

Efficient One-Person Engineering Surveying with a Vision-Enhanced Robotic Total Station: Applications in Cadastre and Construction

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SUMMARY

Focusing on engineering and cadastral practice, this paper reports the field performance of a vision-enhanced one-person robotic total station (RTS) workflow. On the instrument side, the HTS-820 with an Android-based system delivers image-based centering and automatic instrument-height measurement, AI-assisted ATR for target recognition, continuous tracking and fast relocking, plus dual search modes (360° long-range search for 20–300 m and AI search ≤20 m). On the pole side, the SP20 pole control system integrates GNSS/IMU/radio for long-range communication and searching, GNSS RTK with IMU, and optical-tilt compensation, enabling a seamless indoor–outdoor stake-out and surveying workflow with good accuracy. Case studies from construction sites and cadastral projects show stable accuracy and substantial efficiency gains, especially for long-distance stake-out, frequent re-aiming, and target relocation. The solution offers a cost-effective alternative that supports broader adoption in budget-constrained contexts.

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