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A Review of Automated Monitoring System in Construction of Road Project

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Abstract.:This paper covers the literature Review of automated monitoring system by various researchers in the field of construction of road project and also covers the growing need for better monitoring and control of road construction projects together with rapid technological progress which leads to the shift of focus in construction automation towards the area of automated project performance control (APPC). The productivity in construction depends upon the development of models for project monitoring and control which processes the collected data on the project performance, automatically. Authors have presented the process of automated monitoring of road construction activity and conducted the test to overcome the limitations of conventional monitoring method. This will help to understand the need of implementing the automated monitoring system, creating awareness and interest about learning and implementing the rapid developing monitoring system in the construction road project.
Keywords -Automation, Project Performance, Project Control, Data Collection.

I.Introduction.

The construction industry lags behind other manufacturing industries in project performance control. The current practice of manual amassment of monitoring requires massive data collection, more labour intensive, Hence the cost of collecting the data and generating the information is high and the quality integrity and real time availability are low .Hence the focus of our construction automation (CA) research has shifted in recent years to the area of Automated Project Performance Control (APPC). This area deals with automated quantification, in authentic-time, of project performance be speakers (PPI) such as cost, schedule, productivity, and inputs consumption etc.Utilizing Automated Data collection (ADC) technologies. That may lead to enhance the ability of construction managers to respond expeditiously to project performance quandaries. Hence Present study puts efforts in efficacy in cull of best practices method control method to optimizing overall cost of project.

An overview is presented here of an extended research programme called automated project performance control (APPC),Which has been conducted for the last two decade (Navon ,2007).main aim of paper to overview the number of model presented in the framework of APPC programme to reduces the deficiencies of manual data collection and processing.

A major driver for the APPC programme in the development of automated data collection (ADC) technologies and their declining costs. Readily available ADC technologies such as global positioning system (GPS), radio frequency identification (RFID), 3D cameras and laser scanners can facilitate the tracking of worker, equipment, material and construction progress in real time.(Taneja,2011).In the APPC programme models were study to convert automatically collected data into information regarding the project performance indicator(PPI) such as cost schedule resource consumption ect.These PPI can be compared with the project plan to identify deviation and opportunity for improving productivity. This research direction has two major drivers:

(a) The increasing need for feedback and monitoring information.

(b) The rapid technological developments in ADC technologies and their declining costs.

For more than a decade researchers have been pointing out the deficiencies of the current-practice, manual data collection, and/or the need to automate the collection and the processing of the data to produce useful and up to-date feedback information without investing too much cost. Hence automated project performance control (APPC) gives an idea about how to automate labour and earth-moving equipment productivity measurement, how monitoring tower cranes helps to control progress, how to control the entire materials management process, and initial attempts to automate workers safety control.

The main challenge today in automating the control process is the automated measurement of the project performance indicators (PPI). There is no direct method to measure performance indicators automatically. Consequently, this paper gives an overview indirect method used for it. There are many examples of measuring devices, which evaluate a given parameter indirectly, e.g. Global Positioning Systems (GPS), which measure time-of-flight of a signal from known reference stations and calculate positions. The same approach is used here for automated PPI measurement—the values of some indirect parameters are measured automatically and converted into the sought value of the PPI by special algorithms.

II.Literature Review

Shabtai Issac, Ronie Novan carried out an extended research programme from past two decades to examine how productivity in construction projects can be improved through the development and study of models for project monitoring and control, which process automatically collected data on the actual project performance. For this purpose he were conducted test on these models to demonstrate that this approach can help overcome some of the limitations of existing manual methods. However, they also indicate that certain manually obtained data are still required in addition to the automatically collected data. A framework for semi-automated project monitoring and control is proposed, in which both manually and automatically collected data can be incorporated. This framework integrates the

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monitoring of projects with their control by taking into account the impact on productivity of existing deviations from the planned performance, and of the controlling actions that are proposed to deal with these deviations. [I].

