Higher Colleges of Technology — كليات التقنية العليا

Smart Blind Stick

Enhancing Mobility and Safety for the Visually Impaired

Capstone II Project - Higher Colleges of Technology

1 🔍 Problem Statement

Globally, more than 285 million individuals experience visual impairments, with approximately 21,000 residing in the United Arab Emirates. For these individuals, moving safely and independently remains a significant challenge. Traditional mobility aids like white canes and guide dogs provide only partial support. White canes require direct contact with obstacles, offering minimal early warning, while guide dogs are expensive, need extensive training, and require ongoing care. These limitations leave visually impaired individuals vulnerable to physical danger and emotional stress, impacting their independence and quality of life.

The Smart Blind Stick addresses these critical concerns by integrating sensor-based technologies, real-time alerts, and emergency communication features. It is designed to empower users by offering a modern, reliable, and intelligent assistive solution that enhances personal safety and autonomy.

2 Project Scope

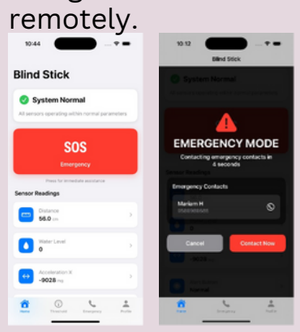
This project involves designing and developing a Smart Blind Stick integrated with advanced technologies, including ultrasonic sensors for obstacle detection, water sensors to identify slippery surfaces, and a panic button that triggers emergency alerts. Additionally, the system is supported by a dedicated iOS mobile application that enhances user interaction and remote monitoring capabilities.

The companion mobile app enables both users and caregivers to track real-time location, configure alert preferences, and manage emergency contact information. The solution is specifically designed to serve visually impaired individuals in the UAE and similar urban environments, with a strong emphasis on accessibility, safety, and ease of use in daily navigation.

3 Main Deliverables

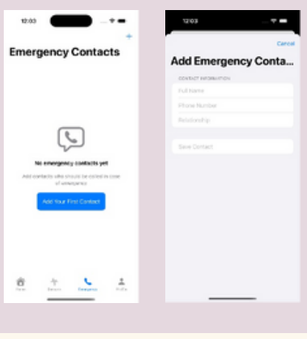
Smart Stick with Sensors
Description:
Detects nearby obstacles using ultrasonic sensors and water hazards using moisture sensors. It provides vibration feedback to alert the user instantly.

📱 Mobile App for Alerts & Updates
Description:
A companion iOS mobile app that displays real-time alerts and system status. It allows caregivers to monitor and receive notifications remotely.



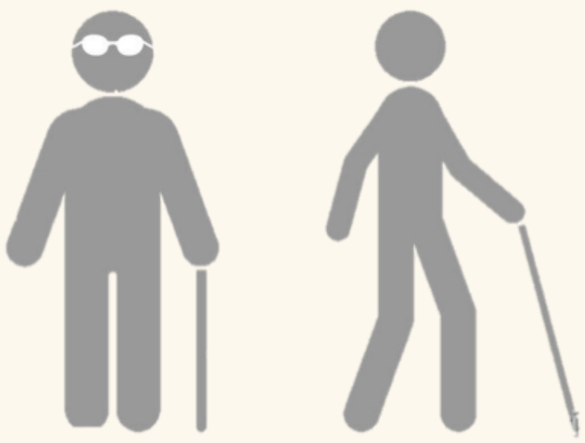
🚨 Emergency Panic Button
Description:
When pressed more than three times, the panic button sends a help message, location, and a photo to emergency contacts within seconds.

👥 User & Caregiver Account System
Description:
A secure account management system for blind users, caregivers, and administrators. Allows personalized settings, notification control, and contact updates.



4 System Features

- Vibration alerts for nearby obstacles
- Water detection alerts
- Real-time notifications to caregivers
- Panic button for emergencies
- Easy-to-use mobile app



5 Future Development

- Add GPS for step-by-step directions
- Add voice assistant for more help
- Make it rechargeable and stronger
- Improve AI to detect more obstacles

Acknowledgments

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