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Haptic Feedback Vest

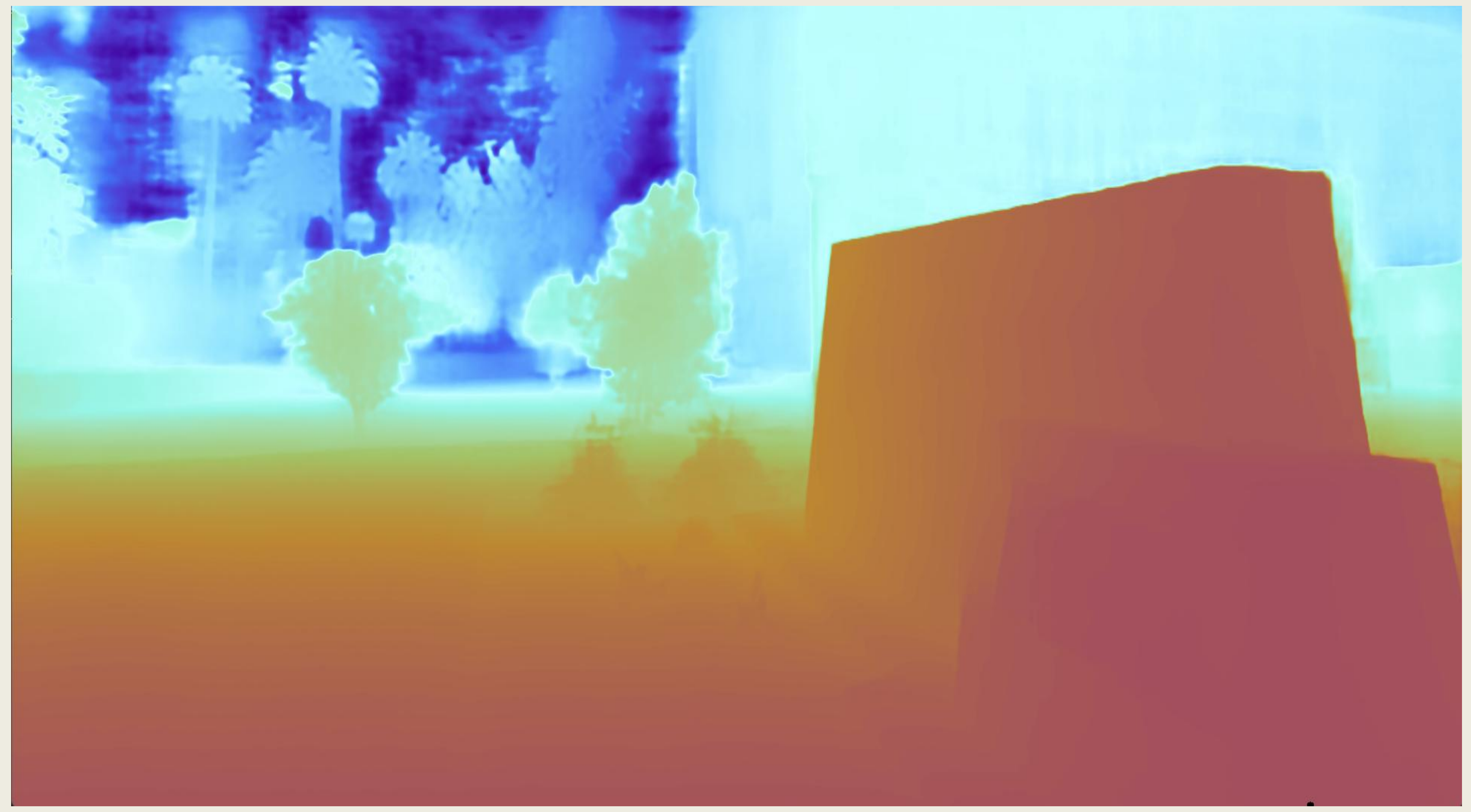
Problem Statement: Individuals with visual impairments require more advanced tools to effectively navigate their environments and avoid obstacles and potential hazards

Concept:

- Camera detects obstacle in front of vest's path
- Motors located on vest will vibrate once objected is detected within certain distance
- Controlled by Raspberry Pi and powered by 5V Li-ion battery

