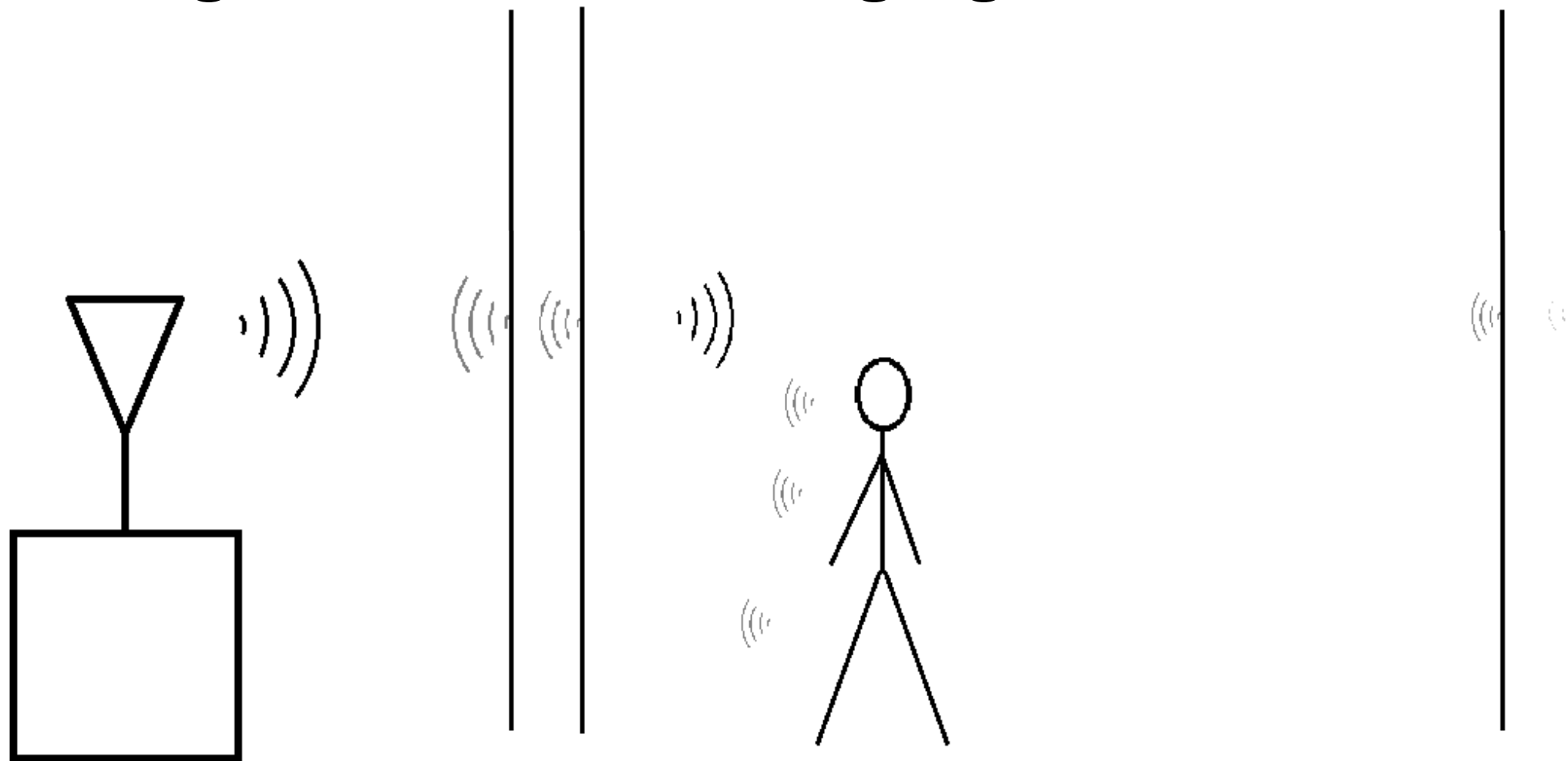


Through-Wall Radar Imaging

By: Travis Mitchell

Through-Wall Radar Imaging



Through-Wall Radar Imaging : Uses

- Military
- Police
- Healthcare

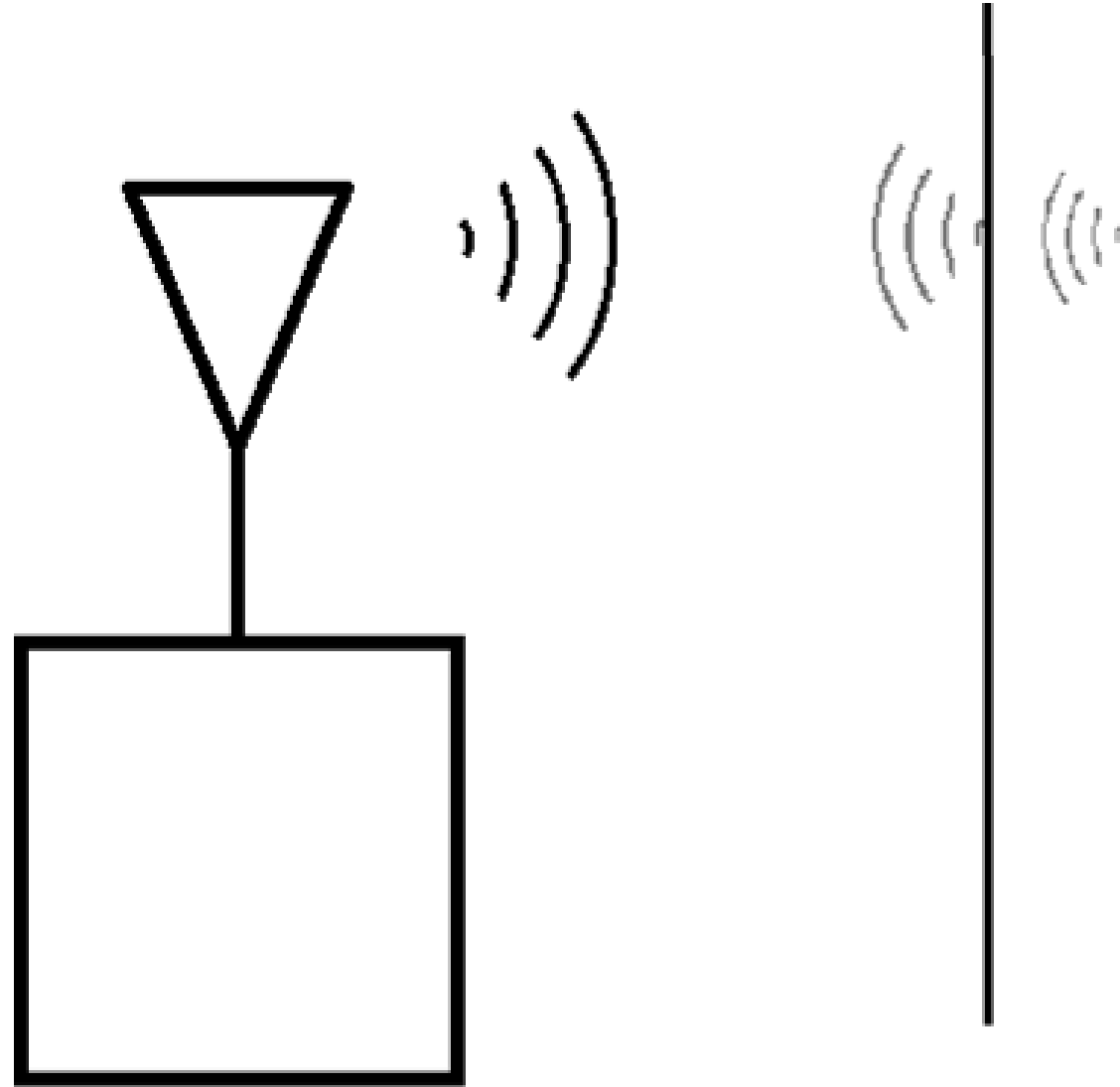
