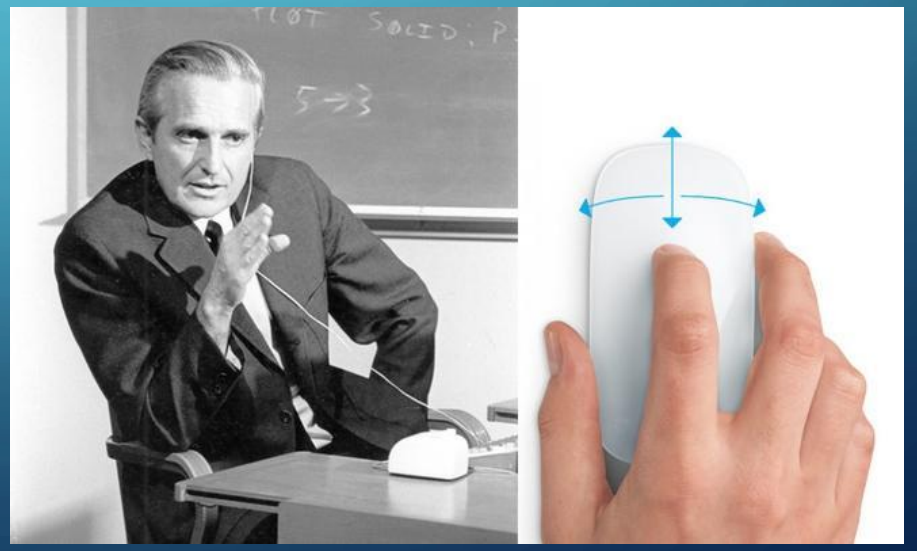
GESTURE BASED UI DEVELOPMENT

INTRODUCTION

- "*A good tool is an invisible tool. By invisible, we mean that the tool does not intrude on your consciousness; you focus on the task, not the tool.*" Mark Weiser
- On an evolutionary scale…
  - Went from keyboards to mice…

