BLIND ASSISTANCE OBJECT DETECTION

REAL-TIME OBJECT DETECTION AND AUDIO GUIDANCE

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Contents

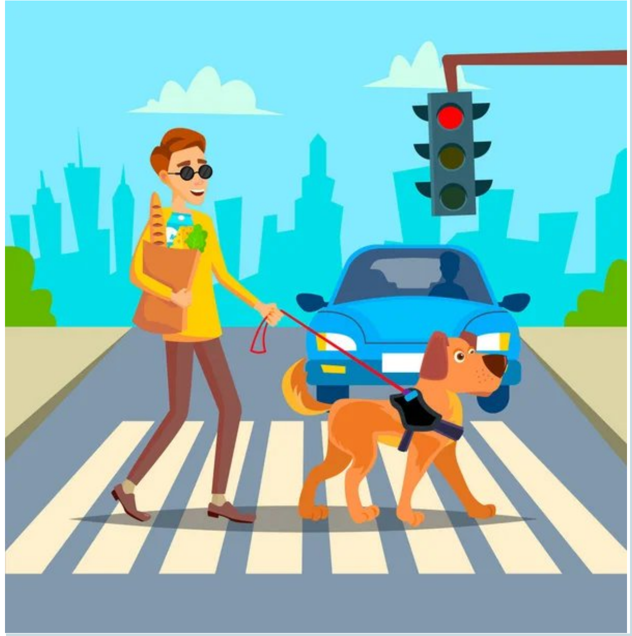
PROBLEM AND EXISTING SOLUTION

285 million people visually impaired worldwide struggle with daily navigation(WHO)[1]

Visually impaired users struggle to detect obstacles beyond cane reach

existing solution:

- Traditional white canes cannot detect **overhead**, **distant**, or **fast-moving** objects[2]
- Guide dogs are **expensive**, limited in availability, and require long-term care[15]
- Many current systems require **internet/cloud processing**, causing delay and privacy issues[7]
- Smartphone-based solutions may fail due to **network dependency[7]**

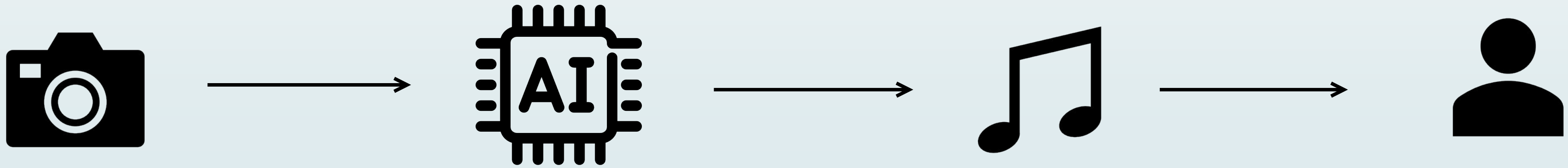


OUR SOLUTION

Affordable AI-powered Assistance

AI based wearable device that:

- Detects obstacles and common objects
- Estimates distance and direction
- Provide real time audio guidance



SYSTEM ARCHITECTURE

YOLOv8n Detection

Achieved **25–30 FPS** during indoor tests at **640×480** resolution, meeting real-time requirements on CPU-only hardware.[5]