Presentation Outline

1. Background Concepts
2. Wi-Fi
3. RFID
4. 3-D

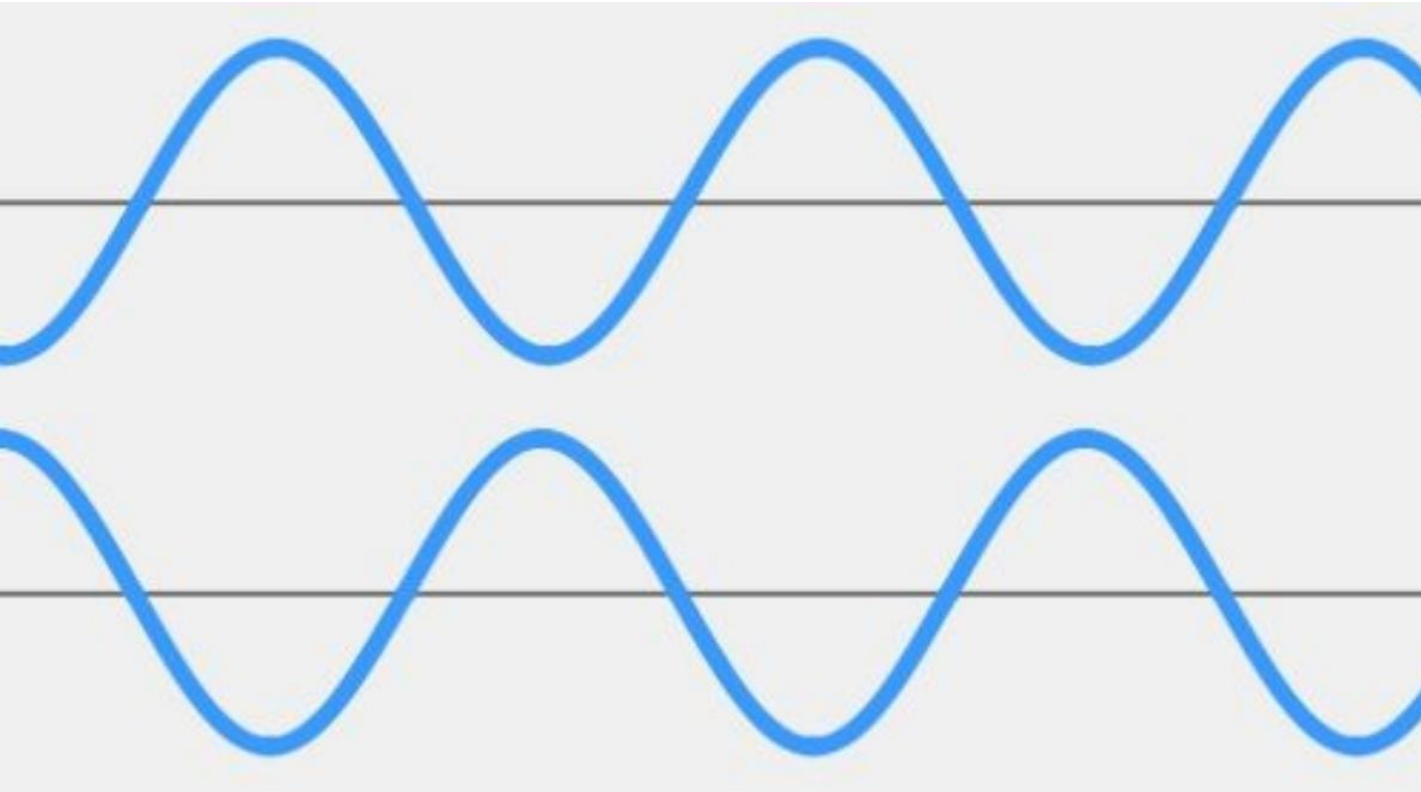
Background Concepts : The Mirror Effect



Background Concepts : The Mirror Effect



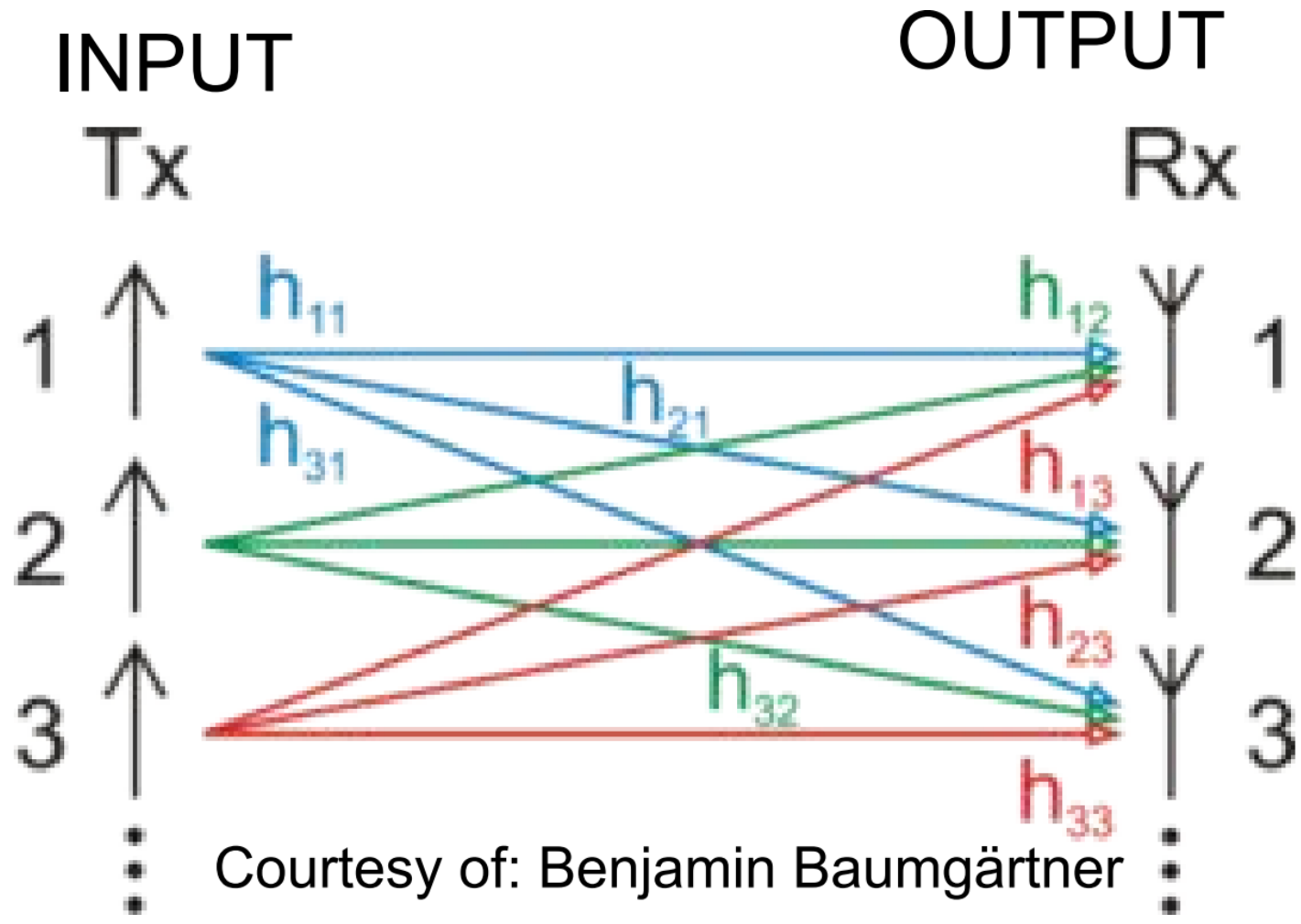
