A Guiding Hand – Assistive Technology for the Blind

Dan Harvey: MSc in Artificial Intelligence
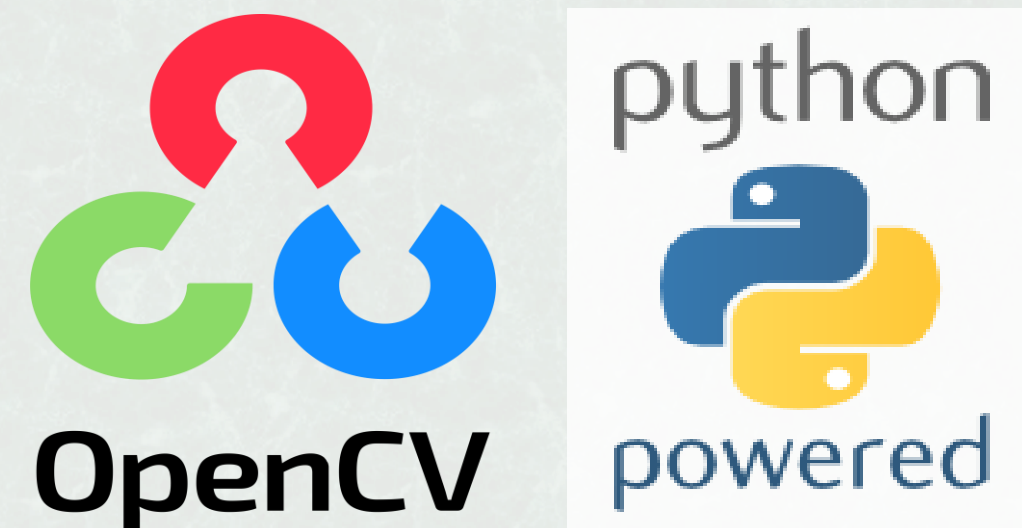
UNIVERSITY of STIRLING

The Gift of Sight is Precious

Blindness is one of the most freedom depriving conditions around. Whilst there are no medical cures, it is possible to substantially improve the quality of life for the blind and visually impaired through innovative use of artificially intelligent solutions that can see on their behalf and enable them to live with greater independence.

Hey Surah!

Surah is an artificially intelligent personal assistant for the blind and partially sighted built in Python 3.9.

Google Wavenet

MediaPipe

OpenCV

python powered
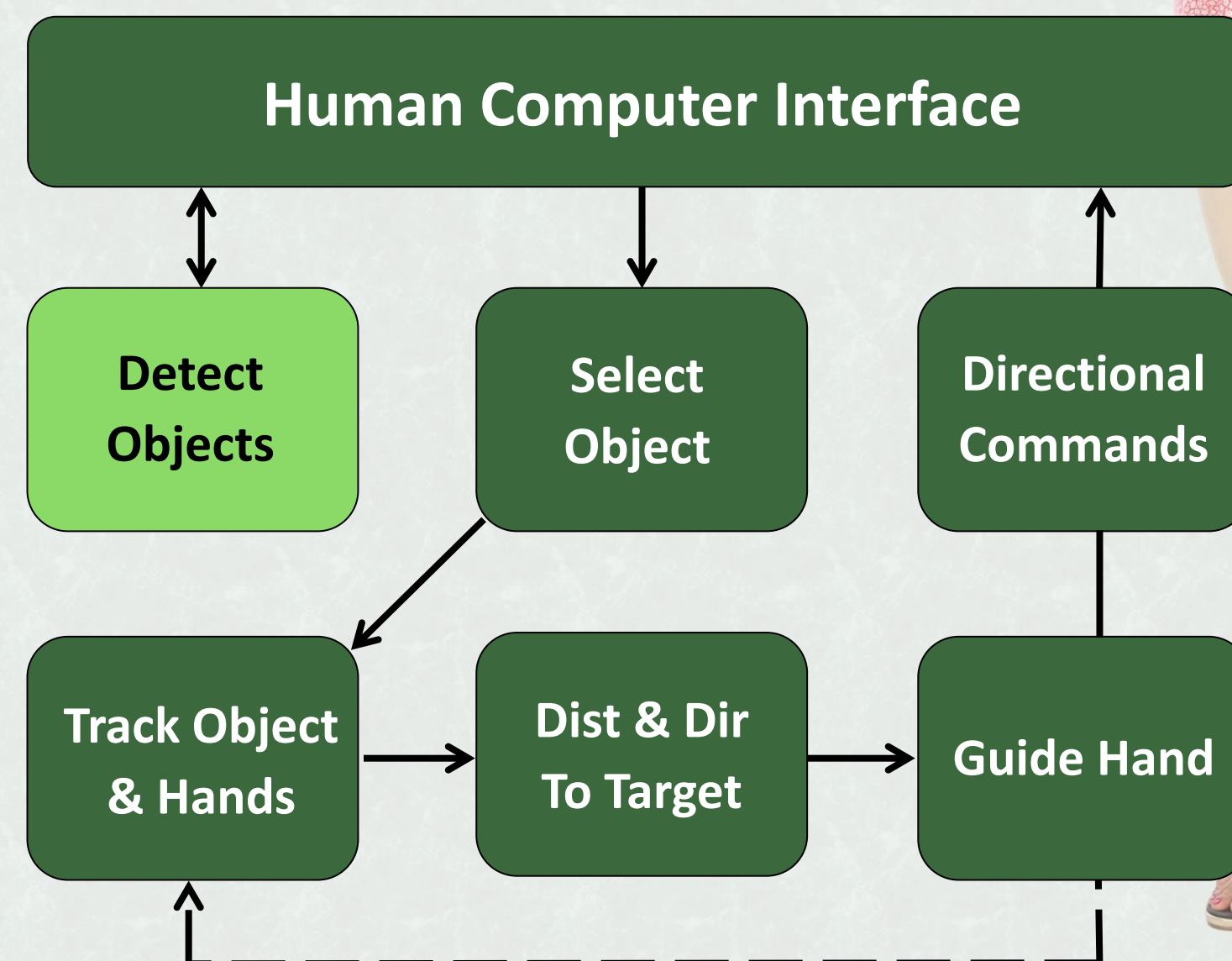
Surah Combines Multiple AI Applications

Voice Recognition & Speech Synthesis
➤ Human Computer Interface
➤ Powered by Google WaveNet
➤ Keyword dictionary provides control flow

Object Detection & Tracking
➤ Identify and track desired object
➤ Single Shot Detection (SSD)
➤ OpenCV object tracking algorithms

Basic Programmatic Flow

```
Human Computer Interface

Detect Objects     Select Object     Directional Commands

Track Object & Hands  →  Dist & Dir To Target  →  Guide Hand
```

Google MediaPipe Hand Tracking
➤ Detects and tracks upto 21 hand landmarks
➤ Open source, cross-platform, ML framework
➤ Advanced algorithm trained on 30,000 hands

Bespoke Guidance System
➤ Calculates distance to the selected object centroid for each of the 21 hand landmarks
➤ Guides hand to desired object via voice commands or wearable tech (vibration pad)

Video
FPS: 17   Distance: 178
Tracking
cup