A Gaze Interactive Textual Smartwatch Interface

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Speech and gaze goes well together

Equipment*

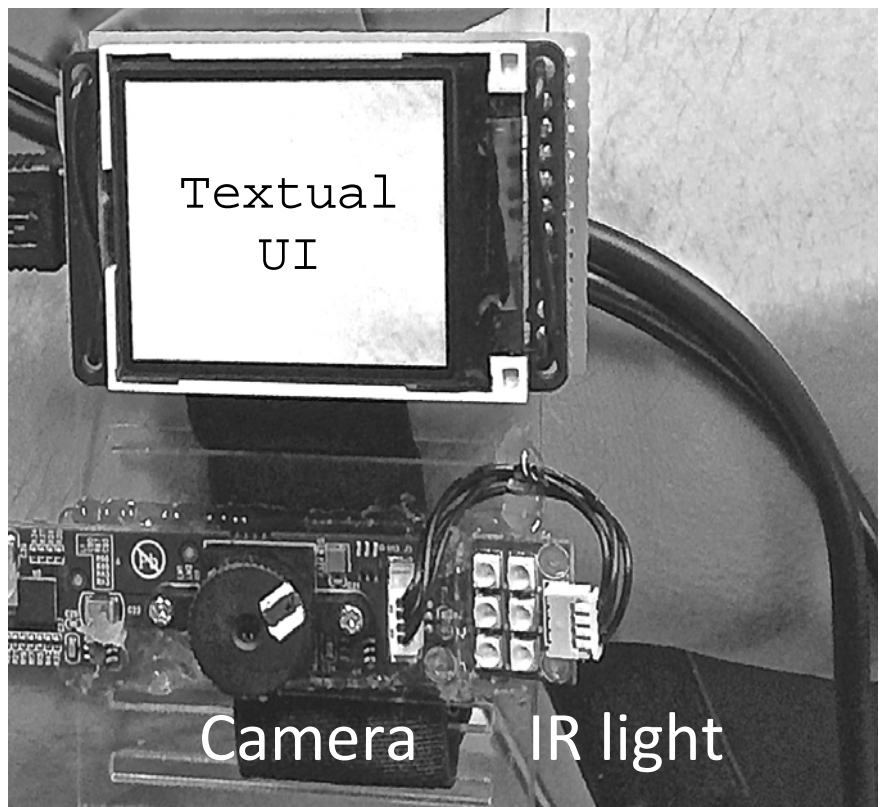30 Hz Eye Tribe USB 3 Tracker Accuracy 1.4 Precision 1.0 - stationary

Track box: X = 30 cm, Y =20 cm and Z = 12 cm at 35 cm distance

A 1.8" Adafruit monochrome TFT screen with a resolution of 160 x 128 pixels, controlled by an Arduino Nano board