Background Concepts : Nulling



Courtesy of: Mike Elliott

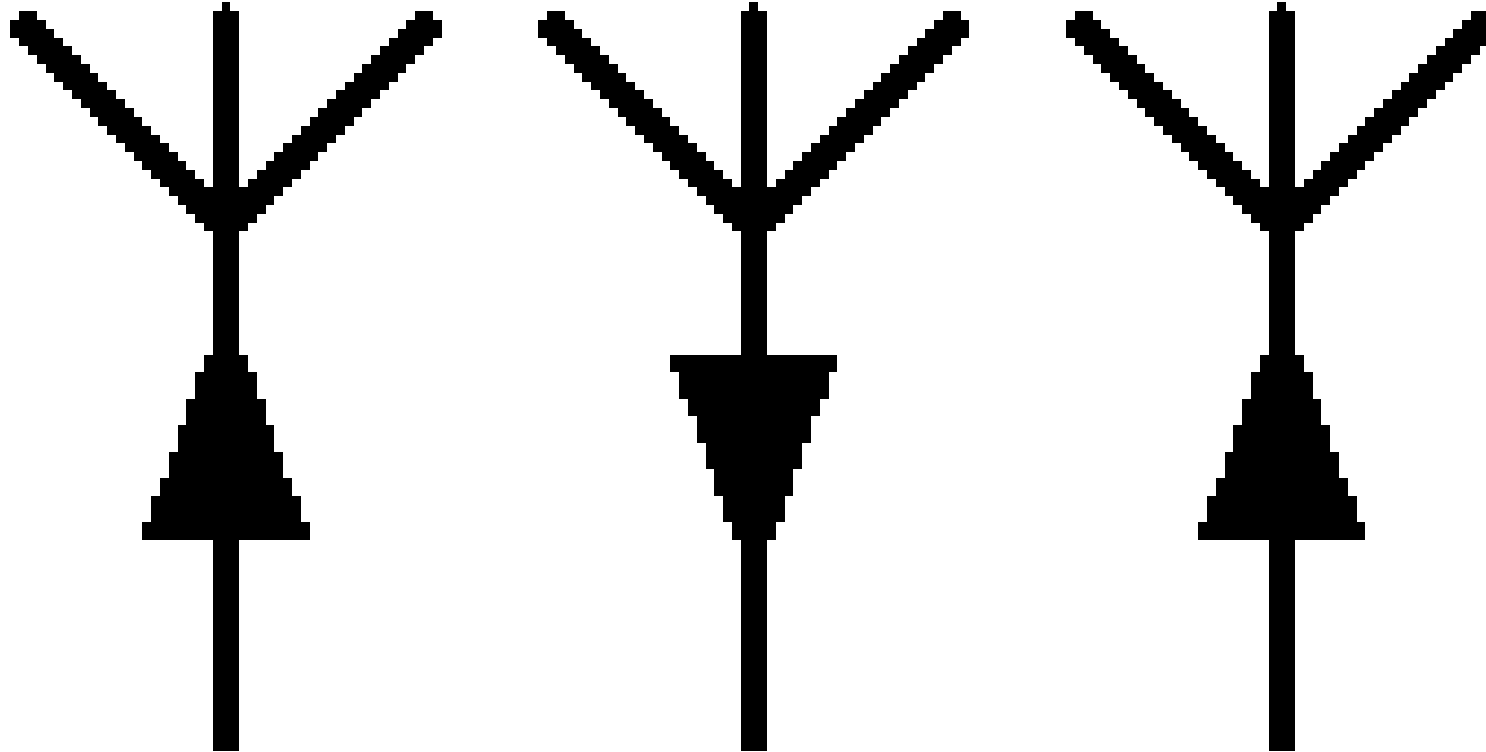


Background Concepts : MIMO Antenna

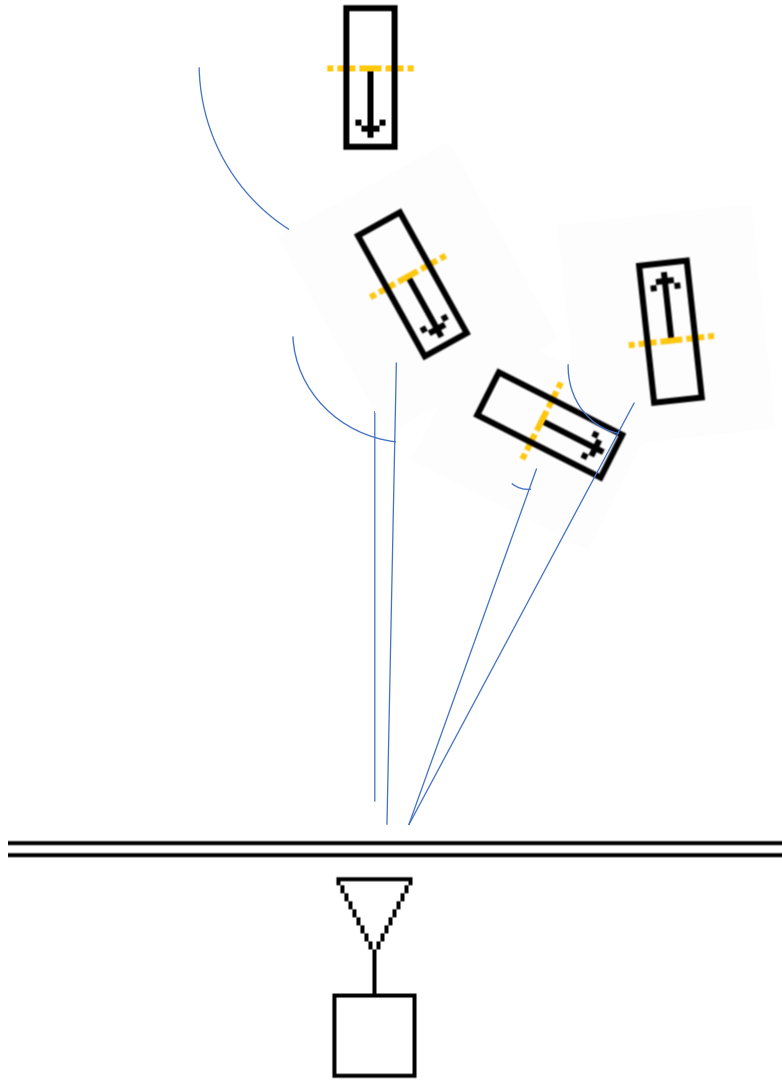


Wi-Fi, Overview

- 2 Transmit, 1 Receive



Wi-Fi



