



Real-Time Object Detection Aid for the Visually Impaired

Rahul Mitra '21 & Alisa Levin '21

Faculty Advisor: Peter Yoon

Department of Computer Science, Trinity College, Hartford, CT

Introduction & Significance

- 2.2 billion individuals worldwide suffer from visual-impairment
- Auditory feedback can help orient people
- Our project leverages a high-performance microcomputer to create a **cost-effective, real-time object detection aid**
- The microcomputer uses **Bluetooth** to interface with an iOS application, which in turn provides audio feedback about the user's immediate environment
- We mounted this system on a **white cane** to enhance a tool already commonly used

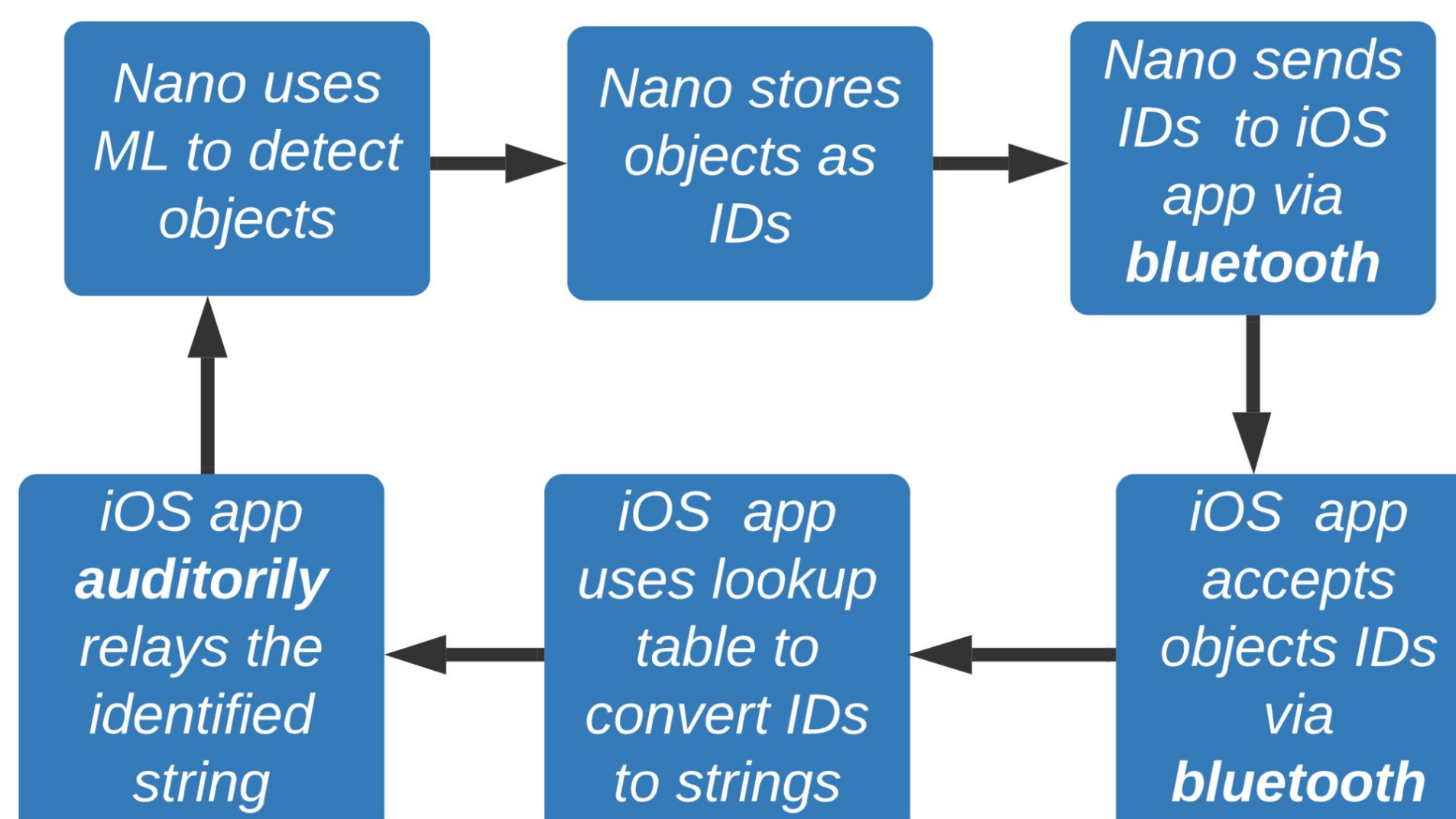
Methods

NVIDIA Jetson Nano

- **SSD Inception v2** – Object detection
- **BlueZ** – Linux Bluetooth protocol stack
- **D-BUS** – Interprocess communication

