ISSN: 2277-9655
Impact Factor: 4.116
CODEN: IJESS7

IJESRT

INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY

THE ROLE OF LASER SCANNING TECHNOLOGY LIDAR SCANNING AND BUILDING INFORMATION MODELLING IN BUILDING CONSTRUCTION

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DOI: 10.5281/zenodo.400955

ABSTRACT

Laser scanning technology is a very helpful feature in the construction work of building. A laser is a powerful scanner that can capture the data with size and shapes and convert this to a cloud data point and after it can be uploaded into 3d modelling. it is a method of selection of data of surface with the help of a laser scanner which captures the data of densely-scanned points with precise distance over a given object. In the process of laser scanning technology various precise methods of scanning are used, they describe the terminologies of laser scanning technology. In this the LIDAR process which termed as the 'light detection and ranging' is a method for collecting data from a cloud point to the surface. Lidar process is also helpful for generate the 3d images that can be used furtherly for 3D computer aided designing and cad modelling. laser scanning technology is a quicker process that provide the data more accurately and cheap than a conventional survey measurement. The building information modelling is endow the 3d images to the construction work with BIM software that can be helpful for the analysis of work.

KEYWORDS: Laser Scanning, building information modelling, 3D BIM, LIDAR Scanning.

INTRODUCTION

Laser scanning technology is the helpful feature of development of point cloud models, in the lifecycle of a building in various stages of building construction work, with more quickly and accurately. The fastest work of laser scanning is possible through the use of laser scanning by manual measurement and various techniques. The human being is faulty in the field measurement thus this impact the project work, Then the laser scanning gives the accurate field data. The accuracy of work is also impact by professional surveying measurement equipment, such as a total- station, the collection of data in this through a laser scanner would be time consumptive and unfeasible. In working in a project the project team realized the increment of the better project work for the time saving, cost saving and a good finish of the project. The laser scanning technology is popular in this days because of the best data provide in laser scanning, provide the actual model of scanning of internal and external data of the building construction. Building information modelling (BIM)is provide the digital representation of the construction work and this also include building construction work. Building information models (BIMs) software are can be provide the exact data of the supporting project work and the data would be analysis. Building information modeling (BIM) are having the standard in the building construction work, this technology having a vital role in the construction industry.

Laser scanning technology has many roles in construction work, projects work ranging from the began to end, and the data will capture can be useful to the entire project work, and the project team. This also include the architects and engineers, from project starting to ending. The 3D building information model is becoming a reality on construction sites provide better field condition and helpful in early design discussions, the software is better for the design consideration and for decision making. There are many assent in laser scanning which must be made when make use.

The most important is expense of the technology and required specialization. The companies are unable to accept the laser scanning technology when it firstly available because of its expense, making the data and project control capabilities unattended. in the present days the laser scanning technology is helpful for the companies and

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professional peoples, As the demand of laser scanning technology is increased the better opportunity for the students are available in the construction management.

LASER SCANNING TECHNOLOGY

Types of laser scanning

The laser scanning technology has working on the two principal time of flight and phase comparison. The first principle of laser scanning describe as time of flight in this principal the calculation will be made in the base of the coordinates. This operation can collect data on the basic of the observations and when the exact observation is found the data is collected. In The phase comparison method of laser beam is transmitted after that it is modulated by a harmonic wave. In this principal the calculations will be made with the modulating waves. The laser scanning technology is often divided into 3D laser scanning, 3D object scanning LIDAR scanning is used to capture the shape of the object. Laser rangefinder is a device that can detect in laser the distance of one point to another.

3D LASER SCANING TECHNOLOGY

in the construction industry the new technology is not be considered quicker and fast, the challenge for the design and construction professional themselves to build projects earlier and cheaper, with the help of new technologies like BIM, 3d laser scanning technology the work is done accurately and faster.in the all of the new technologies a less diffuse technology in this is 3D laser scanning. In the 3d laser scanning technology improve the design process, speed up and reduce the data collection errors, this is also less time consumptive and money. The technology attractive for the fresher of the construction industry.

3D laser scanning technology captures the dimensions and size, shape objects. The scanner outputs after the scanning gives a point cloud image, which accurately defined and respond the scanned objects. Depending on the type and make of the scanner the objects can be scanned the several collection of data from one meter to hundred meter, the accuracy of collecting data is less than 5 mm vary from thousand to hundred thousand point per second. The overall speed depends on the desired density of the point cloud. When an object is too large that cannot be scanned or captured in a single scan then multiple scans are used that can be taken from different lines of sight can be linked together. Once the 3D point cloud is generated, we can export these data to CAD, building information modelling ,2D CAD drawings or a 3D model.