Time	Angle (degrees)
1	88
2	60
3	4
4	- 54

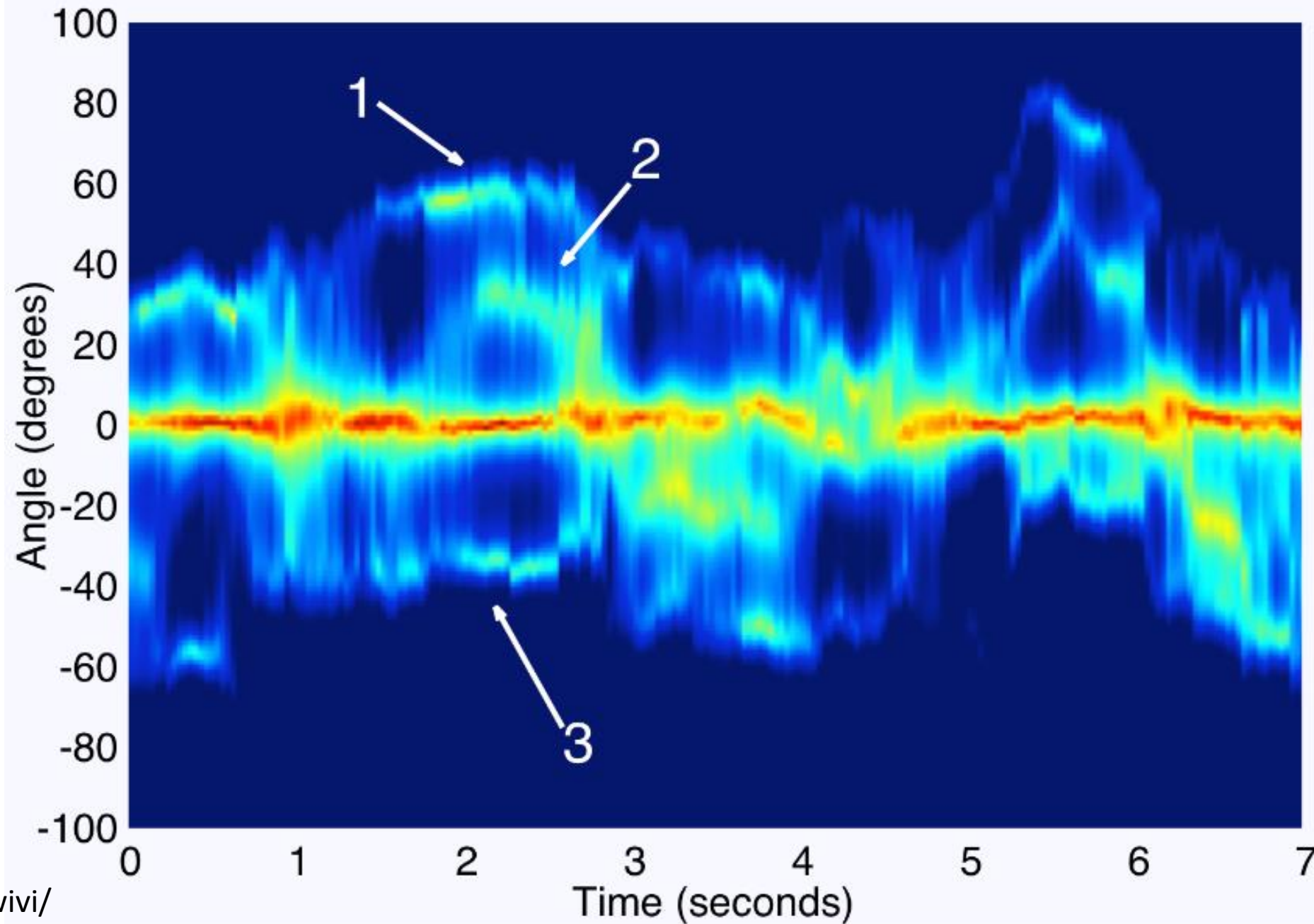
Wi-Fi

Wi-Vi: See Through Walls with Wi-Fi Signals

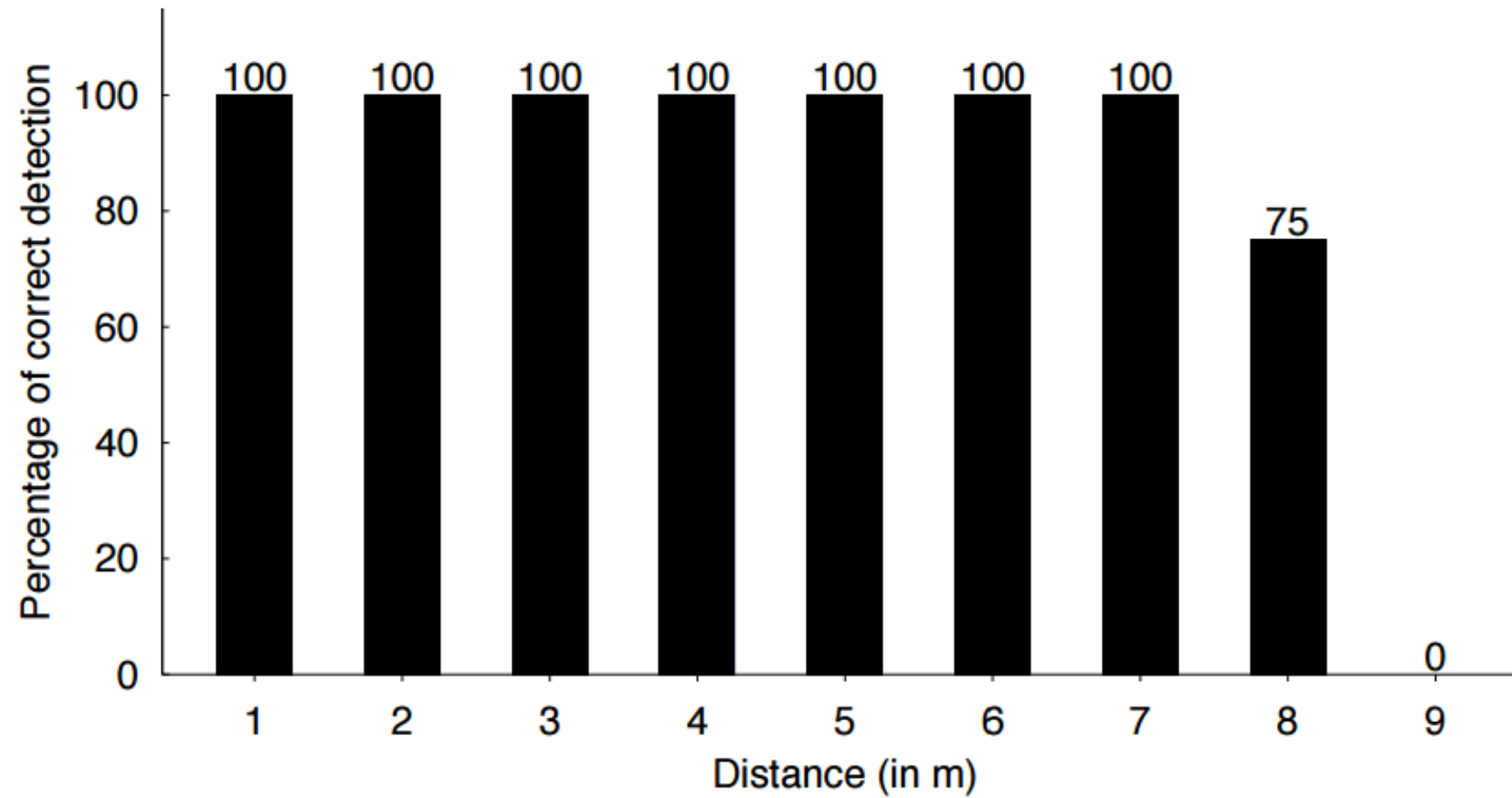


Wi-Fi, display

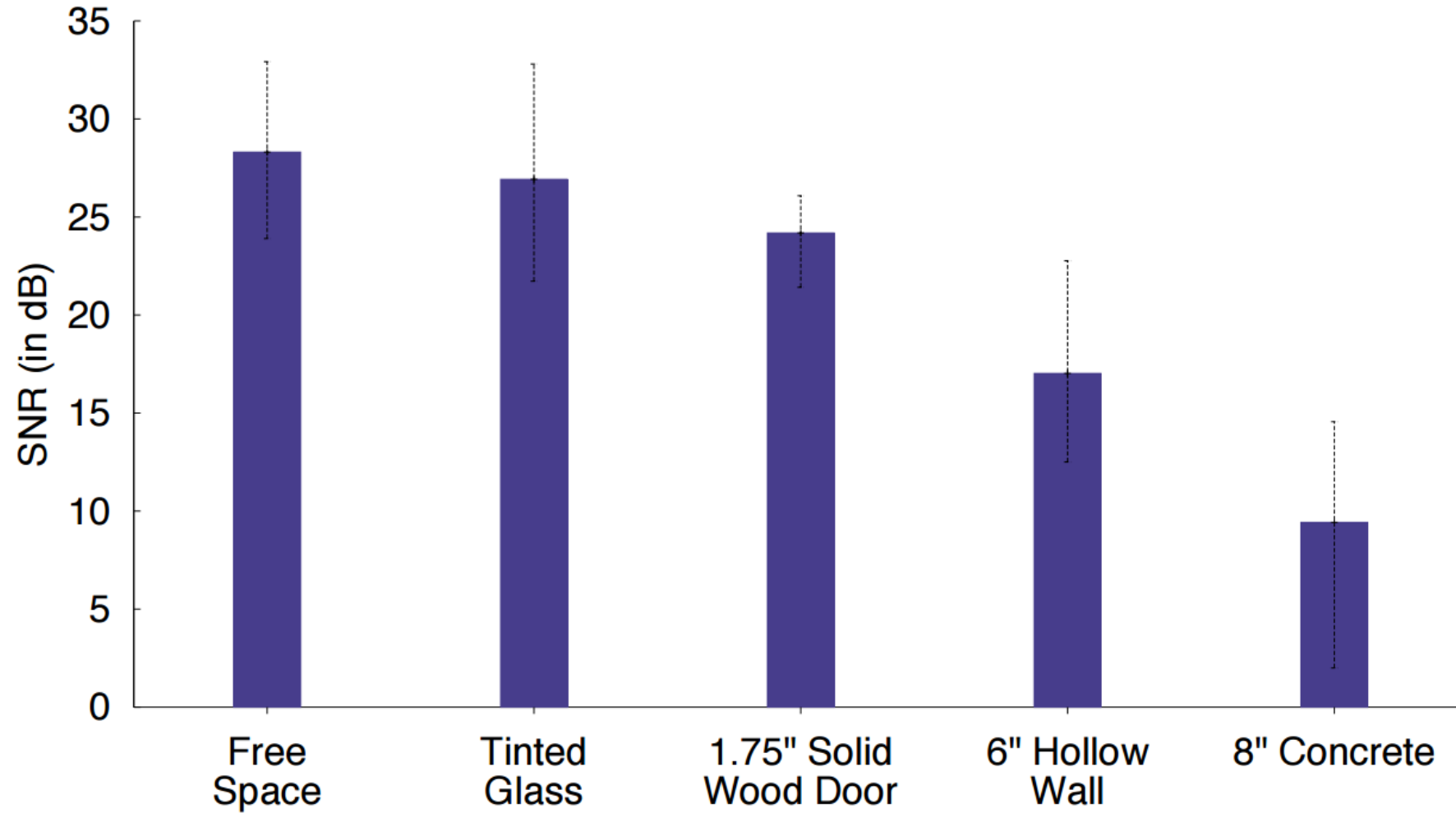