Monocular Depth

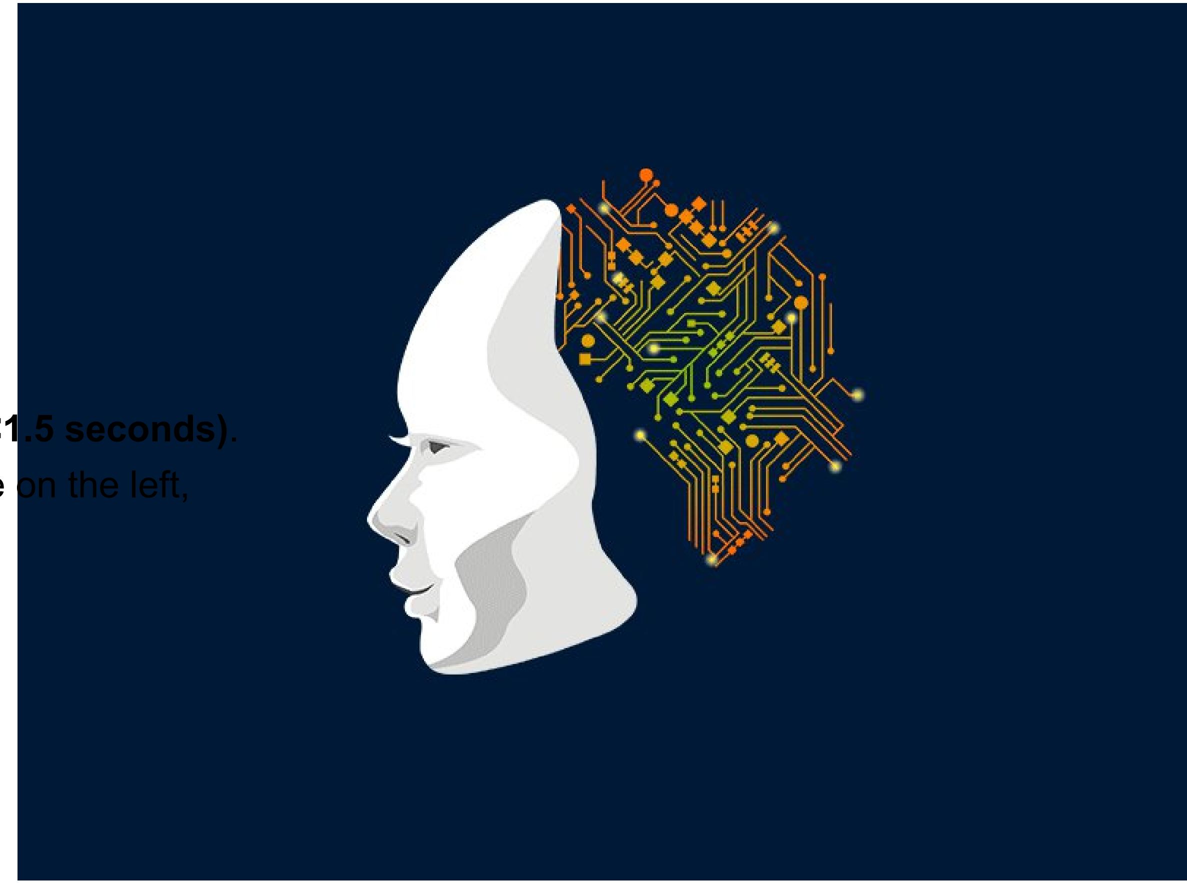
Estimates object $\text{distance} = \frac{k}{bbox\_height}$ using a single camera, simplifying hardware requirements.

Audio Feedback

On-demand TTS produced spoken outputs with **low latency (<1.5 seconds)**. System generated clear messages such as: “Person very close on the left, distance 1.8 meters.”

Offline Operation

Runs entirely offline on cost-effective hardware, ensuring accessibility and privacy.



KEY FEATURES

Feature	YOLO Advantage
Speed	Real-time detection
Accuracy	Good balance of precision and recall
Simplicity	One-stage, end-to-end training
Versatility	Works for detection, segmentation, tracking
Deployment	Works on GPU, CPU, and edge devices

