

## Background

- Individuals with visual impairment rely on assistive technologies that use preserved senses (e.g., touch, hearing) to support daily function
- Advances in AI, especially real-time object detection, create new opportunities for for improving assistive technologies based on sensory substitution
- Technology including Be My Eyes and Seeing AI are among several smartphone apps that provide immediate visual assistance
- However, there are no available fully open-source systems to allow customization by and for the blind and partially sighted community

## Objective

To develop an open-source mobile system that converts visual object detection into intuitive audio feedback to empower blind and partially sighted individuals with customizable and scalable assistive technology worldwide

Download code here:



## Contact Information

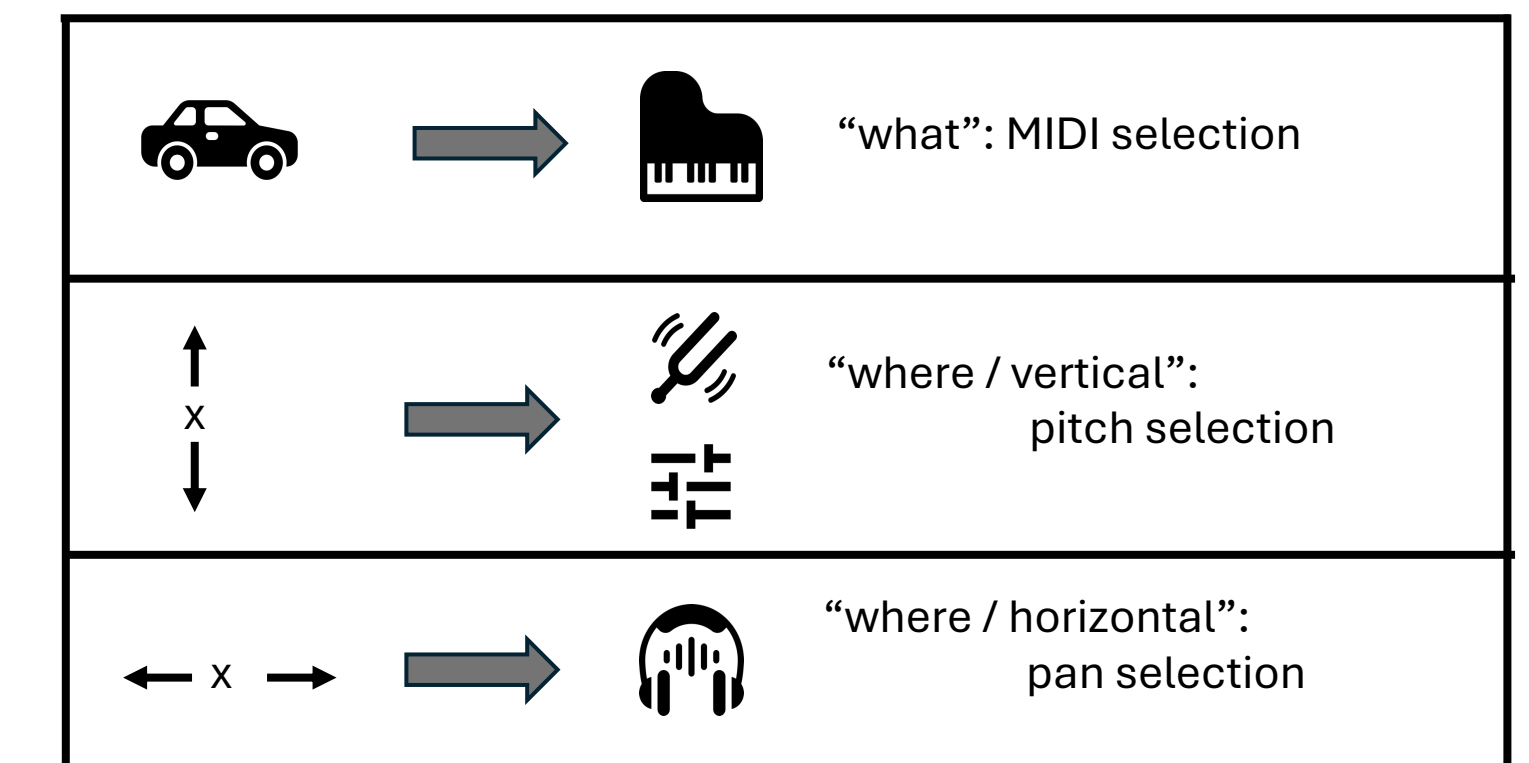
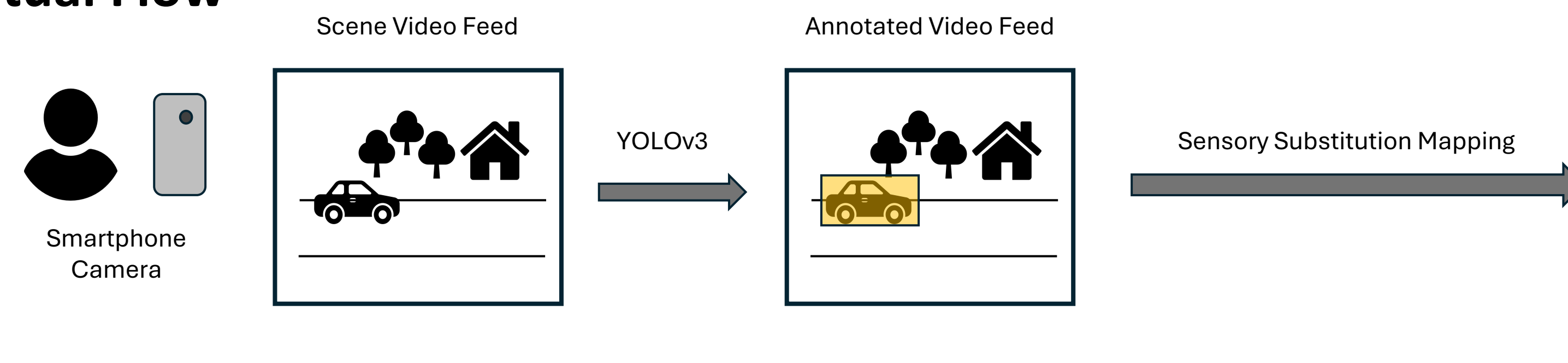
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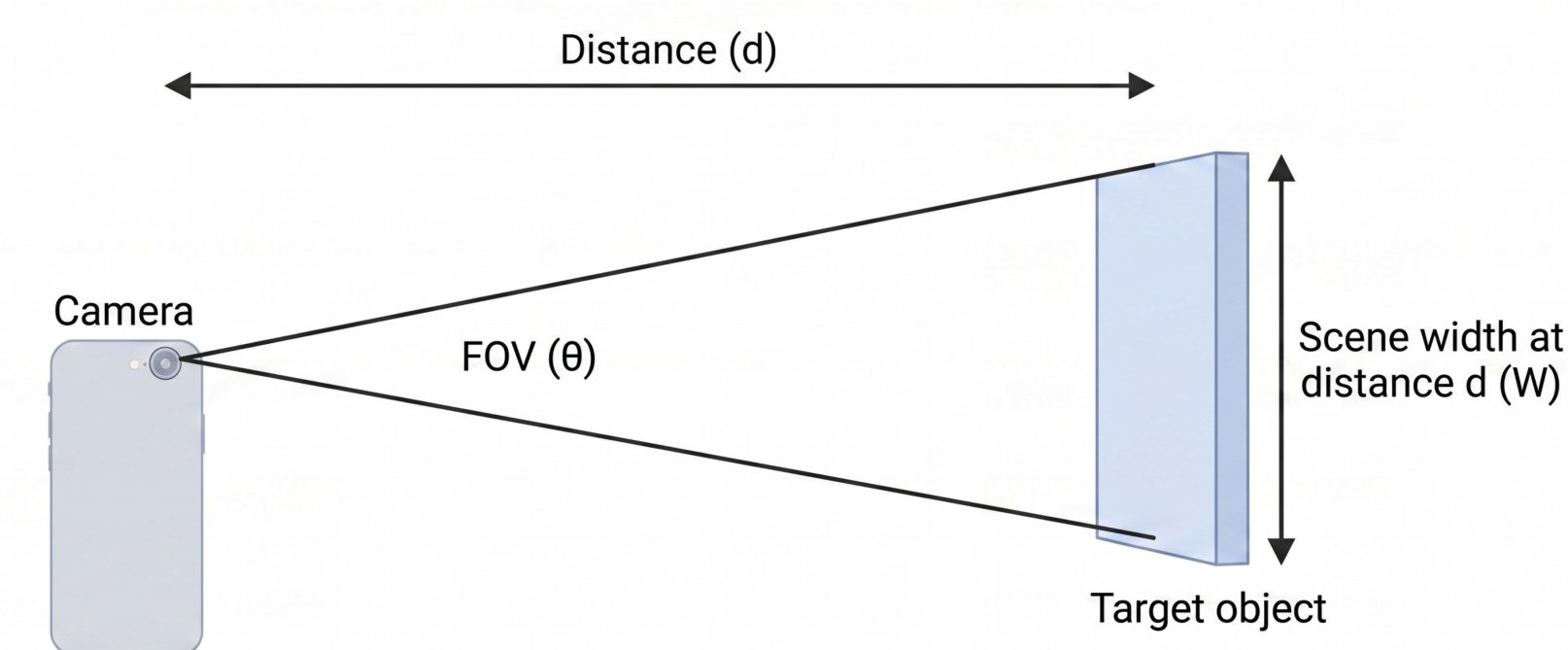
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## Materials and Methods