iOS Application

- **Core Bluetooth** – iOS BLE library
- Converts detected object **IDs to labels**
- **Swipe-controlled audio** for ease of use



Configured White Cane & iOS App

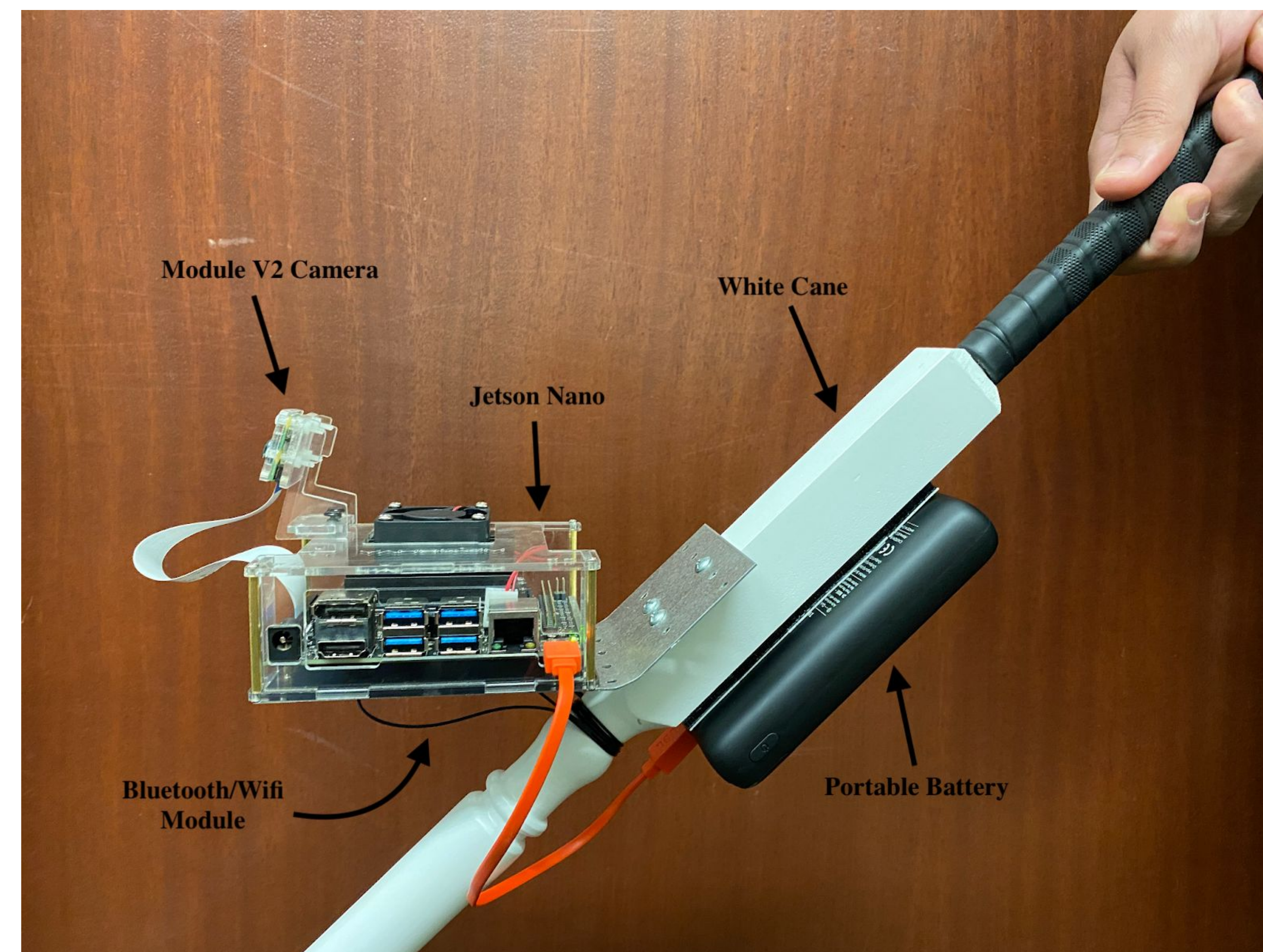


Fig 1. System components mounted on white cane.

