International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 10 Issue: 03 | March - 2026 SJIF Rating: 8.659 ISSN: 2582-3930

Implementation of AI Technology in Civil Practices — in Surveying& for Leveling & Contouring

Sangale Harshal Sunil[1], Pagar Siddesh Vijay [2], Asane Omkar Bhausaheb[3],Mr. P.S.Bhoi[4]

[1]*CivilEngineering Dept., K. K. Wagh Polytechnic, Nashik*
[2]*CivilEngineering Dept., K. K. Wagh Polytechnic, Nashik*
[3]*CivilEngineering Dept., K. K. Wagh Polytechnic, Nashik*
[4]*CivilEngineering Dept., K. K. Wagh Polytechnic, Nashik*

Abstract - Surveying is one of the most important activities in civil engineering, as it provides the basic data required for planning, design, and construction of infrastructure projects. However, traditional survey data processing methods involve manual conversion, drafting, and analysis using CAD software, which is time-consuming and sometimes prone to human error. To overcome these limitations, this project presents an AI-Based Surveying System for Leveling and Contouring.

Overall, this project demonstrates how Artificial Intelligence can modernize civil engineering surveying by making it faster, smarter, and more efficient.

Key Words: Artificial Intelligence, Surveying Automation, Contour Generation, Leveling, Longitudinal Section, Cross Section, KML to CSV Conversion, Terrain Modeling, Civil Engineering, AI Chatbot System.

1.INTRODUCTION

Surveying is a fundamental part of civil engineering that provides essential information about land shape, elevation, and terrain features. It plays a major role in the planning, design, and construction of infrastructure projects such as roads, canals, buildings, railways, and pipelines. Accurate survey data is necessary to generate contour maps, longitudinal sections, and cross-sections, which help engineers make informed design decisions.

2. Body of Paper

The proposed AI-Based Surveying System is designed to automate leveling and contouring operations in civil engineering. The system works as a chatbot-based virtual assistant that processes survey data and generates required outputs automatically.

The system accepts survey data in KML or CSV format. KML files are converted into CSV format by extracting coordinate and elevation values. The converted data is then processed using Python-based algorithms.

Contour maps are generated using interpolation techniques from X, Y, and Z coordinate data. The system also prepares longitudinal sections (L-sections) and cross-sections automatically by calculating chainage and elevation profiles along a selected alignment.

The developed system significantly reduces processing time from hours to seconds while maintaining acceptable engineering accuracy (approximately ±0.1 meter). It eliminates manual drafting work and improves efficiency in survey data handling.

The final outputs are exported in standard formats such as DXF and PNG, making them compatible with AutoCAD and other design software.

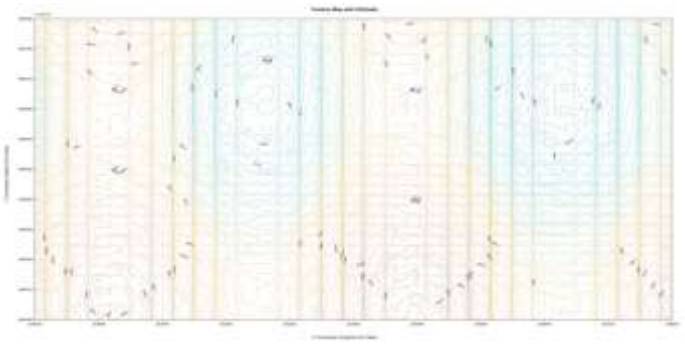

Fig No. 1 Contour map image

3. CONCLUSIONS

This paper presented the development of an AI-Based Surveying System for leveling and contouring in civil engineering. The system integrates Artificial Intelligence with traditional surveying methods to automate data conversion, contour generation, and section preparation.

The proposed system successfully processes survey data in KML and CSV formats and generates contour maps, longitudinal sections, and cross-sections automatically. The results show a significant reduction in processing time from hours to seconds while maintaining acceptable engineering accuracy.

The study demonstrates that AI can effectively reduce manual effort, minimize errors, and improve productivity in civil engineering surveying. The developed system provides a practical step toward intelligent and automated surveying solutions for modern infrastructure projects.

ACKNOWLEDGEMENT

The authors would like to express their sincere gratitude to the Department of Civil Engineering, K. K. Wagh Polytechnic, Nashik, for providing the necessary guidance and support to complete this project successfully.

We are especially thankful to our project guide and faculty members for their valuable suggestions, continuous encouragement, and technical assistance throughout the development of this work.

We also extend our appreciation to our classmates and friends for their support and cooperation during the research and implementation process.

REFERENCES

[1] A. Martínez-Carricondo, F. Agüera-Vega, F. Carvajal-Ramírez, and F. Ferrer-González, “Accuracy assessment of RTK/PPK UAV-photogrammetry under different baseline configurations,” *Remote Sensing*, 2023.

[2] F. Ferrer-González, F. Agüera-Vega, F. Carvajal-Ramírez, and A. Martínez-Carricondo, “UAV photogrammetry accuracy for corridor mapping based on GCP number and distribution,” *Remote Sensing*, vol. 12, no. 18, 2020.

[3] M. Qin et al., “Deep learning for filtering the ground from airborne laser scanning point clouds,” *ISPRS Journal of Photogrammetry and Remote Sensing*, 2023.

[4] K. Nurunnabi, Y. Sadahiro, and R. Lindenbergh, “An efficient deep learning approach for ground point filtering,” *ISPRS Archives*, 2021.

[5] T. Janssens-Coron et al., “Ground point filtering with PointNet: Preliminary results,” *ISPRS Archives*, 2019.

[6] P. Petikas, E. Keramaris, and V. Kanakoudis, “Automatic extraction of river cross-sections from DEMs,” *Water*, 2020.