Final Model

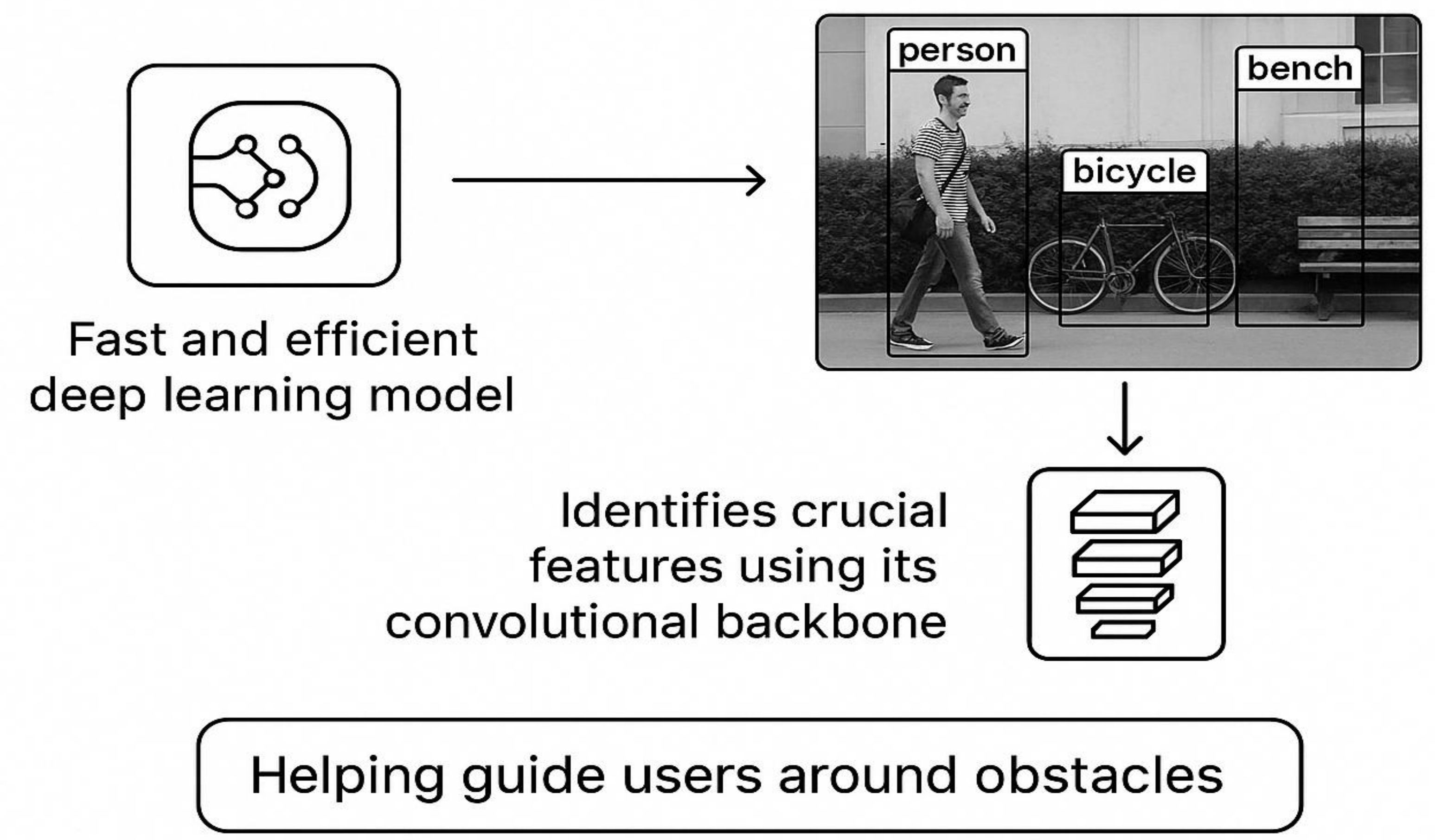
To determine how far away an object is, we use Depth Anything model. This is an AI system trained to estimate object distance even in altered lighting or blurry images. It ensures robust environmental awareness.