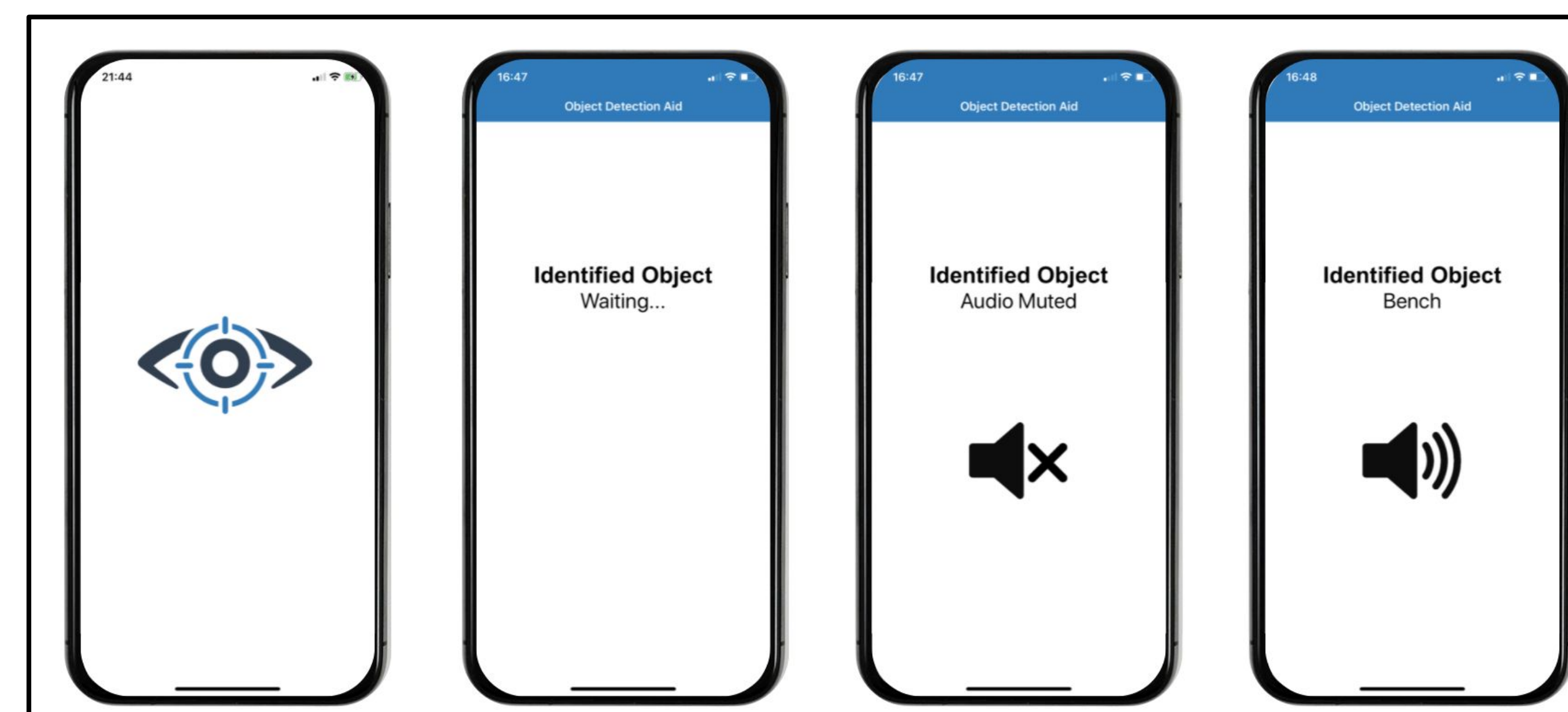


Fig 2. Object Detection Aid (ODA) application.

Outcome

- Implemented model on Nano to achieve real-time object detection (Fig 3.)
- Developed iOS application to interface with Nano via Bluetooth (Fig 2.)
- Configured entire system with a white cane (Fig 1.)