### Conceptual Flow



### Performance Testing



### Accuracy Testing

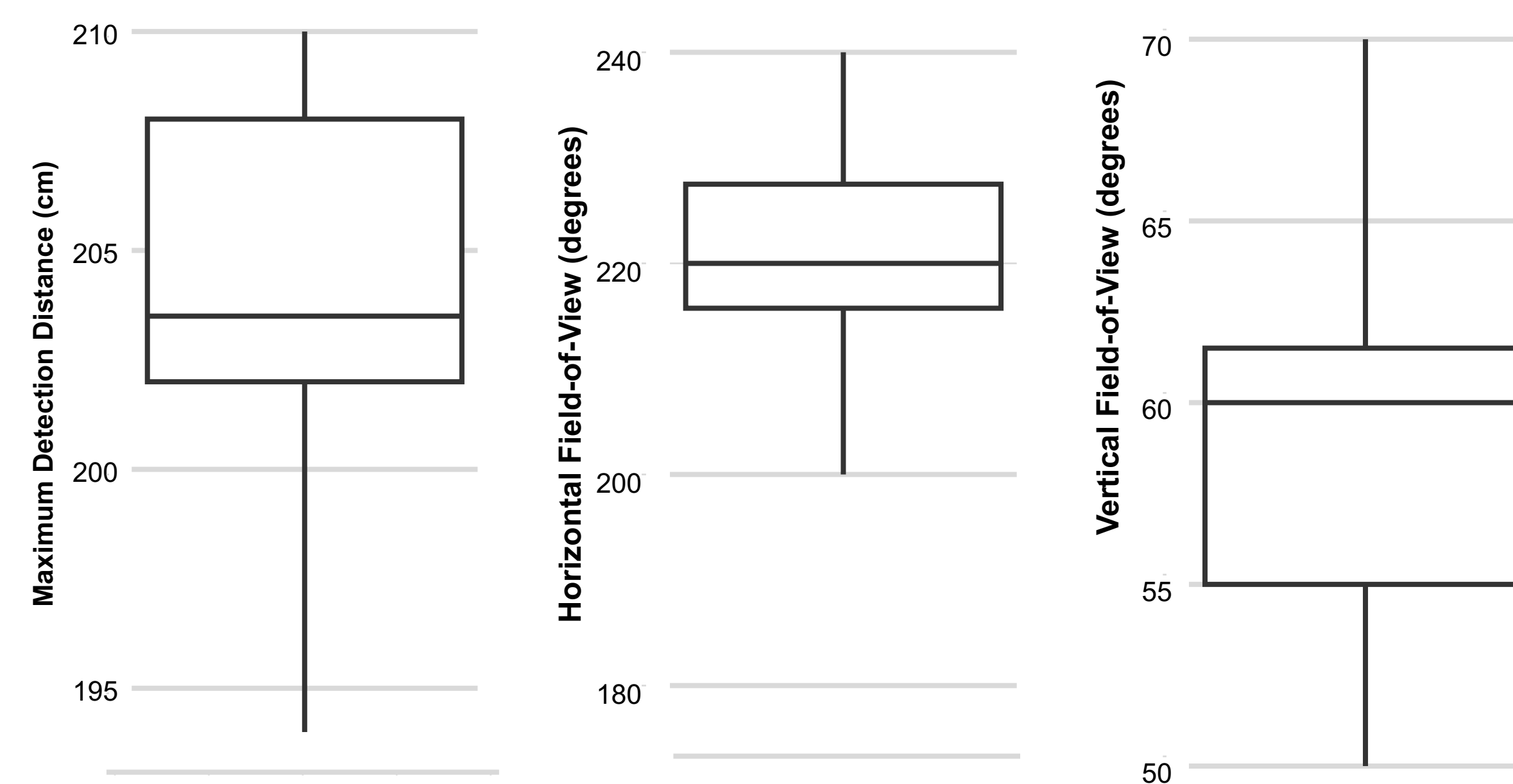
Target object (n = 100 images) vs. off-target object



## Results

Across 10 trials at a fixed target object height of 15cm:

- Detection accuracy: 85% (banana)
- False positives: 0% (apple)
- Fisher's  $p < 0.001$
- Maximum detection distance:  $203.9 \pm 5.0$  cm
- Horizontal field of view:  $220.8 \pm 11.8^\circ$
- Vertical field of view:  $59.2 \pm 5.8^\circ$



## Discussion

### Strengths

- Fully open-source and customizable platform
- Real-time object detection on mobile hardware
- Intuitive audio feedback

### Limitations

- Limited object classes (YOLOv3 constraints)
- Testing performed in controlled conditions
- Requires some user training for interpretation of audio cues

### Future Directions

- Compare performance with existing assistive technologies
- Integrate newer AI models for improved accuracy
- Evaluate impact on real-world navigation tasks