The Eye Tribes Java Client with a custom mobile gaze tracking framework

A standard PC

Velcro strips

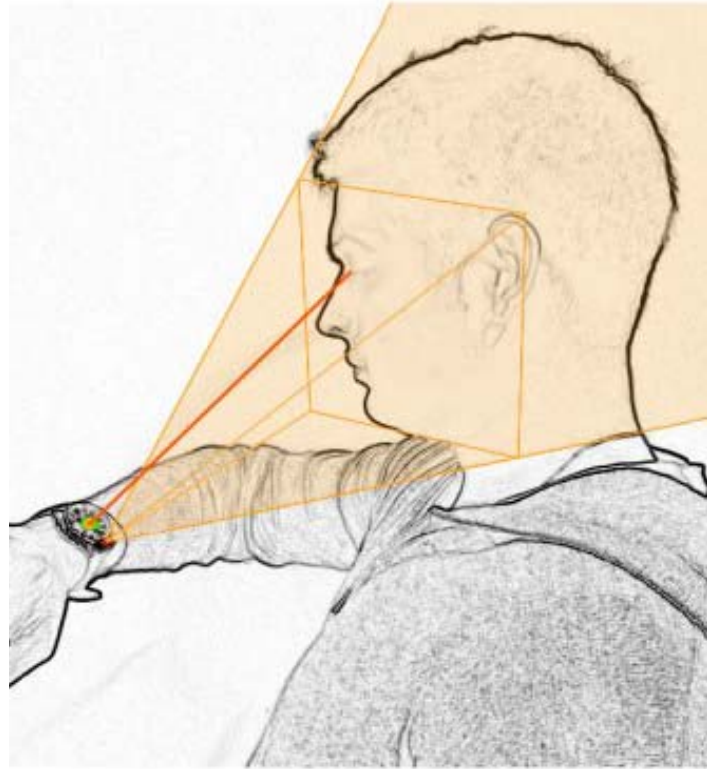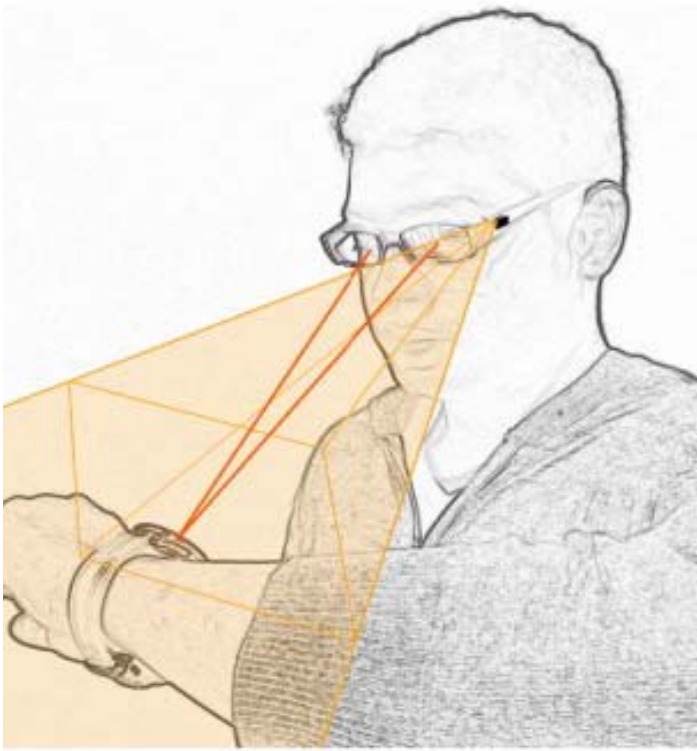