Smartphone-based Gestural Recognition

Ben Alun-Jones

Human Computer interaction

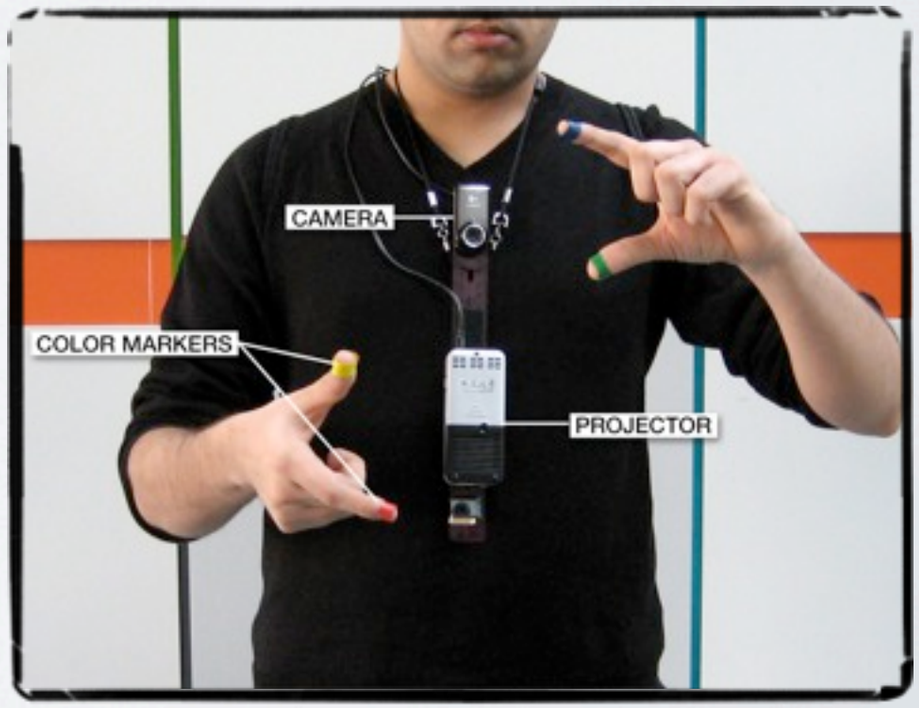
- Largely defined by Xerox-Parc (GUI, mouse/keyboard)
- Changes in technology allow us to consider new forms of interaction
- New forms possible...(but are they necessary?)

Gestures

- We **live** in a 3D environment
- Gesturing is a natural part of how we communicate
  - Not accounted for by existing HCI paradigms
- New interfaces need to become more natural
  - Human Computer Symbiosis

Existing work in the Field

- Computer games controllers
  - Nintendo Wii
  - Playstation Move
  - Microsoft's Project Natal
- g-speak operating environment
- SixthSense
- Stereo Cameras/Computer Vision