RESULT & PERFORMANCE

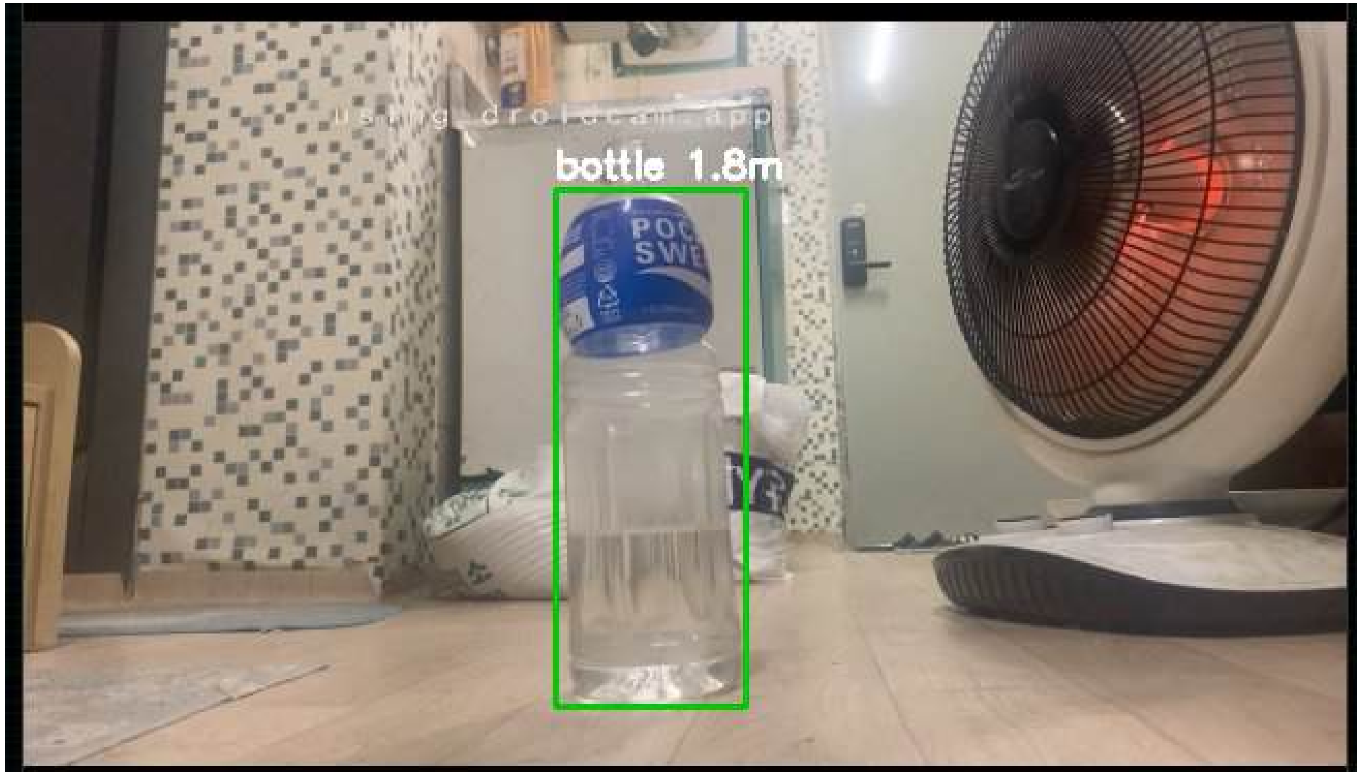


Figure-1: Mid- point(camera to bottle real distance 19 inch)