Three Moving Persons



Wi-Fi



Wi-Fi

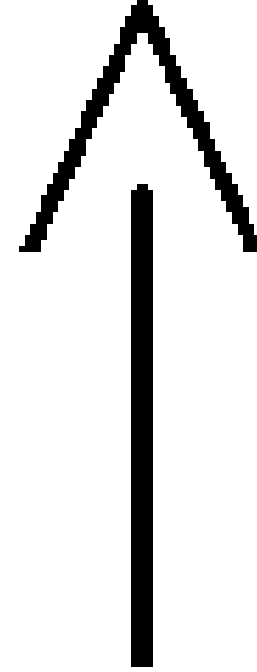
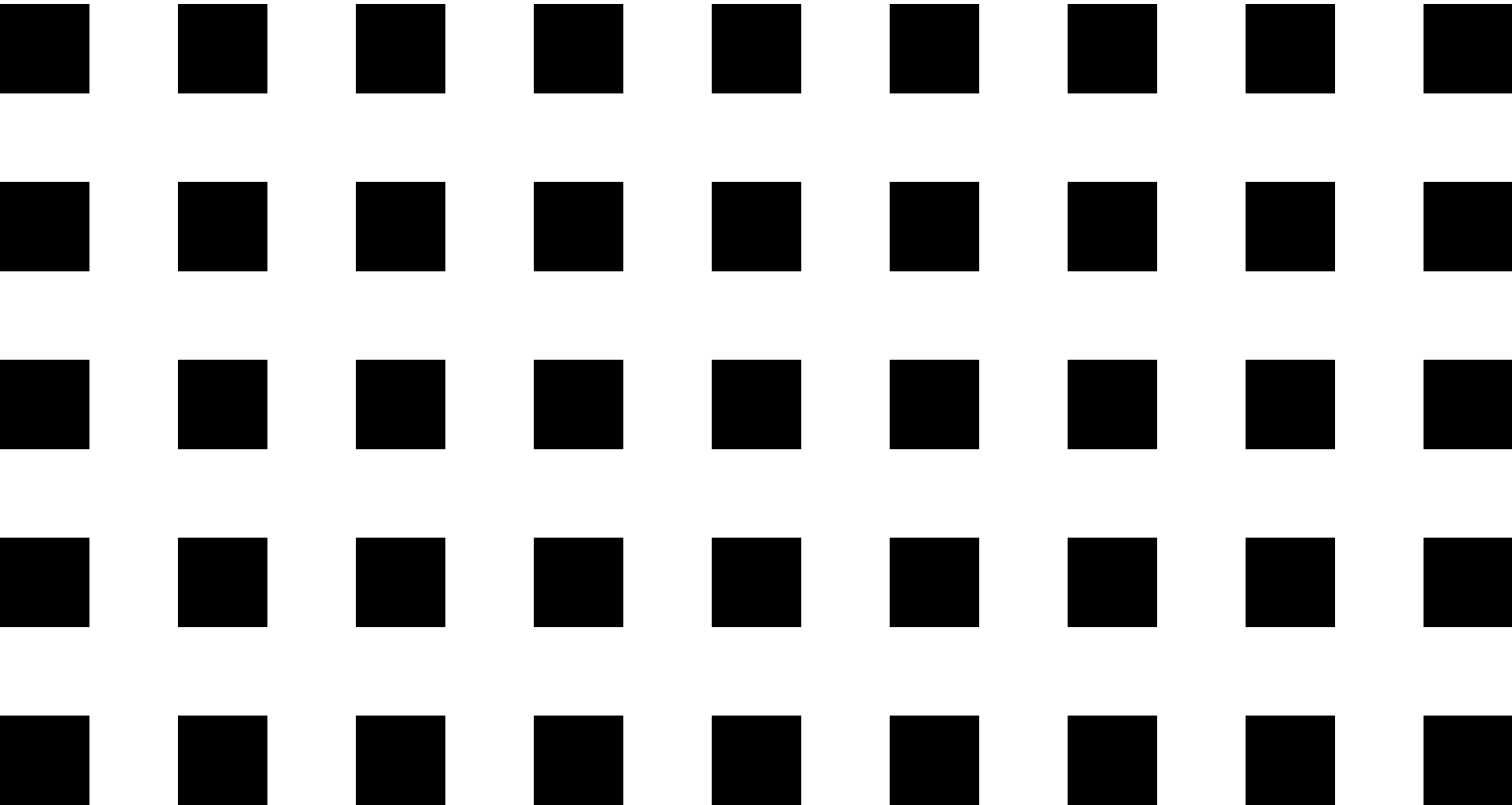


Wi-Fi

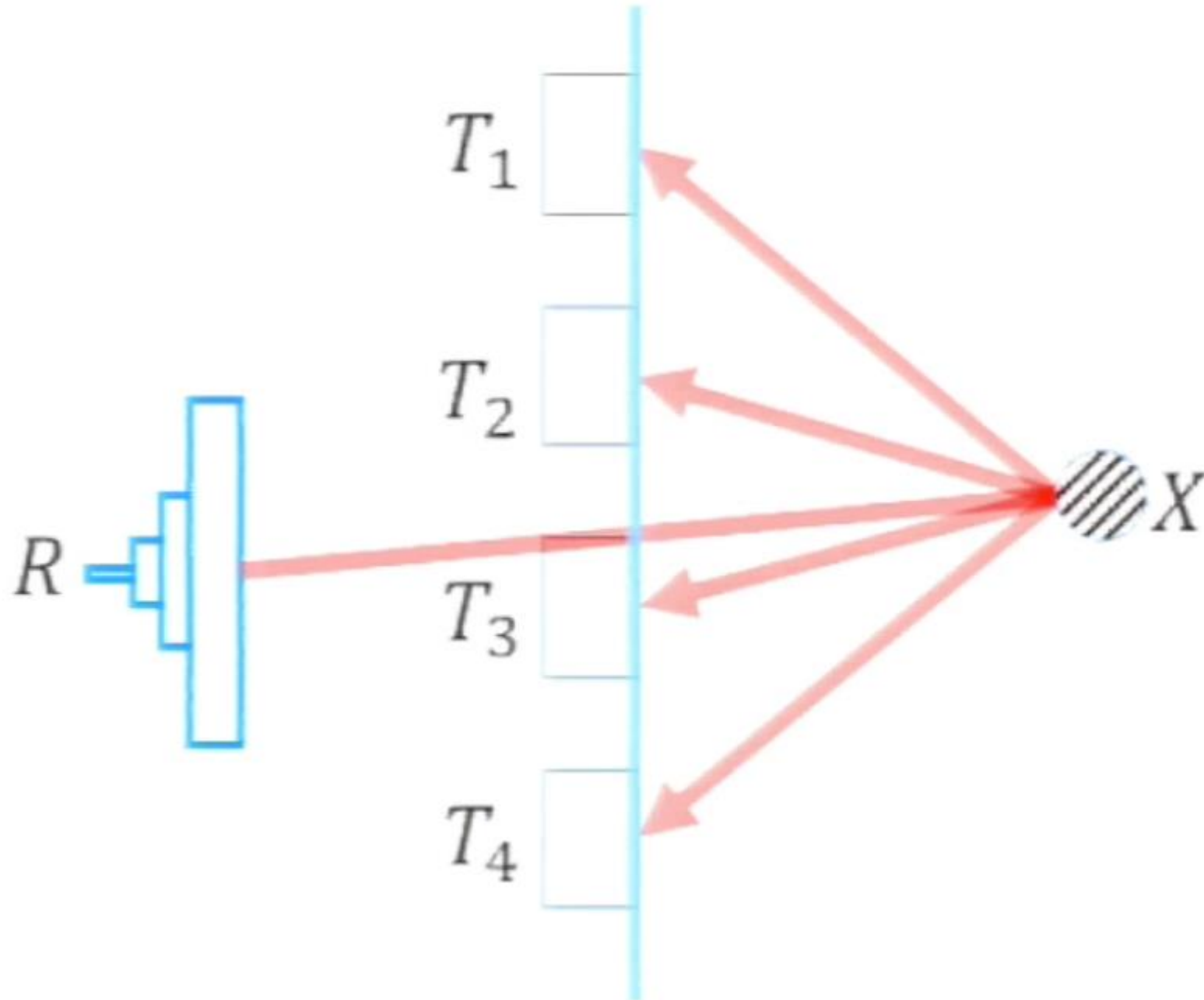
- FCC Compliant
- Up to 3 targets
- Does not need training