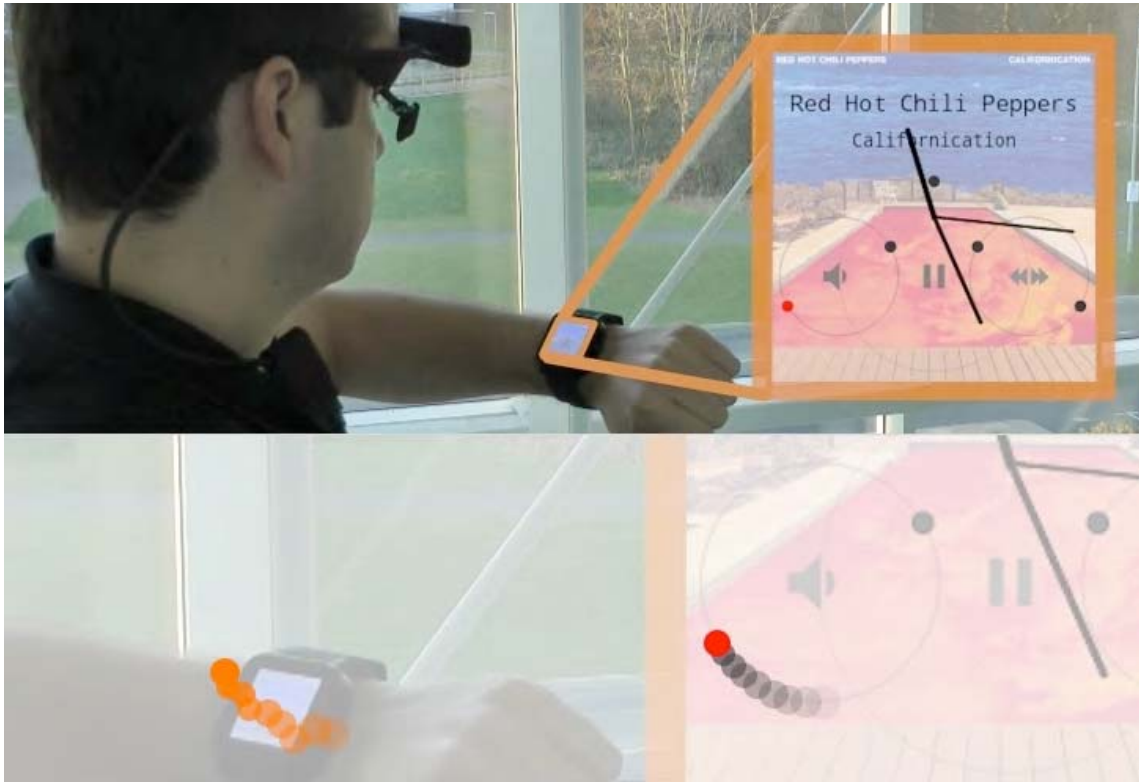# SW tracking from glasses vs. a user facing camera in the watch
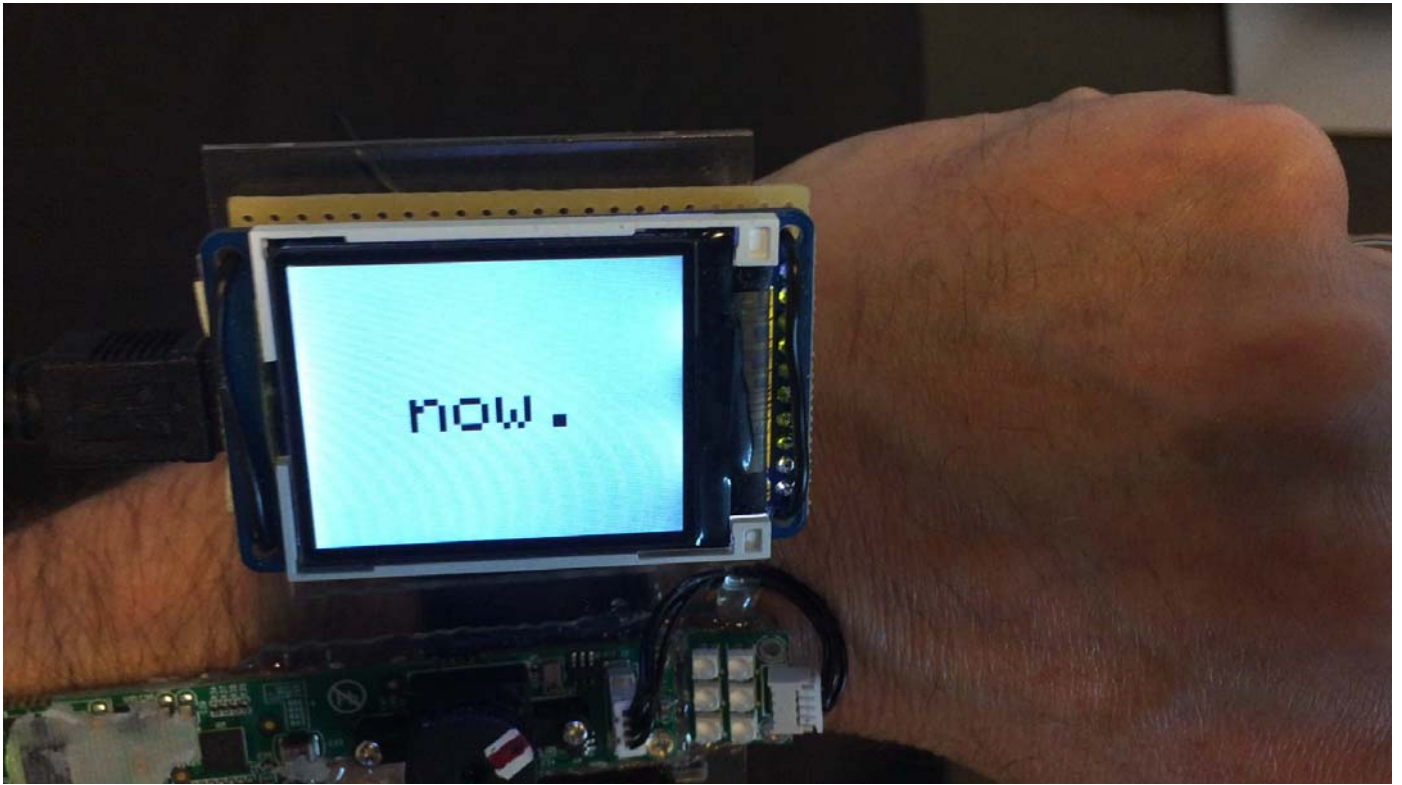

