

Review on Camera Technology and Digital Image Processing in Construction Industry

^[1] Krushna Raut, ^[2] Pavankumar Chandratike, ^[3] Nisha Shingare, ^[4] Ashwini Shinde, ^[5] Minal balki
^{[1][2][3][4]} UG Student, ^[5] Asst. Prof., International Centre of Excellence in Engineering and Management
^{[1][2][3][4]} MIDC Waluj Water Treatment Plant, CIDCO Mahanagar Aurangabad – Pune National Highway, Waluj,
Aurangabad -431 136 (MS) India

Abstract— This paper reviews of application of camera technology through digital image processing for monitoring construction project. On construction site cameras have been around for many years but the application of digital image processing will be helpful for incredible, efficient and economical construction projects. The control of construction project management is a very difficult task to handle in proper manner. So, application of digital image processing on construction site it will be helpful. Application of digital image processing reduces the chances of accidents on construction site.

Keywords— Image processing, Monitoring, Incredible, Efficient, Camera Technology, Etc.

I. INTRODUCTION

Digital image processing is a rapidly evolving field with growing application in science and engineering. The fundamentals of major topics of digital image processing are Representation, Processing, Techniques and Communication. The term 'Digital image processing' generally refers to the processing of two dimensional pictures by a digital computer. A digital image is an array of real or complex numbers represented by a finite number of bits. An image given in the form of a transparency slide, photograph, and chart is first digitized and stored as a matrix of binary digits in computer memory. This digitized image can then be processed and/ displayed on high resolution television monitor. Digital image processing has a broad spectrum of applications such as remote sensing via satellite and other spacecrafts, image transmission and storage for business application, medical processing, Robotics and automated inspection of industrial parts like civil engineering. Image processing is successfully used in many sub-areas of civil engineering like pavement distress assessment, site evaluation via satellite imagery, engineering document scanning studies of crack propagation and microstructure in cement based material, and evaluation of soil fabric etc. Traditionally, site superintendents walk the construction site to verify the progress report

and understand the current state of construction progress. Construction –site control in the majority of the construction industry is still mostly a manual task using visual inspection and paper based checklists, project participants such as owners, architects, contractors, and subcontractors increasingly rely on using technologies to update data when collecting site performance information. Another way for moderating construction site is by taking photos of construction site daily at the end of work and comparing every day work with previous day work. Construction Progress Monitoring is a critical task for construction manager. To go on site is time consuming process. In Nowadays due to ineffective construction management the project gets become costlier and may pitfall. In nowadays construction projects are increasing and the rates of construction material, equipment and labor charges are also increase because of demand of large construction project. In this if any proposed work like excavation can done in 2 days and the excavator operator does not do it correctly or in time then that increasing time after proposed time it counts big charge of money and it will not affordable.

II. LITERATURE SURVEY:-

Y. Wu and H. Kim researched on Digital Imaging in Assessment of Construction Project Progress (Dept. of

civil and environmental engineering, university of Alberta, Edmonton, Canada). Jeffery S. Bohn and Jochen Teizer present Benefits and Barriers of Construction Project Monitoring Using High Resolution Automated Cameras. (ASCE June 2010). Timothy C. Lukins and Emanuele Trucco researched on Towards Automated Visual Assessment of Progress in Construction Projects (UK). Junhao Zou and Hyoungkwan Kim worked on Image Processing for Construction Equipment Idle Time Analysis (Dept. of civil and environmental engineering, university of Alberta, Edmonton, Canada). Jorge Abeid Neto, David Arditi and Martha W. Evens researched on Using Color to Detect Structural Component in Digital Picture (Civil and Computer Science Dept. Illinois Inst. Of Technology, Chicago, and USA 2002). C.A. Quinones-Rozo worked on Digital Image Reasoning for Tracking Excavation Activities (Dept. of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, United states, 22 Oct. 2007). Changyoon Kim, H. kim and Yeonjong Ju represented Bridge Construction Progress Monitoring Using Image Analysis (ISARC 2009). Seokho Chi and Carlos H. Caldas Researched on Image-Based Safety Assessment: Automated Spatial Safety Risk Identification of Earthmoving and Surface Mining Activities (ASCE March 2012). Seunghyun Lee and Min Hong Researched on Implementation of Man-Hours Measurement System for Construction Work Crews by Image Processing Technology (Hongik University, Korea, 1 may 2014).

CAMERA TECHNOLOGY IN CONSTRUCTION INDUSTRY:-

Whenever the word camera heard on our ear the first thing comes in our mind that the a scientific equipment which captured the number of images and which it converts into video that process carry out a equipment named as a Camera. Generally camera is used for capturing images and videos for safety and security of commercial shops, banks, industries and high secure zones. In digital image processing the camera with application in construction management mainly focus on controlling the measurement environment that cameras operating and processing its visual contest provided. Now in our project we take application of camera technology for digital image processing in construction industry. The movement of equipment

captured by camera technology in the form of video and after that it processed in MATLAB software in the manner of digital image processing.

BACKGROUND:-

Digital image processing develops hardware and software processing and to analysis provides promising opportunities in construction management and site investigation application. It is the different structure components and equipment from the background. It is the very potential for a resultant digitized, two dimensional about the size, shape and location of object. It is extensively for quantitative analysis and observation of the geometry of the region extraction for modeling and identification purposes. The geotechnical and transportation engineering sub-areas of civil engineering are to lead in applying image processing techniques to solve practical problems.