RFID

- 1 Input, 45 Output

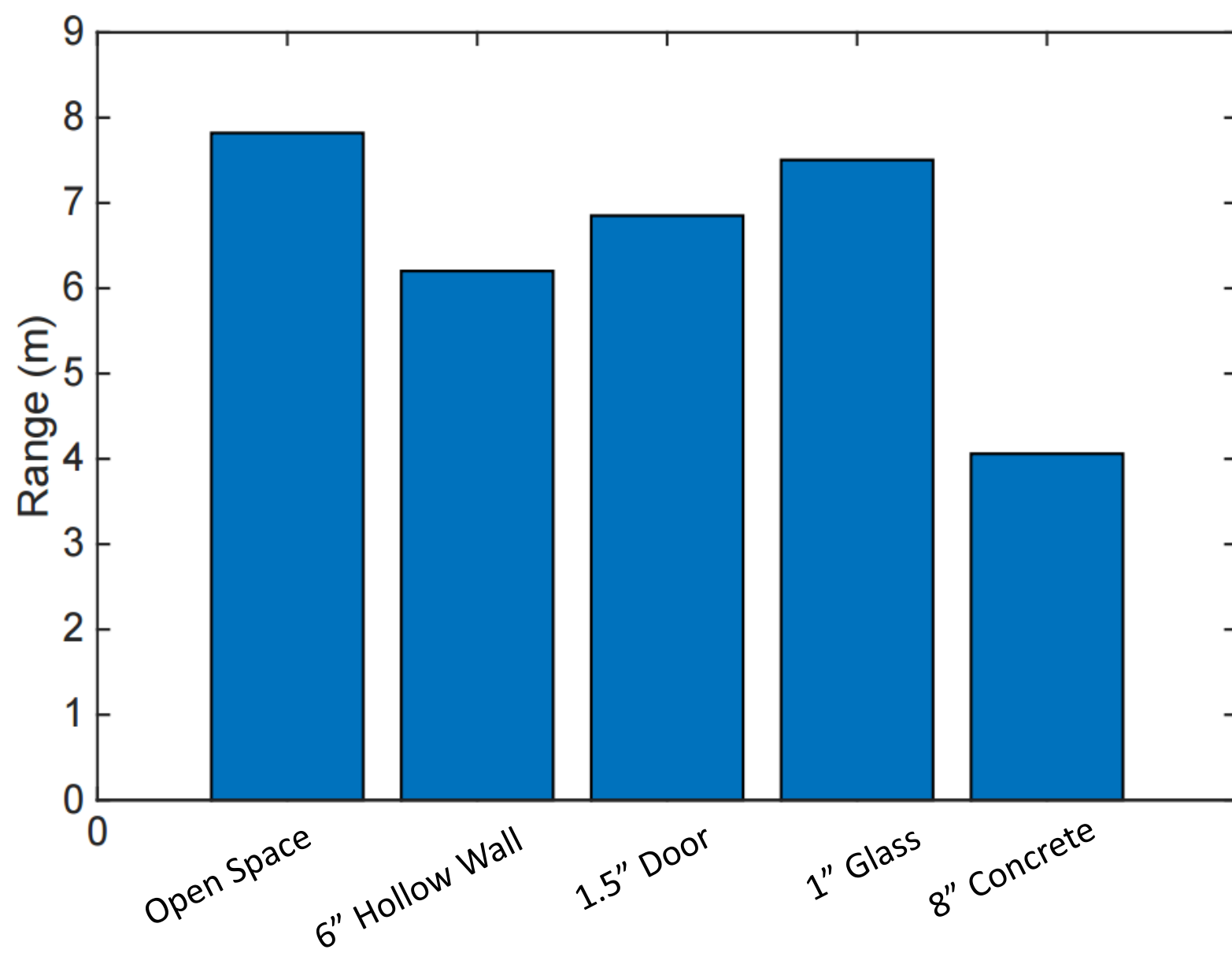


RFID



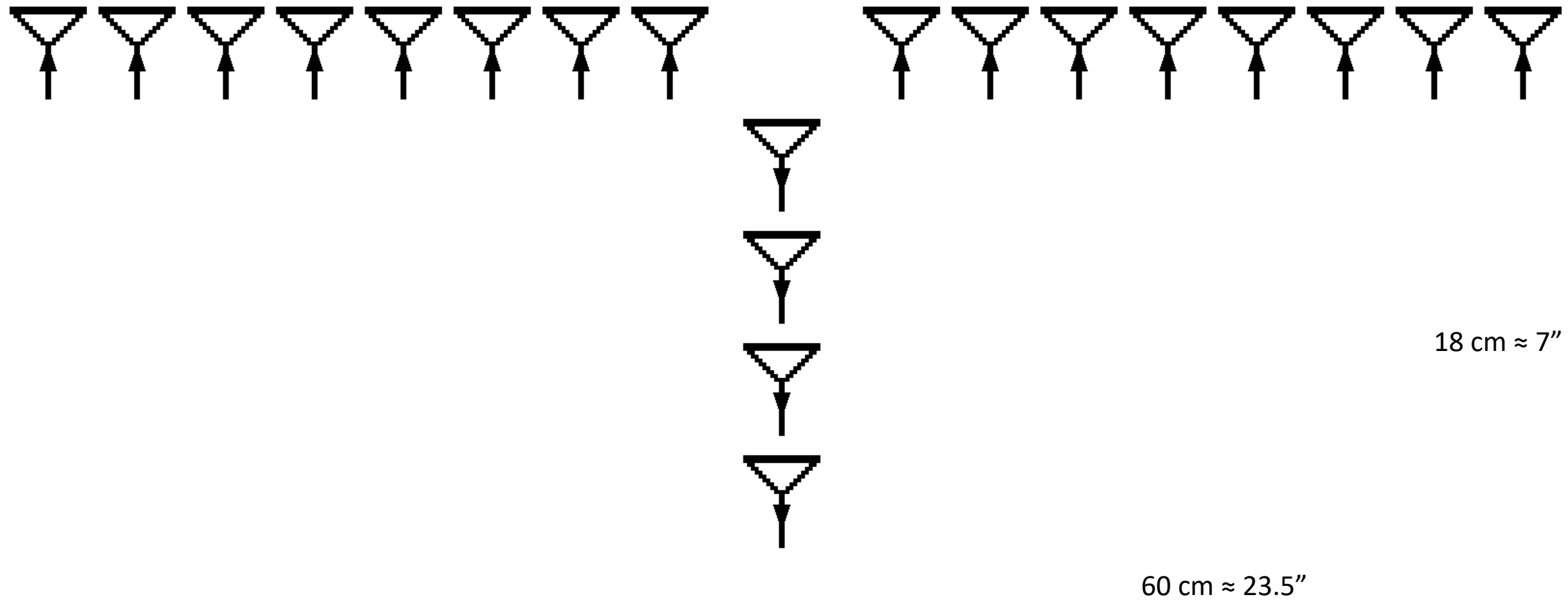
RFID

- NOT FCC COMPLIANT
 - Due to amplified signal.
- Needs to be trained, unlike the Wi-Fi