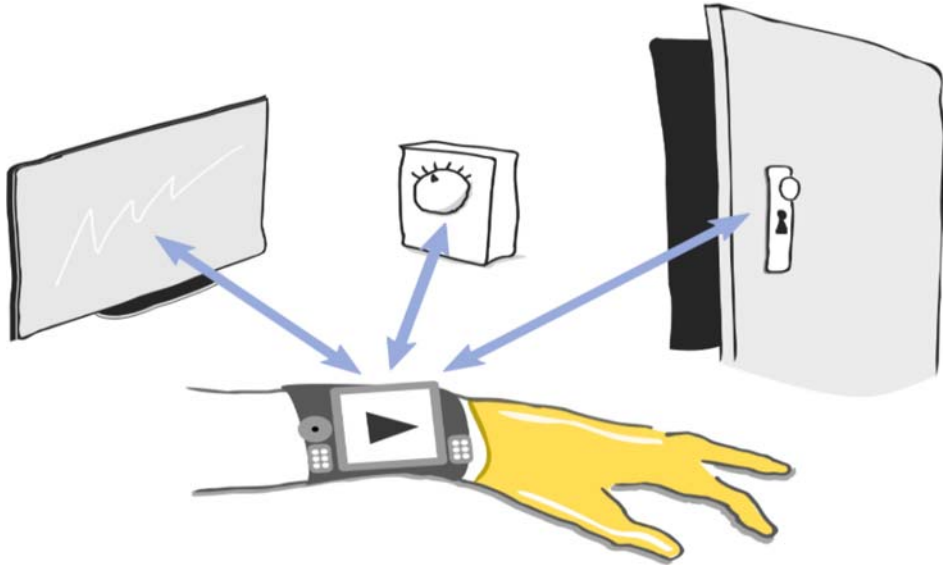Figure from Akkil et al: CHI 2015.