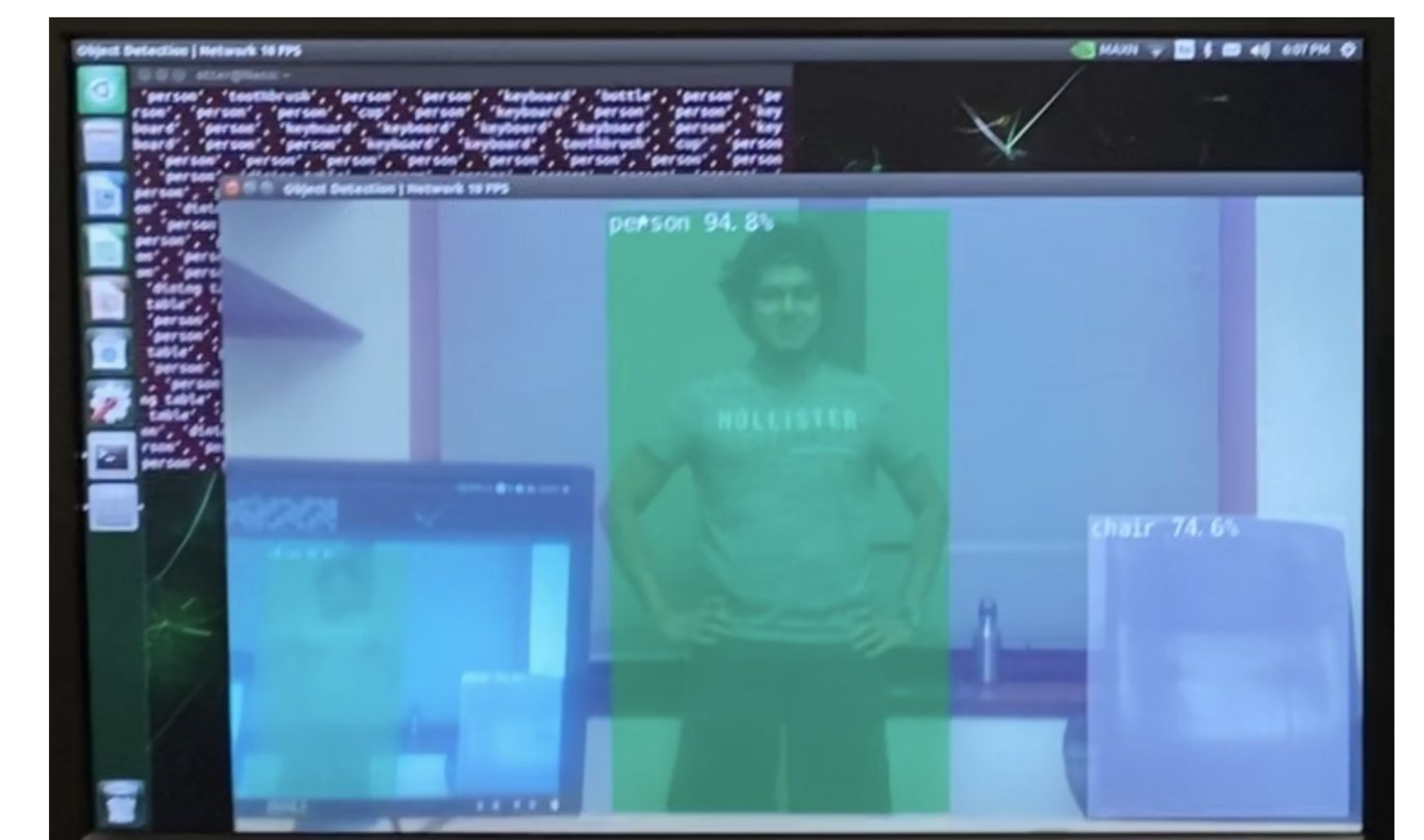


Fig 3. Bounding boxes signify identified objects.

Future Directions

- Improve classification model
- Add angle-adjustable camera mount
- Gather feedback from end-users
- Code: https://github.com/rahul-mitra13/Object_Detection_Aid

Acknowledgements

The Trinity College Computer Science Department & Travelers.