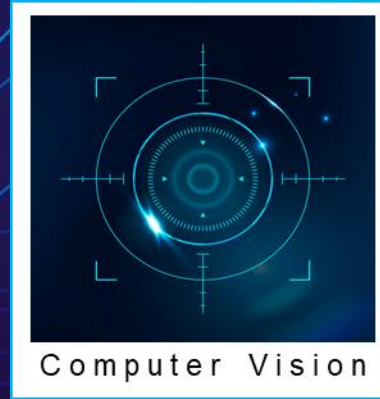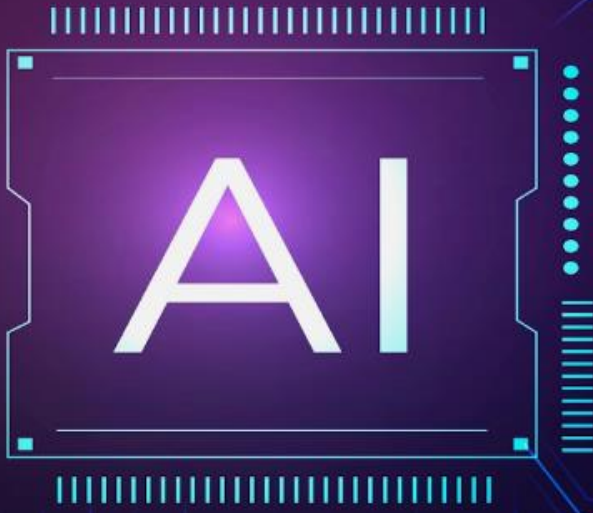SHYENA
TECH YARNS

A Data Science Company

AI

Computer Vision

Case Study

Transforming Construction
Site Monitoring with AI-
driven 3D Object
Recognition

About the Client
A Building Information Management Product Company

Business Problem

The client's vision centered around eliminating the manual complexities of measuring construction site progress, especially the installation of critical components like Pumps, Bends, and Valves. The aim was to automate the process, enabling accurate progress tracking and anomaly detection while enhancing overall construction efficiency.

Solution

To address the challenges of manual progress tracking, object recognition technology was harnessed to seamlessly integrate with the existing BIM application.

- **Advanced Recognition with Pointnet++:** Leveraging the capabilities of Pointnet++, a well-established deep learning network designed for classification and segmentation tasks, the team embarked on developing a cutting-edge solution for object recognition. Pointnet++ comes pre-trained on Shapenet and Modelnet, providing the ability for transfer learning with new data.
- **Data Processing and Model Adaptation:** The client contributed point cloud datasets, capturing objects of varying sizes (small, medium, large) such as pumps, bends, and valves. These point clouds were obtained through LIDAR technology. The data underwent meticulous processing using the Python Point Cloud Library (PCL). To facilitate model compatibility, the datasets were uniformly sampled, transforming them into suitable inputs for the Pointnet++ model.
- **Highly Accurate Recognition:** The Pointnet++ model demonstrated impressive prowess, achieving recognition accuracy exceeding 90%. The AI system was finely tuned to distinguish and classify objects, regardless of their size or complexity.
- **Seamless Integration:** Building on the success of the model development, APIs were crafted to allow effortless integration with the BIM system. This seamless integration empowered construction professionals to incorporate AI-driven progress tracking without disruption.

Outcome

Through the deployment of advanced AI models, the client achieved a transformative outcome. The integration of AI-powered object recognition provided the means to eradicate error-prone and labor-intensive manual progress measurements at construction sites. The system not only facilitated precise tracking of construction progress but also proactively identified anomalies, significantly enhancing quality control and project management.

The success of this project opens the door to further advancements. The application of AI in construction management could extend beyond progress tracking to areas such as safety compliance monitoring, resource allocation optimization, and more. The integration of AI technologies positions the client at the forefront of modern construction practices.

By seamlessly marrying AI-driven object recognition with BIM, the client forged a new path in construction site monitoring, elevating operational efficiency and laying the foundation for a future where technology shapes construction management practices.
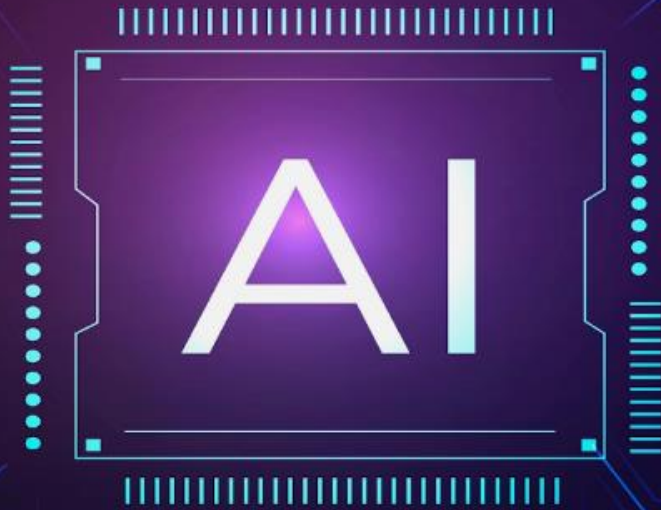
Technology Used

Python, OpenCV, Tensorflow, Deep Learning, PCL, PointNet++

![Shyena Techyarns logo]

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TECH YARNS

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AI

Office Locations

Pune, India
3rd floor, Sargam Tower
Anna Saheb Chirmule
Path, Neel Kamal
Society, Karve Nagar,
Pune 411052

Middletown, USA
651 N. Broad St.
Suite 206,
Middletown,
DE
19709

London, UK
Suite 858,
Unit 3A,
34-35 Hatton Garden,
Holborn, London,
EC1N 8DX

Email us for your technology needs
contact@shyenatechyarns.com

Schedule an appointment on
www.shyenatechyarns.com