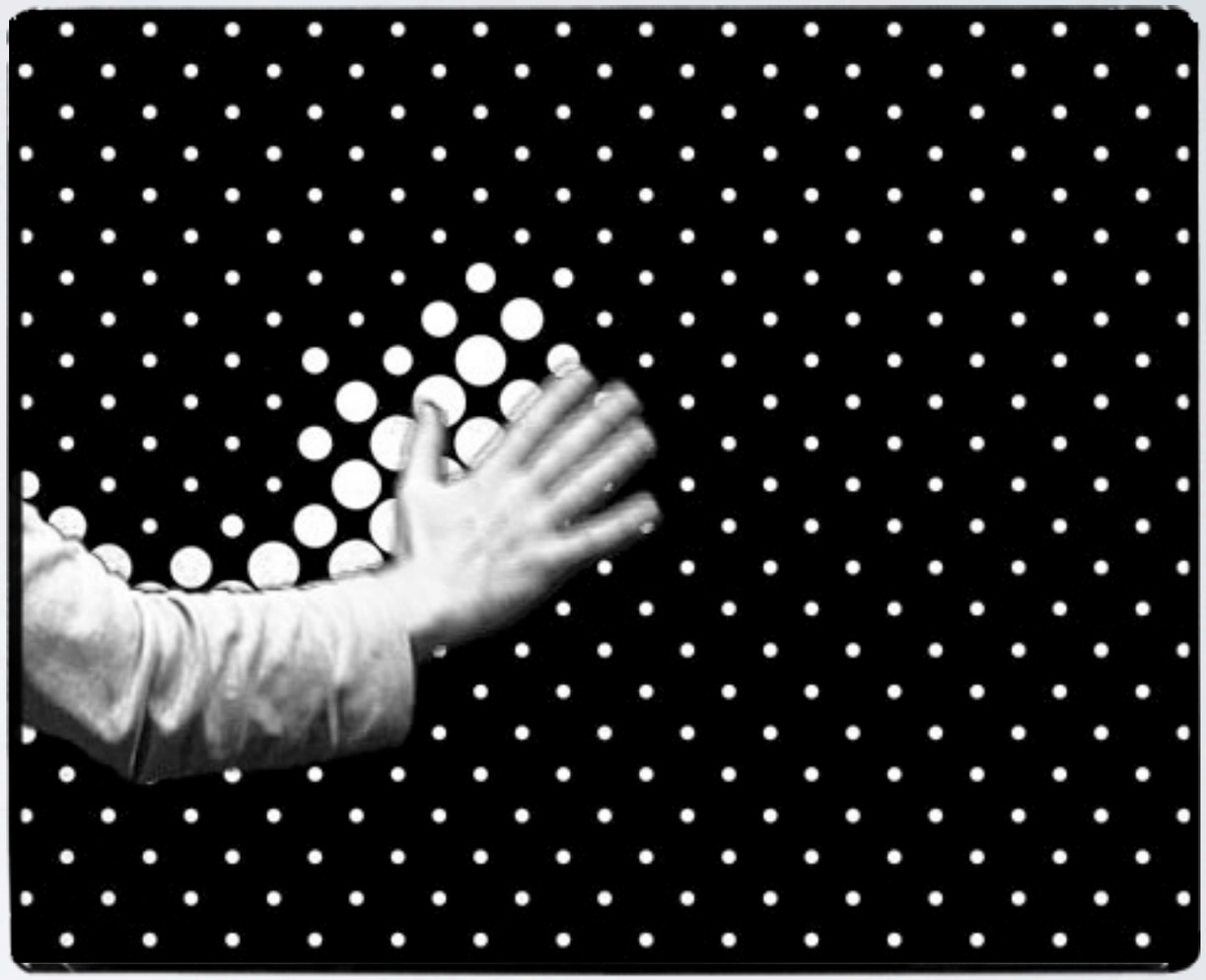


The State of Play

- Most solutions are expensive, proprietary software/hardware combinations
- We live in the age of the network
- Success depends on the size of the community that supports it

The State of Play

- Technology still suffers from an ‘us and them’ attitude



- We need technology to be natural, appropriate and fun

What I Propose...

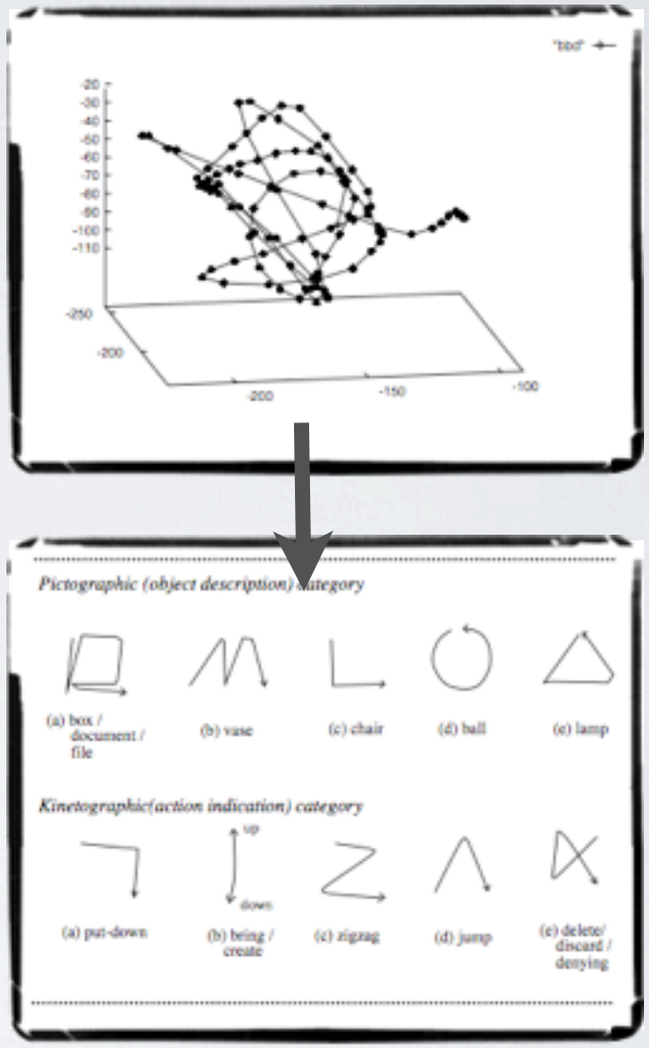
- Smartphones (e.g. iPhone, Nokia N900) are increasingly common

- Could be used as controllers for larger applications

- A generic gesture recognition system for smartphones is a missing link

How To Do It

- Need to recognise 3D gestures from pre-defined gesture set
- Hidden Markov Models provide a possible solution (can recognise gestures relatively independent of time)
- Trained by user or use predefined set



From *Recognition of Space-Time Hand-Gestures using Hidden Markov Models*
Yanghee Nam and KwangYun Wohn