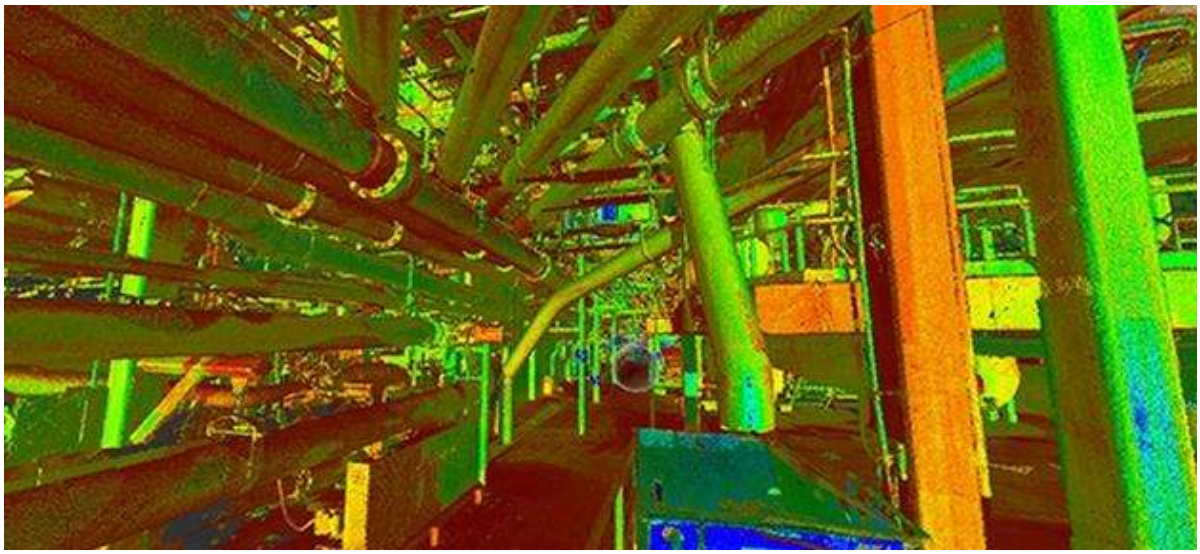

Figure: 3D laser scan technology in building construction work

Primary Uses

The 3d laser scanning technology is a slow adoption to the construction industry but now this technology is currently uses number of purpose and various industries for the accurately work. The technology is primarily considered in construction industry and project works that can provide the more accuracy of work and done the work fast.

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Building/Facility Renovation

In this the 3d scanner accurately develop the 3d models of the interior and exterior of existing building. The purpose of the development of this is to plan and design of the future addition and for renovations, sometimes the building work encounter inaccurate and incomplete drawings than the 3d scanner provide a complete check on in this drawing. The renovate building work is primarily done with the help of the 3d laser scanner.

LIDAR Laser Scanning Technology

Lidar laser scanning technology is termed as (Laser Imaging, Detection And Ranging) technology for its 3D laser scanning. In the LIDAR laser light is use for the produce of the laser result in a high level of detail in small amount of time. The LIDAR scanning is used in the building work and foundation work and also be useful in large scale mapping application. The accuracy of the work and decision making is a great approach in LIDAR scan. The photo shows a Leica Scan Station C-10, a 3D laser scanner which uses LIDAR. In process of LIDAR scan a collection of point set are available and The point sets are combined into clusters to form the point clouds.

The LIDAR laser scanning technology is will be used in the conjunction with 3D printers and helpful for the manufacture and replace building components. LIDAR is a most accurate and effective way to capture the data and record the data. Lidar scanner will give the accurate 3D images and provide the actual image of an object. This in turn might be linked to interim payments for contractors.

Figure: LIDAR laser scan technology in building construction work

BUILDING INFORMATION MODELLING

In the building information modelling all the challenges of the project is challenge for the successful of project including costlier budget, limited manpower, irregular schedule and limited source of information. The significant disciplines in the building information modelling should be coordinate properly and all the information regarding to architectural, structural and MEP designs are to be provided for the proper workflow. Building Information Modeling percussion at the initial stage, identifying the exact location.

In The BIM concept primarily investigate the role of virtual construction. The priority to its actual physical construction, in order to reduce suspicion, solve problems, and analyze potential impacts. The Sub-contractors can improve the critical information and the knowledge is to be provide for the best of the project, the project from the beginning to the end is analysis from every trade. The Scopes of work can be defined systematically and the sequence of the work also include. the BIM software also prevents the errors of the building work by enabling conflict and the improper measurement of the field work.

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CONCLUSION

Laser scanning is important part of the workflow for construction work. The professionals who use BIM have a greater advantage of the building construction work and the planning, designing of the building work faster and accurately. The error in the faulty measurement and human impact in the field is prevented. The project team is need to ensure that the advantages of the work and the information of work can be provided for the better workflow of the project. The laser scanning methods are a new technology, and the prevention in the errors and the course work should be best practiced. In addition to including the laser scanner is a powerful tool which can generate the images of the object more accurately and faster. In the construction work the building parts of internal and external are scanned with the laser scanner and provide a complete check on the work. The information that provided is should be very helpful for the students of the graduated and undergraduate of the education of the construction management, Provide a complete check on students with experience regarding the implementation of such technologies. In order to keep up with the ever evolving technologies in construction, the learner and educational institutions need to continue integrating and updating the technologies.

The 3d laser scanning technology has still some issues that furtherly explore. Firstly, the huge amount of data is collected in point cloud so fit the cloud with the color images should be explored further to reduce the amount of data through software technology routes. Second, in this techniques the time requirement is more and workers are required more in number to change the data point cloud into CAD graphics. In addition, 3D laser scanning is becoming a standard technology for the 3D modelling of complex scenes. the 3D laser scanning technology and building information modelling (BIM) technologies helpful for the new possibilities for students and the project workers that has a greater advantage in the construction management.

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