


















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Project Detail

TREX

Problem statement:

For visually impaired individuals, something as simple as walking down the street can turn into a daily struggle. The traditional white cane, while affordable and reliable, only helps in detecting obstacles on the ground. It cannot warn about dangers at head level like hanging boards, tree branches, or side mirrors of vehicles.

Crossing a busy road becomes especially frightening, as there are no real-time alerts to signal fast-moving vehicles or unexpected hazards. Because of these risks, more than half of visually impaired people prefer not to travel alone, limiting their independence.

This lack of safe mobility does more than restrict movement—it affects confidence, career opportunities, and social participation. In short, the world outside becomes a place of fear instead of freedom.

Solution:

Imagine if the white cane, the most trusted companion of a visually impaired person, could do more than just touch the ground. A Smart Assistive Stick can transform it into a true guide, one that *sees, senses, and speaks* for the user.

This smart cane uses ultrasonic and infrared sensors to detect obstacles, not only on the ground but also at head level-like tree branches or signboards that are otherwise invisible to a normal cane.

Through gentle vibrations or audio cues, it alerts the user about the direction and distance of these obstacles, almost like a friend tapping their shoulder to warn them.

It can also sense approaching vehicles, helping make road-crossing safer. With GPS and voice assistance, it guides users confidently through unfamiliar routes, turning fear into freedom.

Lightweight and designed to look and feel like a regular cane, it blends seamlessly into daily life, yet offers so much more. In essence, this smart stick doesn't just detect obstacles, it restores independence, dignity, and confidence to those who use it

Sensors (to detect obstacles and environment):

1. Ultrasonic / Infrared sensors – detect obstacles at ground and head level.
2. Downward sensor – detects stairs, potholes, or uneven paths.
3. Optional GPS module – for navigation and location tracking.


















Processing Unit:

Microcontroller (ESP32 / Arduino / STM32) – to process sensor data and control outputs.

User Feedback System:

1. Vibration motors – alert user through different vibration patterns.
2. Audio output (earpiece / bone conduction speaker) – voice guidance or warnings.
3. Buttons – for mode change or SOS emergency.

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Power Supply:

1. Rechargeable battery (Li-ion/Li-Po) – powers the stick.
2. USB-C charging port – for easy recharging.

Connectivity:

Bluetooth / Wi-Fi – to connect with a smartphone app for navigation, SOS, or customization.

Design & Build

Lightweight foldable cane – made of aluminum/carbon fiber.

Ergonomic handle – for comfort.

Rugged casing – to protect electronics (water and dust resistant).

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Yes



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