithm for passenger's safety Seh-Chan Oh ; Sung-Hyuk Park ; Chang-Mu Lee Telecommunications Energy Conference, 2009. INTELEC 2009. 31st International DOI: 10.1109/INTLEC.2009.5351903 Publication Year: 2009 , Page(s): 1 - 4 .
- [6] Vision Based Platform Monitoring System for Railway Station Safety Sehchan Oh ; Sunghuk Park ; Changmu Lee Telecommunications, 2007. ITST '07. 7th International Conference on ITS DOI: 10.1109/ITST.2007.4295854 Publication Year: 2007 , Page(s): 1 - 5 Cited by: Papers (3) .
- [7] A platform surveillance monitoring system using image processing for passenger safety in railway station Sehchan Oh ; Sunghyuk Park ; Changmu Lee Control, Automation and Systems, 2007. ICCAS '07. International Conference on DOI: 10.1109/ICCAS.2007.4406975 Publication Year: 2007 , Page(s): 394 - 398 Cited by: Papers (2).
- [8] A monitoring system with ubiquitous sensors for passenger safety in railway platform Sehchan Oh ; Gilgong Kim ; Hanmin Lee Power Electronics, 2007. ICPE '07. 7th International Conference on DOI: 10.1109/ICPE.2007.4692395 Publication Year: 2007 , Page(s): 289 - 294 Cited by: Papers (1).
- [9] Performance analysis of vision based monitoring system for passenger's safety on railway platform Seh-Chan Oh ; Hanmin Lee Control Automation and Systems (ICCAS), 2010 International Conference on Publication Year: 2010 , Page(s): 1867 – 1870.
- [10] An Integrated Simulation Platform for Railway Synthetic Monitor and Control System in Multiple Layer Transportation Hinge Zhang Lei ; Chen Zhixin ; Wang Jia ; Yin XiaoHong Hybrid Intelligent Systems, 2009. HIS '09. Ninth International Conference on Volume: 2 DOI: 10.1109/HIS.2009.127 Publication Year: 2009 , Page(s): 74 - 79 Cited by: Papers (3).
- [11] World's first city-wide fiber Bragg grating sensing network for railway monitoring Tam, Hwa-Yaw Optical Fibre Technology, 2014 OptoElectronics and Communication Conference and Australian Conference on Publication Year: 2014 , Page(s): 1056 – 1057.
- [12] Multi-camera based surveillance system Behera, R.K. ; Kharade, P. ; Yerva, S. ; Dhane, P. ; Jain, A. ; Kutty, K. Information and Communication Technologies (WICT), 2012 World Congress on DOI: 10.1109/WICT.2012.6409058 Publication Year: 2012 , Page(s): 102 - 108 Cited by: Papers (1).
- [13] Vision-based object detection for passenger's safety in railway platform Seh-Chan Oh ; Gil-Dong Kim ; Woo-Tae Jeong ; Young-Tae Park Control, Automation and Systems, 2008. ICCAS 2008. International Conference on DOI: 10.1109/ICCAS.2008.4694449 Publication Year: 2008 , Page(s): 2134 – 2137.
- [14] The high-speed Railway Safety Comprehensive Monitor and Control System based on the Cyber Physical System architecture Zhu Tong ; Huang Zhiwu ; Li Shuo ; Liu Weirong Control Conference (CCC), 2011 30th Chinese Publication Year: 2011 , Page(s): 5591 – 5595.
- [15] Fibre-optics sensor networks for condition and structural health monitoring of railway systems Hwa-yaw Tam Optoelectronics and Communications Conference (OECC), 2011 16th Publication Year: 2011 , Page(s): 518 Cited by: Papers (1).