Similar Systems/Solutions

- WiiGee is a similar solution for Wii controller, but computation done offline

- Most missing some form of **feedback**

- This invalidates one of the '8 golden rules' of interface design

Feedback

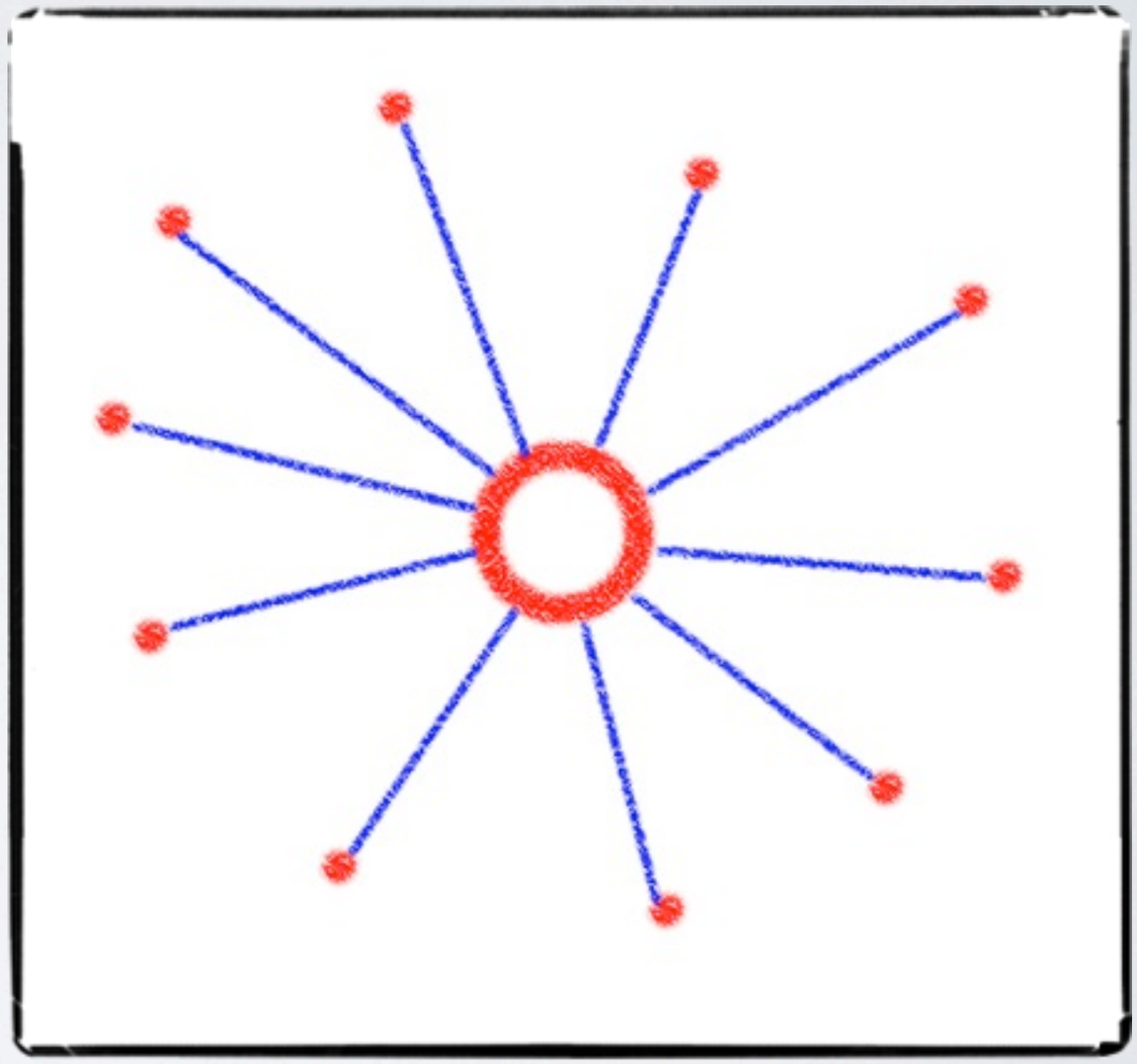
- Smartphones have speakers and vibration units
- ‘Earcons’ are audible notifications (think of when you last burned a CD)
- Vibration communicates with your sense of touch

“For every operator action, there should be some system feedback. For frequent and minor actions, the response can be modest, while for infrequent and major actions, the response should be more substantial.”

Shneiderman's Third Golden Rule of Interface Design

Application Integration

- Gestures can be used to ‘trigger’ application modes
- Network is key, therefore communicate over the network (OSC/XML)
- Packet simply says which gesture recognised



Summary of Project

- 3D Accelerometer based recognition for smartphones
- Computation done **on the phone**
- Communicate over network using OSC
- Prototype for N900

Timeline

- Initial Demo - 28th April
- User Training - 19th May
- Complete - 2nd June
- Write up and document

Questions?