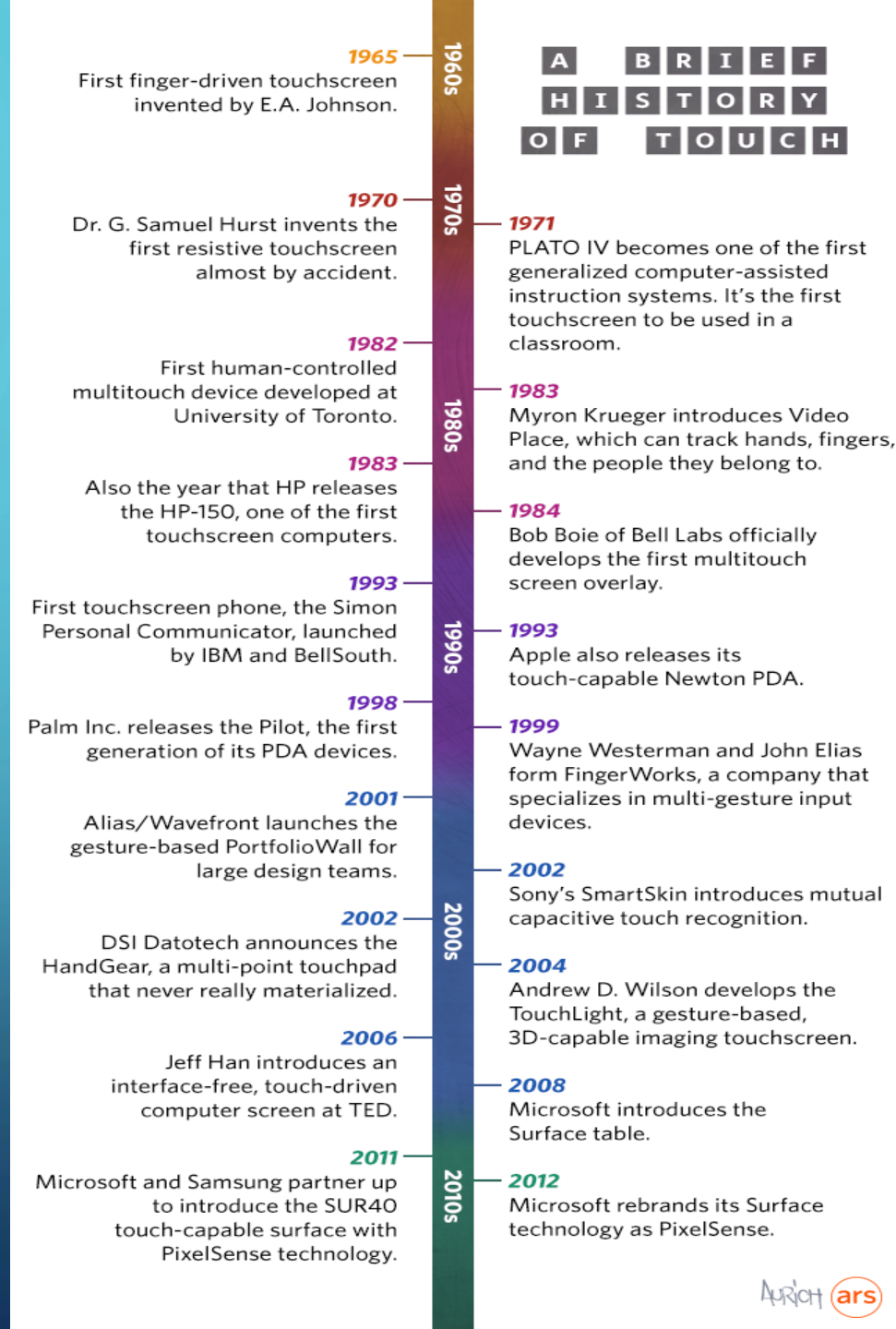


INTRODUCTION

- Mice and Keyboard are good, but what about touch
- Took time and technology, but then in 1965
  - E.A. Johnson created the touchscreen
  - Touch display – a novel input./output device for computers
  - Described the mechanism used by modern smartphones

INTRODUCTION

- Graphic taken from Ars Technica article on touchscreen technology
  - From touch displays to the Surface: A brief history of touchscreen technology
- Star Trek did not use touch screen in TOS
  - Not until TNG did it appear, paralleling the technology world advances
  - By the late 1980s, touchscreen became more available



INTRODUCTION

- Some interesting thoughts

- The best computer interface talk by James Patten

INTRODUCTION

- HCI really
- Want to look at the state of play (you probably already know this but …)
- Acknowledging that gestures are here to stay and how to design with them
- Gesture rich devices, IoT might be worth a look
- Using webcams (maybe – will see how other things go)
  - I would mention Google Glass, but maybe not…

INTRODUCTION

- Kinect – the workspace, recognition, skeletons

- Hololens
- Myo Armband – setting up and using the gestures with C# and visual studio
- Speech systems (cos that's where the trouble starts)
- Future possibilities (check your local cinema now)

- Skinput – Microsoft Research
- Cultures and gestures

INTRODUCTION

- Would have used Kinect, Myo, Leap, Oculus Quest, Neurosky
- Am willing to make them available to you – can arrange collection at appropriate times for groups to work with
- Not as much pass the parcel as previous years