Ioannis Brilakis, Gauri Jog et all. Studied on tracking of project related entities such as construction equipment, materials, and personnel is used to calculate productivity, detect travel path conflicts, enhance the safety on the site, and monitor the project. Radio frequency tracking technologies (Wi-Fi, RFID, and UWB) and GPS are commonly used for this purpose. However, on large-scale sites, deploying, maintaining and removing such systems can be costly and time consuming. In addition, privacy issues with personnel tracking often limits the usability of these technologies on construction sites. As per his research, he presented a vision based tracking framework that holds promise to address these limitations. In the framework he uses videos from a set of two or more static cameras placed on construction sites. In each camera view, the framework identifies and tracks construction entities providing 2D image coordinates across frames. Combining the 2D coordinates based on the installed camera system (the distance between the cameras and the view angles of them), 3D coordinates are calculated at each frame. The results of each step are presented to illustrate the feasibility of the framework. [II].

ASCE M, Shpatnitsky had carried out field experiment for studding the earthmoving equipment productive model as per his research. The model, which uses global positioning system for on-site automated data collection, was tested and validated on site. The results of the field experiments have indicated that the expected accuracy level of the model can be assessed as ±4–5% for unstructured activities and even higher for more structured ones, such as asphalt spreading. As per his opinion it is possible to automatically measure the performance of earthmoving operations. Based on the results, it concludes that there is need for further research. [III].

Ronie Novan et all had carried research on the comparison on conventional monitoring method and automated monitoring method as per his discussion the current monitoring and control methods rely on massive manual work. As a result, control information is expensive to produce, or is generated irregularly. Additionally, the information is only available infrequently in many cases after the controlled activity was completed and its quality and integrity are low. The purpose of the research is to improve monitoring and control information, i.e. to offer it on a daily basis, to improve its quality and integrity and to reduce the cost of generating it. To do these researchers started exploring the use of automated data collection (ADC) technologies. We developed models for automated labor and equipment control, materials management and control as well as monitoring safety measures all described in this paper. Based on the above, the paper discusses development issues and the prospects for commercializing such systems. Materials management and control is currently the most practical application. On the other end of the spectrum is labor control, which currently is the most challenging area. [IV].

Shpatnitsky, Ronie Novan The author had concentrated on particular area of civil engineering i.e. on road project as per his research on monitoring and control of earthmoving operations is gaining an increasing interest. Manual monitoring and control of earthmoving operations have not yielded the expected results. Additionally, because manual monitoring is labor-intensive, construction managers have to choose between monitoring based on rough estimates, or spending a lot of time collecting and processing data. The latter choice distracts them from many other important duties. The purpose of the present model is to automatically collect and process monitoring data providing the construction manager with real-time control information. The model was developed for road Construction. It uses GPS technology for automated data collection, logging the locations of all the earthmoving equipment while working on the project. Specially developed algorithms convert these locations to control information regarding productivity, duration (or progress) and actual consumption of materials. The model was implemented and tested for 3 weeks in a road construction project. The performance of four activities was measured by the model and compared to manual measurement of the same parameters. This comparison indicated that the model could reach a deviation of ±4–5% [V].

III Conclusion.

The introduction of ADC technologies on construction sites may offer the opportunity to realize this. However, Overview of literature the implementation of models that were study and developing in the APPC programme indicate that certain manually obtained data are still required in addition to the automatically collected data. The proposed framework, whose ultimate objective is to seamlessly integrate both manually and automatically collected data in order to improve productivity, shows promise. Additional research is currently being carried out in order to develop the databases and methods required to fully realize it. Eventually, this framework could facilitate the establishment of a database that can be used to analyse, and also this research work is helpful to those who are recently work in the automated monitoring system in construction of road project. The aim of this research work is to understand the need of implementing the automated monitoring system, creating awareness and interest about learning and implementing the rapid developing monitoring system in the construction road project.

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