RESULT &
PERFORMANCE

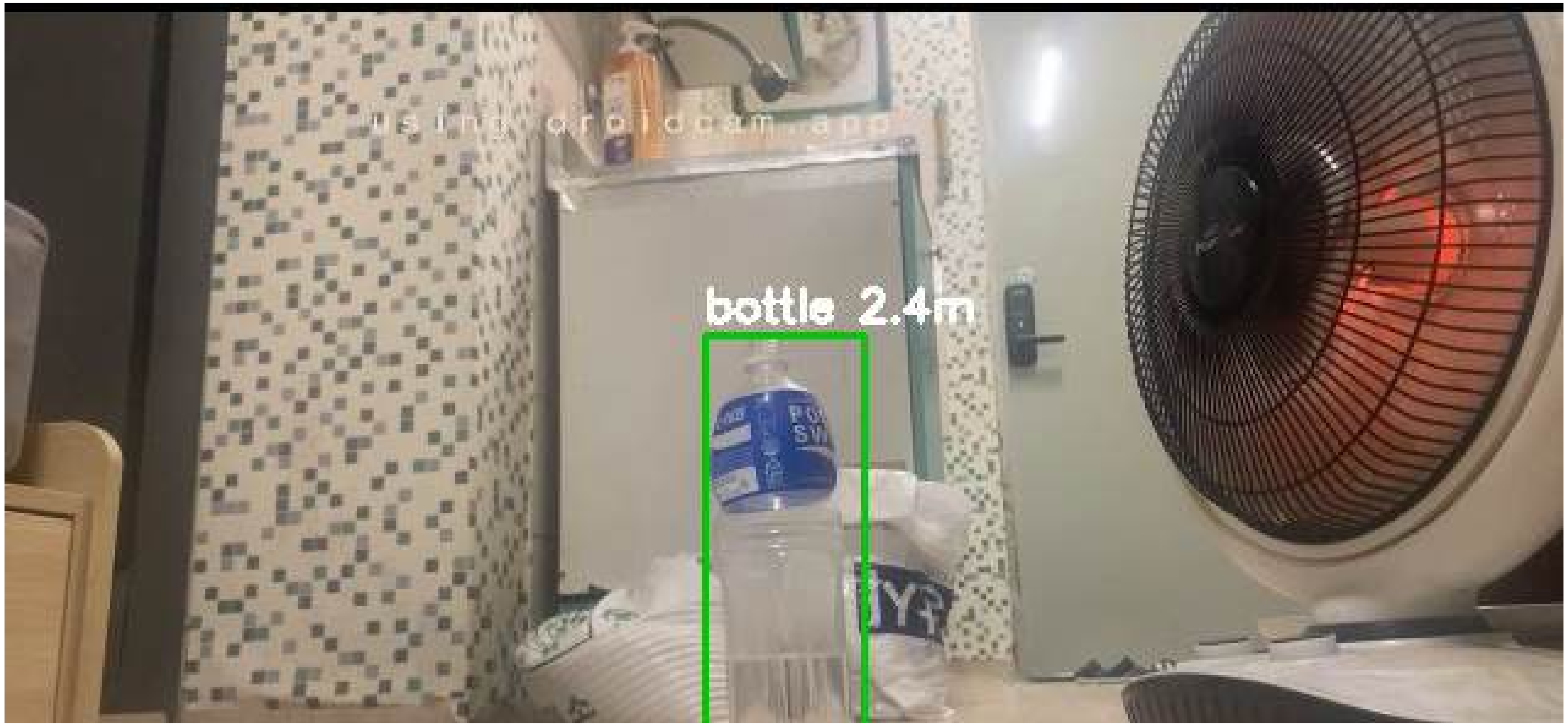
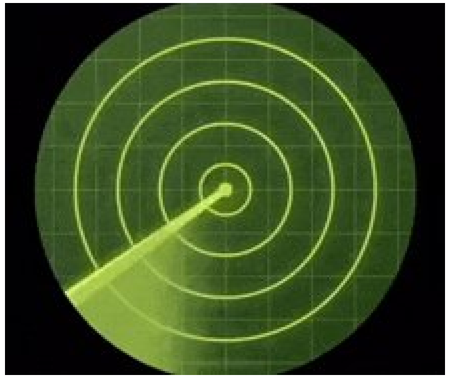


Figure-2: Camera to bottle distance real life 22 inch

RESULT & PERFORMANCE

Figure-Compare between 2 bottles distance real life is 12 inch and 25 inch

FUTURE IMPROVEMENTS



- Read text/signs
- Outdoor navigation
- Identify people

IMPACT

- Affordable assistive solution
- Increases **independence** for visually impaired pe
- Can be adapted globally[17],[15],[20]….

CONCLUSION

“AI and Technology should empower everyone.”

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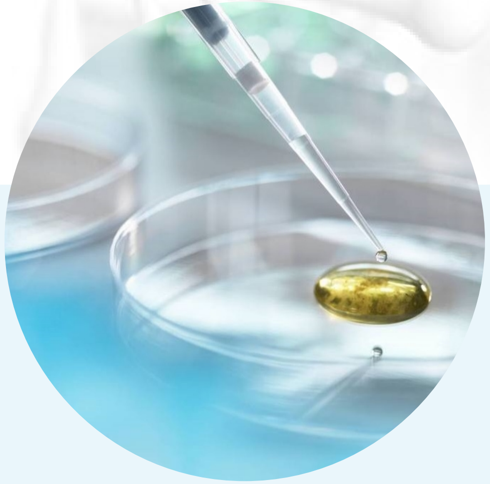

THANK YOU

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