GESTURE RECOGNITION

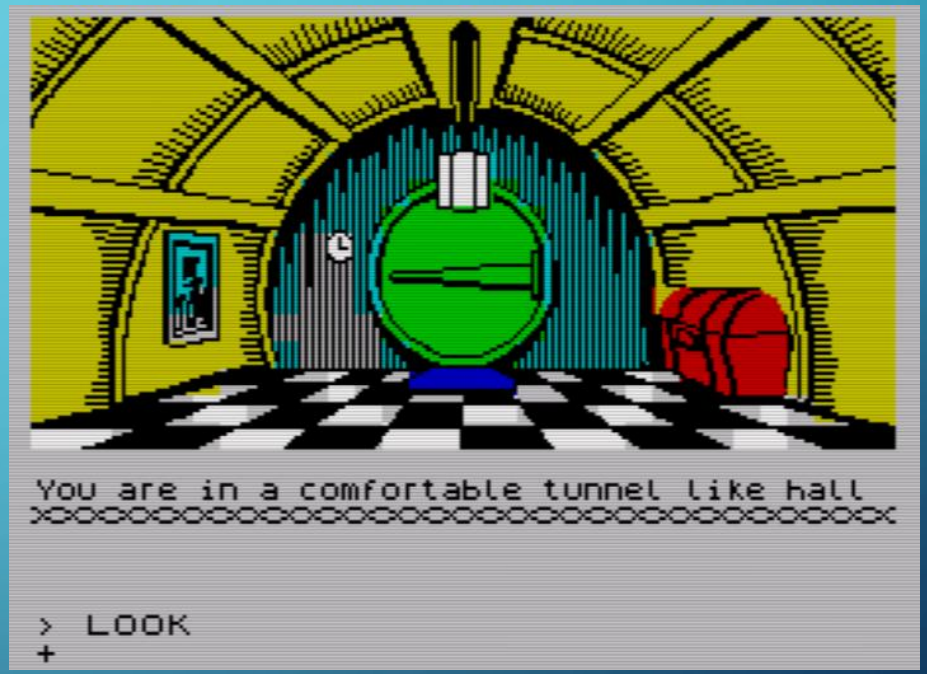
- Topic with the goal of interpreting human gestures via mathematical algorithms
  - Commonly originate from the face or hand
  - Lots of research on facial recognition
  - Much current research on emotion recognition from face and hand gestures
- Has been some research done on interpreting sign language
  - Early work required gloves to help the camera recognition
- Posture, gait and human behaviours are also part of the field of study

GESTURE RECOGNITION

- Part of communication for us so why not use it to communicate with machines and mechanical devices
  - (or just use the devices to communicate with each other)
  - Can computers understand human body language and make life better?
  - Moving to a more natural interface
- Jeff Han at TED talked multi touch in 2006
  - Minority Report was released in 2002
    - (that's from the TV series)

GESTURE RECOGNITION

- Sometimes though, it feels more like this…



GESTURE RECOGNITION

- Co-speech gestures & Emblems
- Co-speech – facilitate the understanding of spoken language
  - Not meant to be produced without speech
- 4 types – Iconic, Diectic (pointing), Metaphoric, Beat
  - Iconic – represent object attributes, spatial relationships and actions (interpretative dance really, describe a tall person, a lazy river)
  - Deictic – connect speech to another idea, object of location (point at someone you are talking about), used often by children
  - Metaphoric – put an abstract idea into a more literal form
  - Beat – rhythm of speech with no semantic meaning (someone using his hand when talking)

