

บทคัดย่อ

Design and Development of an Application to Enhance Visual Capabilities for Completely
Blind Individuals

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Visually impaired individuals face persistent barriers to information access. Although Braille and screen readers exist, Thai language support and the clarity of synthetic speech remain limited. This study presents an Android application that uses AI and computer vision to substitute sight with clear, native Thai audio. The integrated system, fully compatible with TalkBack, delivers five core functions: (1) obstacle detection with distance estimation; (2) banknote classification and value calculation; (3) color identification; (4) text reading via OCR; and (5) face recognition. Camera input is processed by RT DETR for object detection, DeepFace for face recognition, and Pytesseract for OCR, with continuous feedback through Text to Speech. The UI is intentionally simple, featuring five task focused buttons, while Python APIs provide real time inference. Models were trained on datasets annotated in Roboflow and run on Google Colab to improve accuracy. System tests achieved 100% banknote classification, 85–90% value aggregation, ~96–98% text reading accuracy, ~87–92% color identification, ~60–70% obstacle detection, and ~70% face recognition. User evaluations with visually impaired participants reported high usability, clear announcements, and full TalkBack support. The app shows strong potential to enhance convenience, safety, and independence; future work will improve obstacle and color accuracy and streamline nonessential components.

Keywords: Visually Impaired Artificial Intelligence Computer Vision Android Application Assistive Technology