Computer Vision with OpenCV

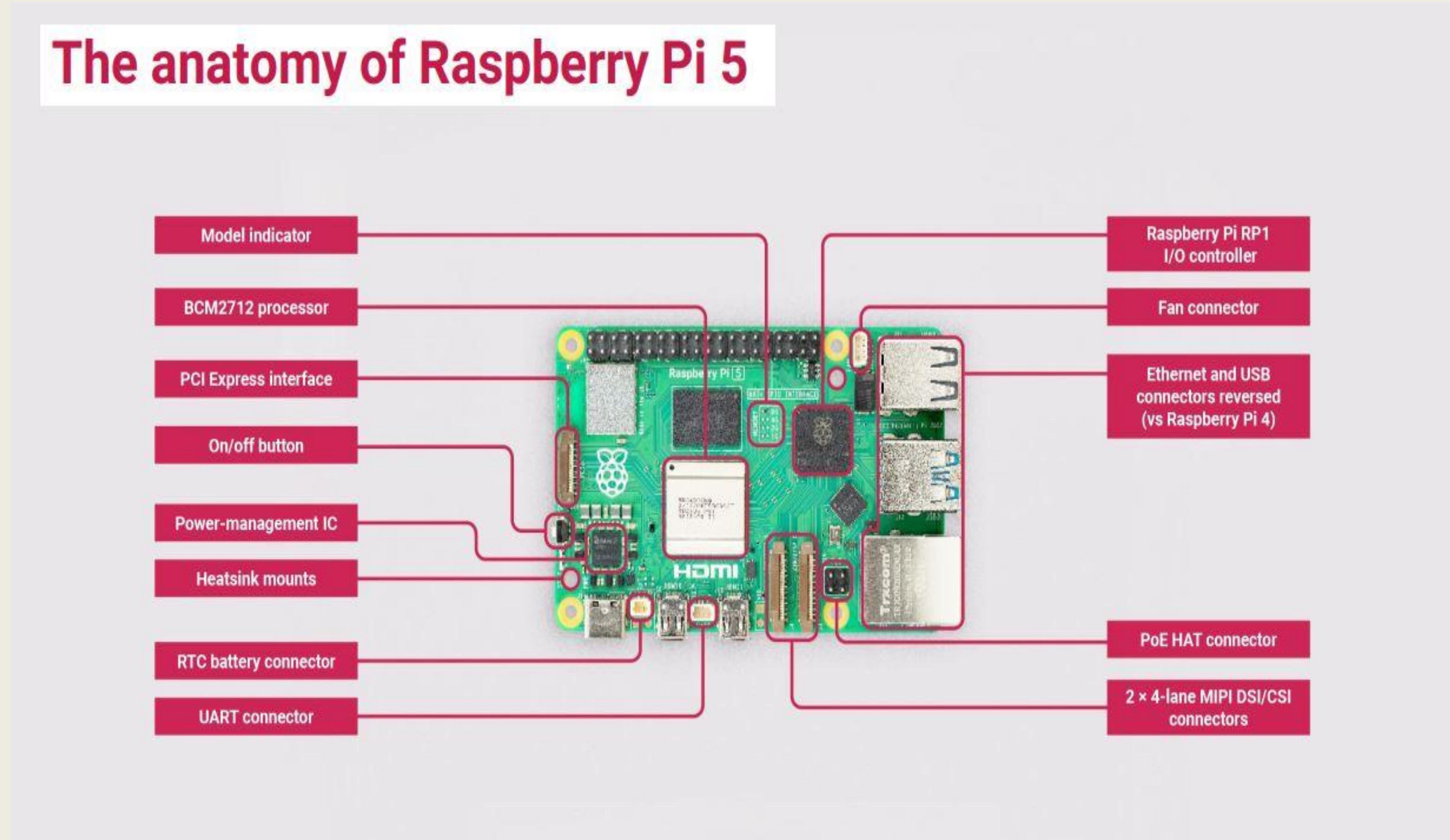
We developed a functional model using OpenCV, a powerful open-source library for object detection and image processing. Written in Python, it forms the core of our system's ability to "see" and understand the user's environment.

YOLOv11: Real-Time Object Detection



Our system integrates YOLOv11 (You Only Look Once), a fast and efficient deep learning model. YOLOv11 detects objects in real time and identifies crucial features using its convolutional backbone, helping guide users around obstacles.

The Raspberry Pi acts as the control center, hosting all models and managing hardware components. It reads visual input, processes it, and activates haptic feedback based on obstacle detection.



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