GESTURE RECOGNITION

- Emblems
  - Are capable of conveying meaning independent of speech

GESTURE RECOGNITION

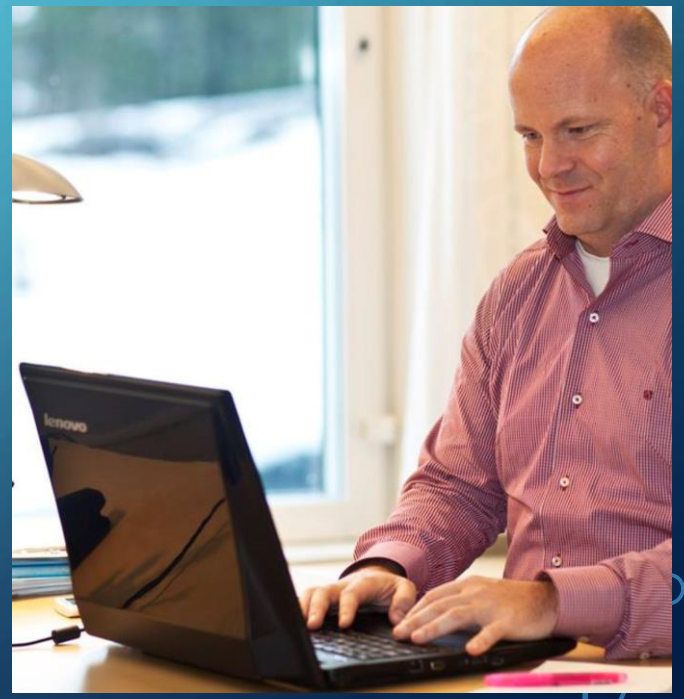
- On touch screen
  - Interact with controls and applications more intuitively than a mouse or cursor based UI
  - Worked on smartphones, tablets for some time now
    - Mitsubishi Diamond Touch (2005)
      - https://www.youtube.com/watch?v=YLM8HUL330w
    - Surface (SecondLight)
      - https://www.youtube.com/watch?v=XfzpIPIrzjY
  - All based around touch input
  - Have a check on Skinput research from Microsoft
    - https://www.youtube.com/watch?v=nMj6aQe6CLY
    - Acoustic transmission via the skin as a UI
      - Location of finger taps on the arm and hand are the input signals (uses an array of sensors in an armband to read and interpret)

GESTURE RECOGNITION

- Track user motions and translate these to instructions
  - Wii, Playstation Move use controller based accelerometers and gyroscopes to sense tilting, rotation and acceleration
- Move to the VR space now with Vive, Oculus
  - https://www.youtube.com/watch?v=WA_PSZj1sCs
- Natural User Interface uses a camera and microphones (Kinect) to allow interaction through body motion, gesture and speech commands

GESTURE RECOGNITION

- Gaze tracking for eye movements as input
  - Immersive Labs intelligent interactive billboard signage
    - https://www.youtube.com/watch?time_continue=5&v=6-ZLw2Q7U2M
  - Eye controlled laptop from Lenovo in 2011
    - https://www.youtube.com/watch?v=GFwhx0Wy8PI
    - Henrik Eskilsson, CEO or Tobii



GESTURE RECOGNITION

- Has been incorporated to cars and bike over the last few years
  - BMW Vision Next100 Bike
  - https://www.youtube.com/watch?v=oW0ShDRggts
  - BMW Dashboard (2016 7 series)
  - https://www.youtube.com/watch?v=wqvAPskg_k0

GESTURE RECOGNITION

- Brain machine interface reads neural signals and uses programs to translate
  - Each specific thought has its own pattern and electric signal
  - Neurosky Mindwave kits
- Using your brain to throw trucks
  - https://www.youtube.com/watch?v=5q3htmeYVpU
- NUI – described in 2008 as the next evolutionary stage in computing
- Check out "The Sixth Sense" on
  - https://www.ted.com/talks/pattie_maes_demos_the_sixth_sense

GESTURE TYPES

- Look on Wikipedia for a pretty extensive list of gestures and their associated meanings in parts of the world
  - https://en.wikipedia.org/wiki/List_of_gestures
- Online – direct manipulation gestures, scale, pinch, zoom etc
- Offline – processed after user interaction with the object (menu activation by holding hand up or executing a predefined gesture)

GESTURES

- How many are available?
  - Tap, double tap, Drag
  - Flick, pinch, zoom (spread)
  - Press, press and tap, press and drag
  - Rotate

DON'T FORGET THE MOVIES

- Iron Man – personal assistants with sarcasm as a feature
- Better than the salt and pepper shakers of Star Trek ☺
- http://blog.keyvan.eu/post/54582800992/glows-50-years-of-visionary-sci-fi-computer