

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

Xianyu Lan and Stefan Wei (China, PR)

**Key words:** Cadastre; Engineering survey; GNSS/GPS; Low cost technology; One-person operation; Robotic total station; ATR; Indoor–outdoor staking out & Surveying

## 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  $\leq 20$  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.

---

Efficient One-Person Engineering Surveying with a Vision-Enhanced Robotic Total Station: Applications in Cadastre and Construction (13956)

Xianyu Lan and Stefan Wei (China, PR)

FIG Congress 2026

The Future We Want - The SDGs and Beyond

Cape Town, South Africa, 24–29 May 2026