Smooth pursuit

Augusto Esteves et al. UIST 2015
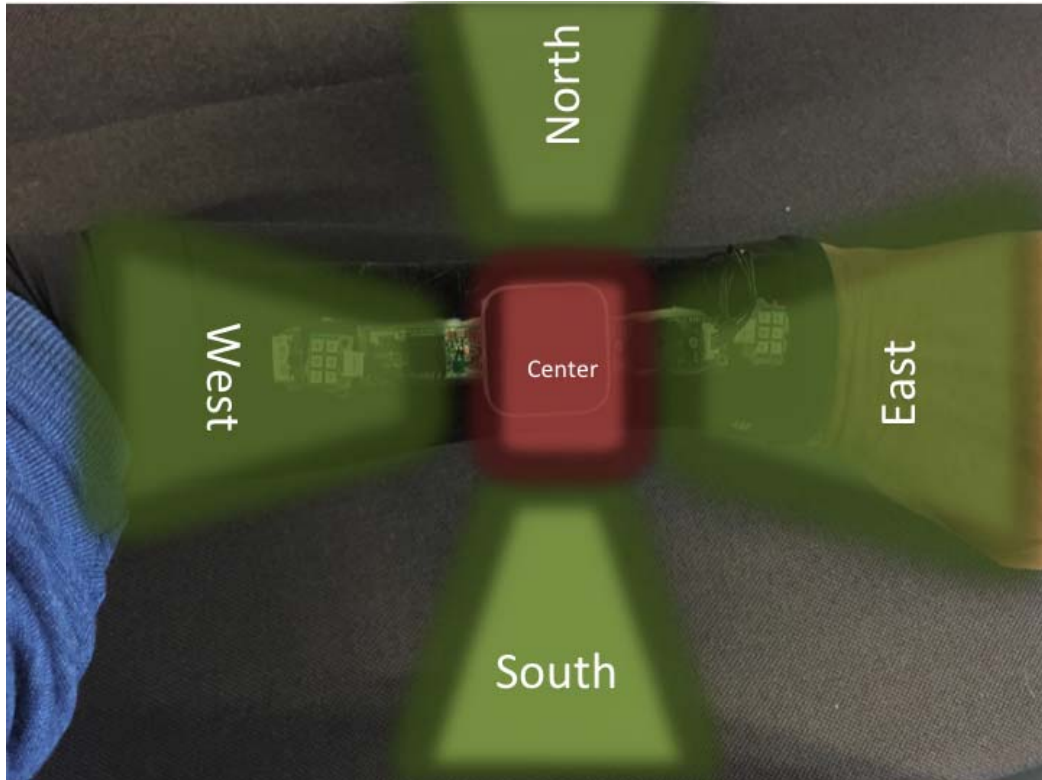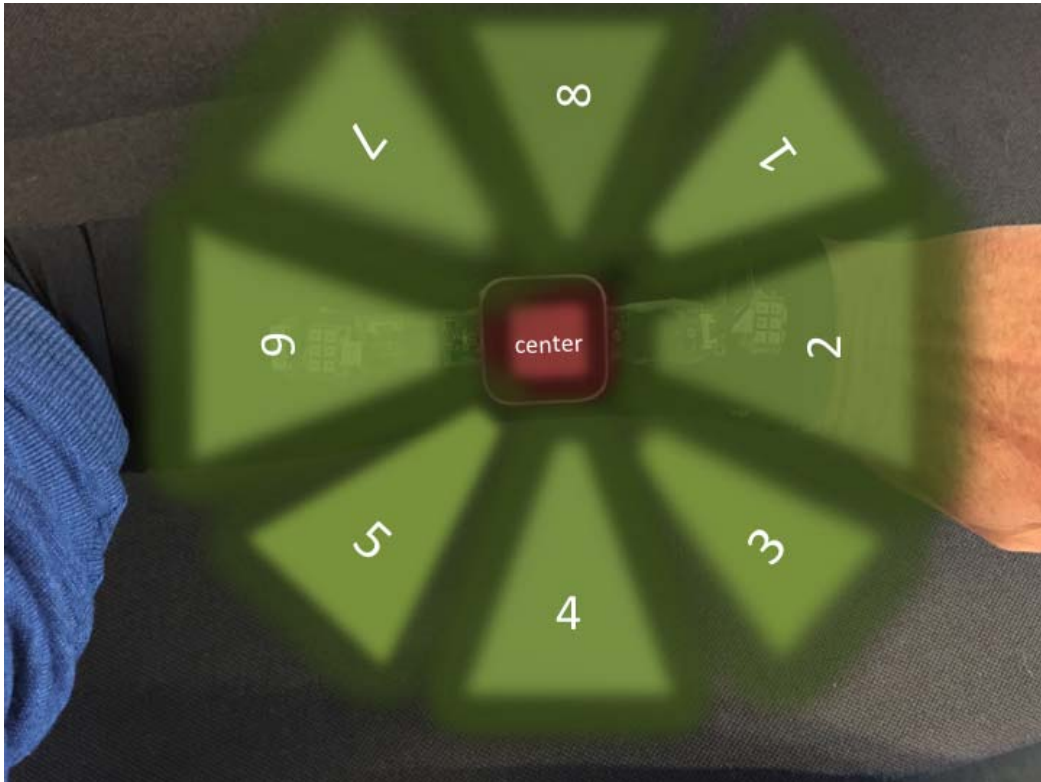
The textual interface

Hands-free

- What if people had a gaze tracking unit with them all the time that they could easily use to control the environment ?