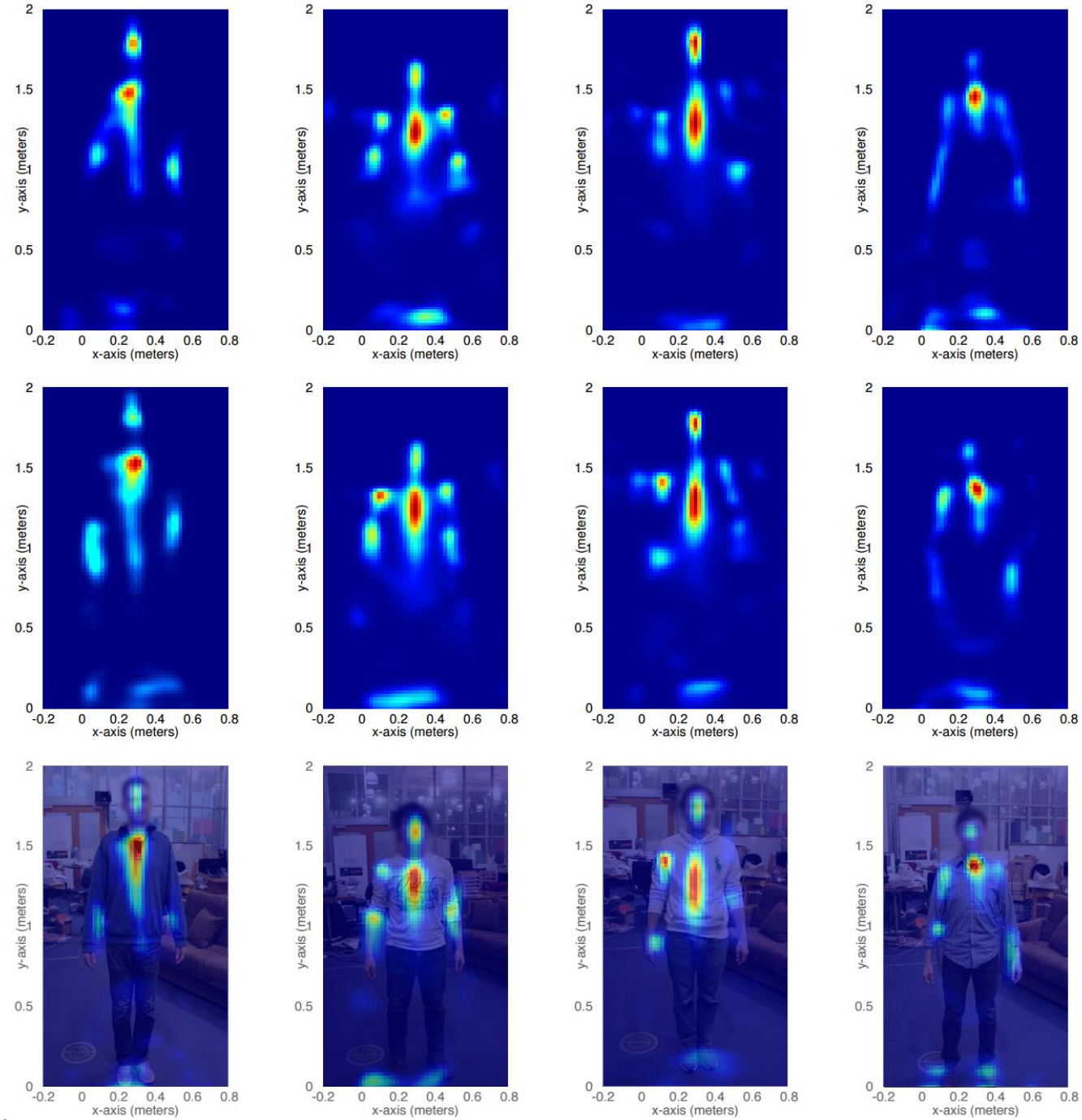


Detecting Range

3-D, array



3-D



(a) Subject A

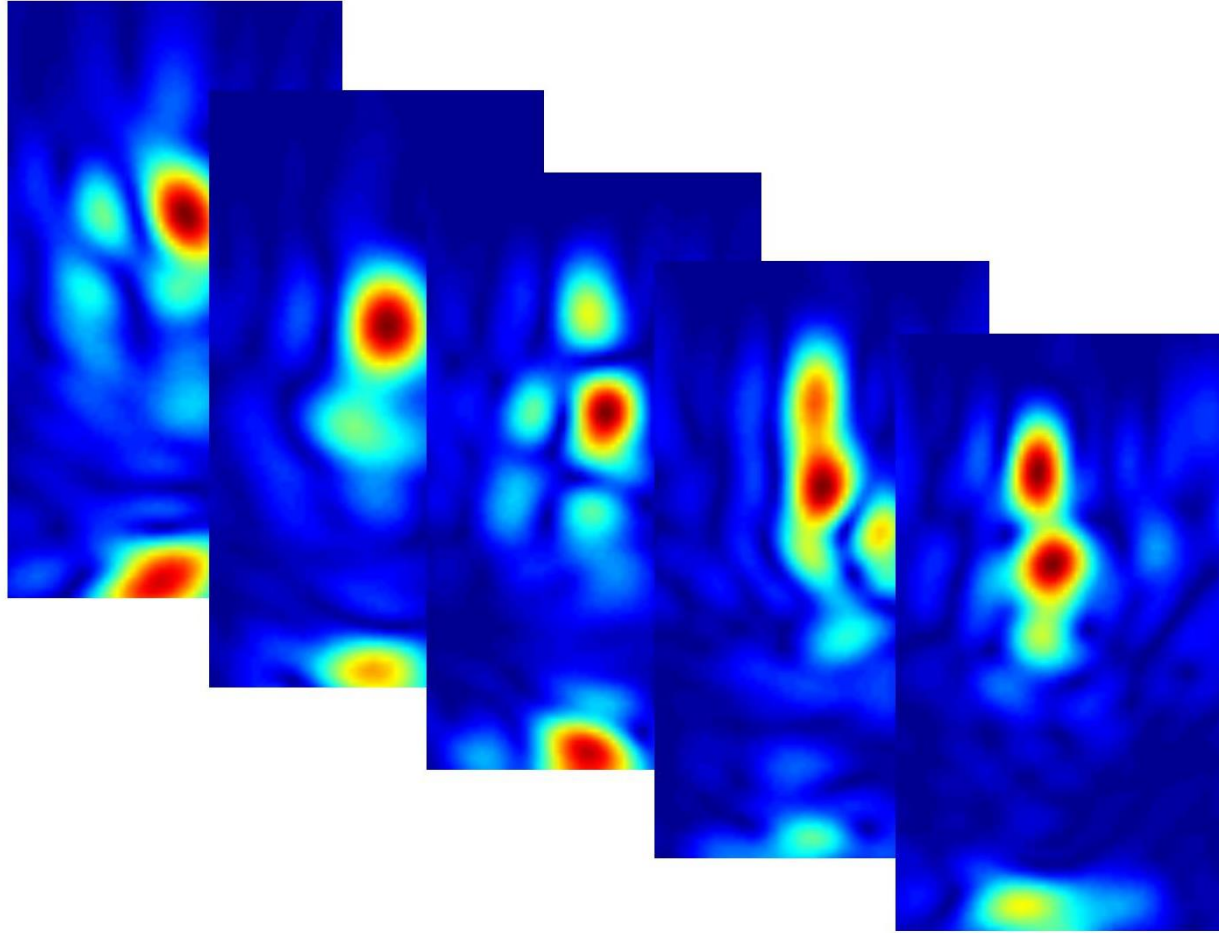
(b) Subject B

(c) Subject C

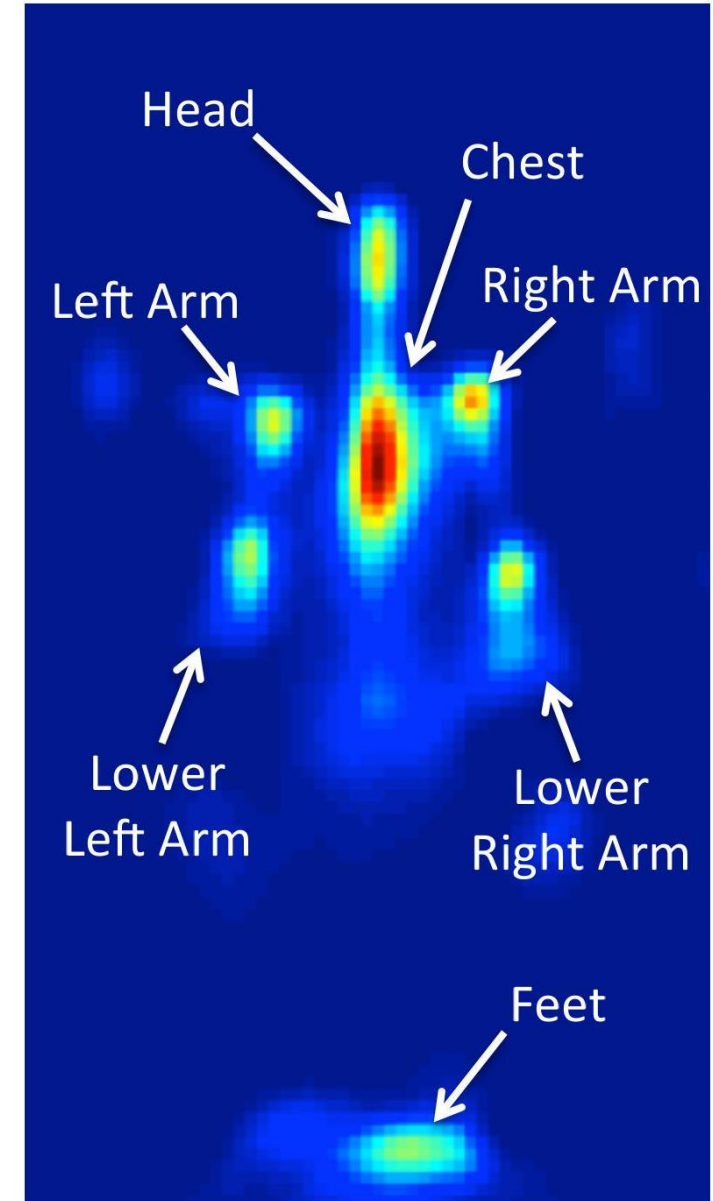
(d) Subject D

3-D

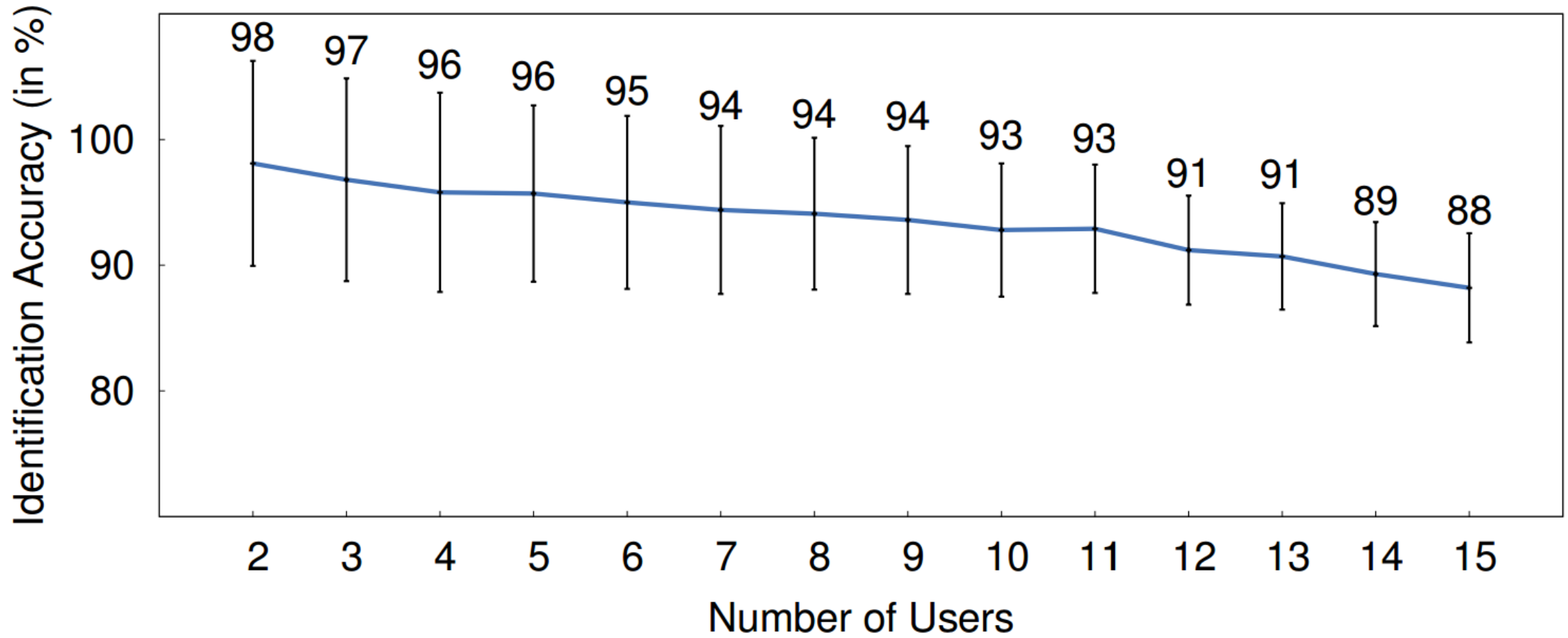