APPLICATION:-

• *Image processing for construction equipment idle time analysis :-*

Accurate analysis of equipment idle time is more useful for the utilization of construction equipment in a large construction project. Less idle time gives us higher efficiency of construction progress. It is not practically possible to calculate idle time by human visualization. Digital image processing method gives automatically the idle time of construction equipment during progress of project management.

• *Bridge construction progress monitoring using image analysis:*

This digital image processing presents the whole process of monitoring of a cable stayed bridge construction from the automated data acquisition to the data analysis by digital image processing.

• *Digital image processing for tracking excavation activities:-*

Digital image processing is used to field records of excavation time to time. If sufficient number of targets are selected from excavation site then 3 dimensional geometry of site is easily obtain. For specific reason observed measurements of ground deformation can be stored in the form of images.

• *Safety:-*

Safety is very important issue at construction site, for which camera is used. Any hazard is occurring at site then staff on duty informed for removes that hazard. On site thieves catch by using cameras. In case of

earthmoving and surface mining activities more possibility of accident happening in that case safety is measurable factor. In such case digital image processing gives safety risk factor.

•Automation on construction site:-

On construction site is not practically possible to use automation system but by using digital image processing it so easy to apply automation on construction site. Because of not applying automation on site large errors occur on construction site to minimize this errors digital image processing help.

BENEFITS:-

Digital image processing progress monitoring prevents construction projects from falling into the pit fall of ineffective management. It provides less rework than the general methods because of automatic and increase measurement accuracy and also provide large amount of saving. Well project control and management is to minimize the unnecessary cost of project construction. Data collected at random interval and non standard format is not helpful for project management as compared to data collected by camera at regular interval. When meetings are held, meeting participants can instantly learn about the project status and minimizing waiting periods. Digital image processing minimizes telephone calls and email answer and thus reduces the site visits for the progress of project. Camera is mounted in single spot and it is most advantages for reducing confusion that may arise from multiple perspectives. Camera taking images at standard time and it is more advantageous for accurately gauge progress. For post project analysis or marketing purposes the standard images allows for time-lapse photography. Camera use for monitoring work force, materials, inventory and equipments of important imbalance for a project management. Time wasting, task completion timing and inefficiency can be reduced for good project progress digital image processing. Digital image processing reduces the frequency of trips, saves gas expense and wear and tear on company vehicles and traveler should be informing site condition before visiting. Camera helps us for safety and security. Camera becomes beneficial to some user when used as safety inforcement tool for long projects. More detailed studies saving due to material tracking can be quantified also.

BARRIERS:-

Due to changing project site and environment it

is very difficult and complicated task of monitoring construction progress by digital image processing. Tracking the location and performance of site sources like material, labor equipment may not feasible because of several problems like ethical problem etc. due to poor communication and documentation resulting more problems generating in managing construction progress by digital image processing. Camera catch thieves but due to interval between pictures it is less likely to occur. Digital image processing is not suitable for small scale construction industry. In case for interior and finishing of building the user remount camera to other location and it gives wrong data analysis and in that case digital image processing is not applicable. In many project site due to corruption the engineers do not gives the CCTV footage for the digital image processing. Some peoples having no more knowledge of camera technology. They are in misunderstanding of camera technology.

III. CONCLUSION

This paper represented the application with benefits and barriers of use of high resolution camera & image processing in civil industry. It is found that this technology has great importance as well as potential in civil industry for better management and improvement. It may help in proper resource management. For the quantitative determination of difficult jobs, data collection, In- depth analysis this study will proved helpful.

REFERENCES:-

- [1] Y. Wu and H. Kim (2004) "Digital Imaging in Assessment of Construction Project Progress", Proc. 21st International Synopsium on automation and robotics in Construction (ISARC),Jeju, Korea, Sep.
- [2] Changyoon Kim, H. Kim (2008) "Bridge Construction Monitoring using Image Processing", College of Engineering Yonsei University, 26th International Synopsium on automation and robotics in Construction (ISARC)
- [3] C.A. Quinones- Roza (2012) "Digital Image Reasoning for Tracking Excavation Activities", University of Illinois at Urbana-Champaign, United

states. Automation in construction 17 608-622.

[4] Jorge Abeid Neto, David Arditì and Martha W. Evens (2000) "Using Color to Detect Structural Component in Digital Picture" Illinois Inst. of Technology, Chicago, and USA Computer-Aided Civil and Infrastructure Engineering, Vol.17, No.1, pp. 61-67.

[5] Seokho Chi and Carlos H. Caldas (2012) "Image-Based Safety Assessment: Automated Spatial Safety Risk Identification of Earthmoving and Surface Mining Activities" Journal of construction engineering and management, ASCE/341.

[6] Junhao Zou and Hyoungkwan Kim "Image Processing for Construction Equipment Idle Time Analysis", university of Alberta, Edmonton, Canada.

[7] Timothy C. Lukins and Emanuele Trucco "Towards Automated Visual Assessment of Progress in Construction Projects" (UK).

[8] Seunghyun Lee and Min Hong(2014) "Implementation of Man-Hours Measurement System for Construction Work Crews by Image Processing Technology" Hongik University, Korea, 1 may.

[9] Jeffery S. Bohn and Jochen Teizer (2010) "Benefits and Barrs of Construction Project Monitoring Using High Resolution Automated Cameras", ASCE June, Journal of construction engineering and management,2010.136:632-640.