Snapshots are Collected across Time



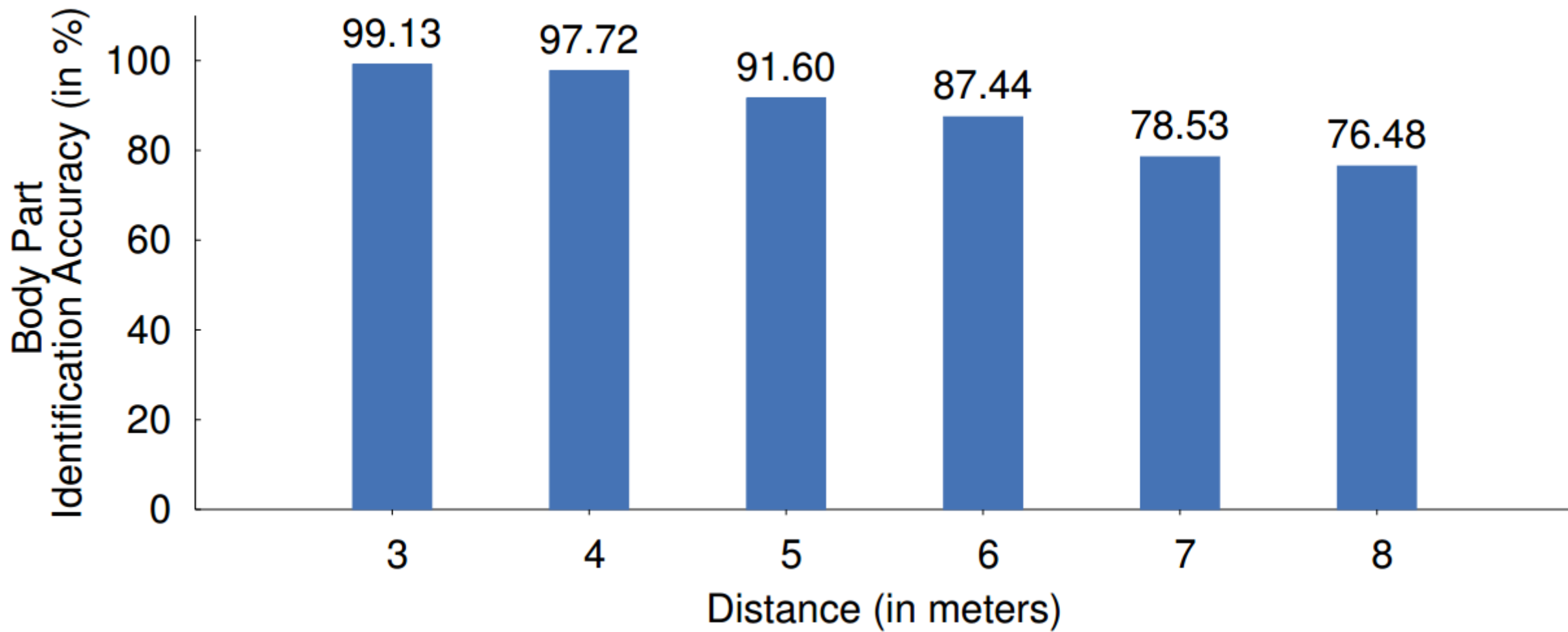
Captured Human Figure



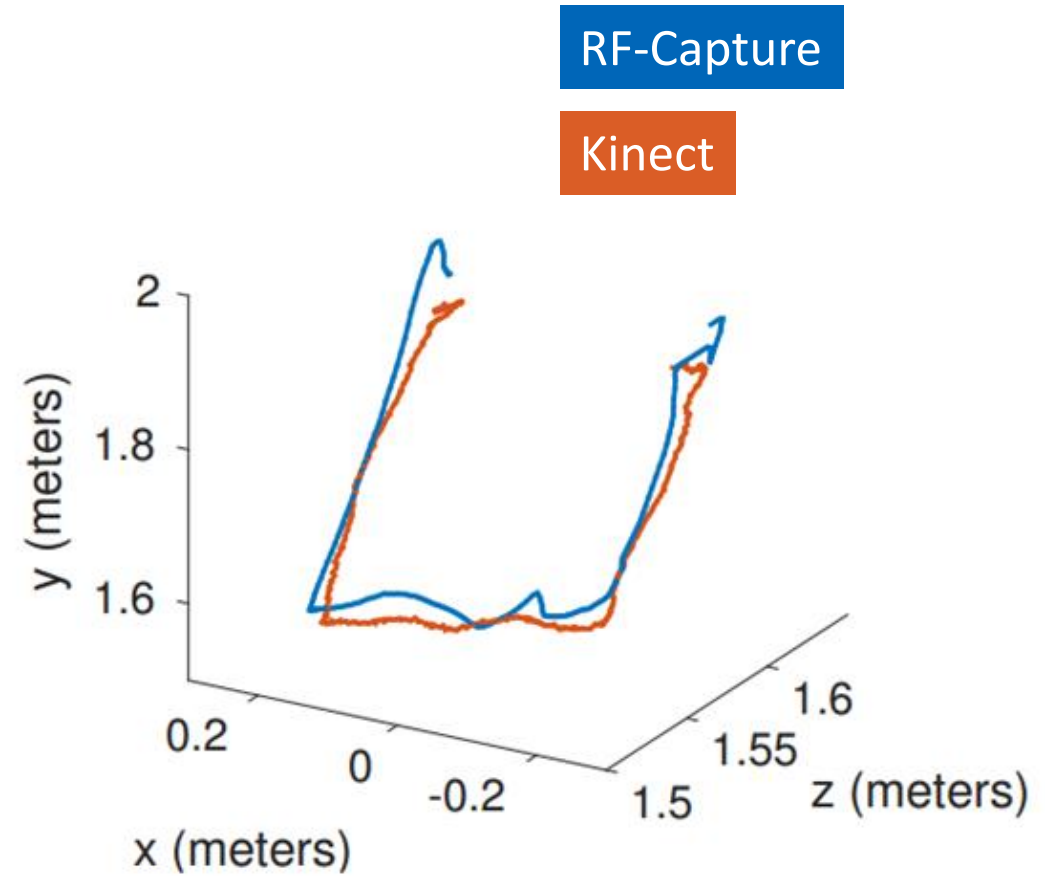
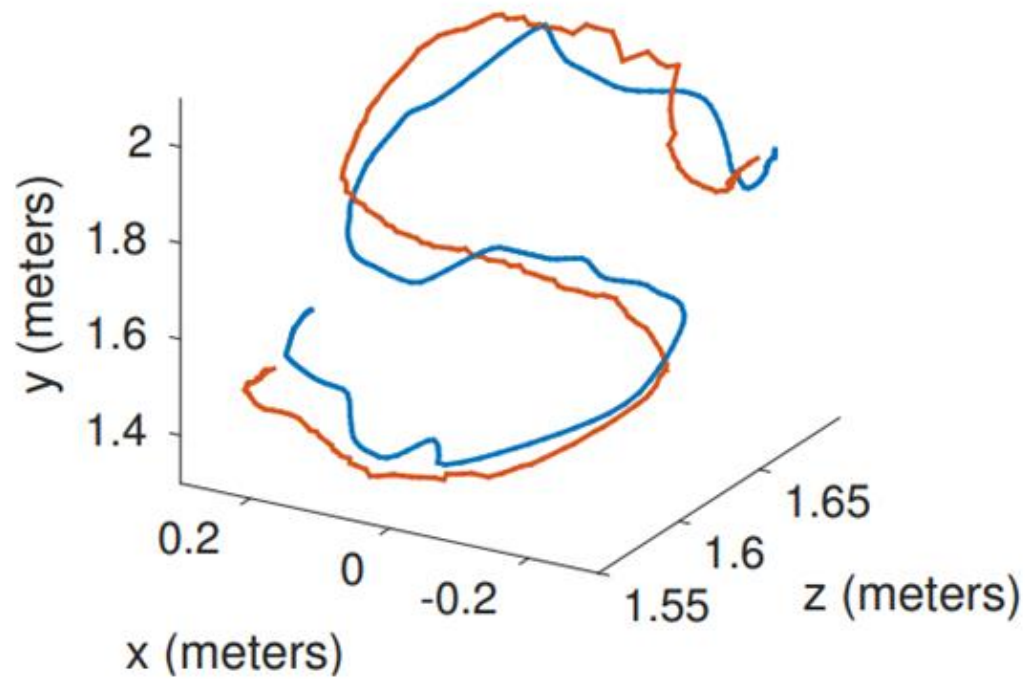
3-D



3-D



3-D



Through-Wall Radar Imaging

- Growing Field

Questions?