4 virtual input fields

8 virtual input fields

Accuracy and precision
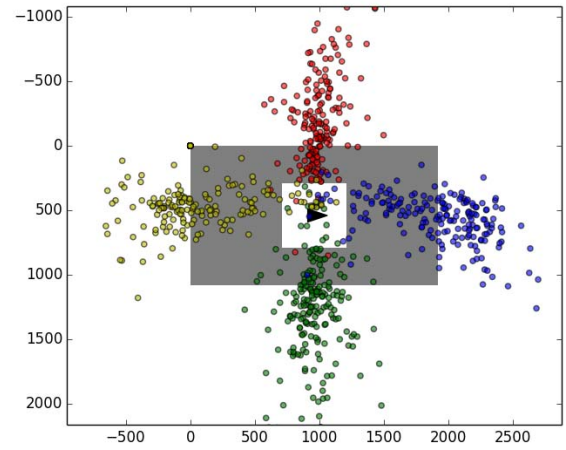# – standing and walking slowly

Condi. on*	Accuracy**	Precision*
Standing	2.93 ± 0.11	2.95 ± 0.09
Walking	3.00 ± 0.12	3.02 ± 0.10

Illustration – not real data

Gaze gestures are unnatural -but they work

Enac. ng remote control*
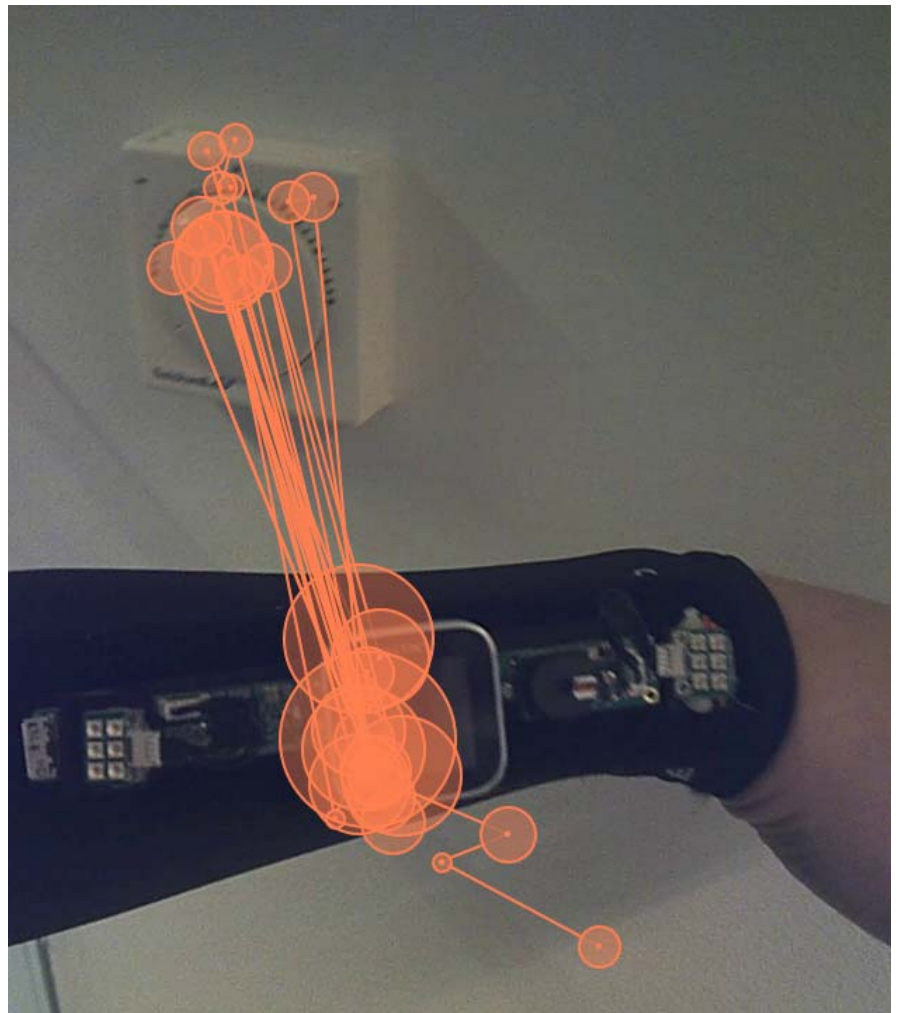
10 people from our lab (6M, 4F)

Wearing SMI Eye Tracking Glasses 2

Twelve use-cases; e.g.:
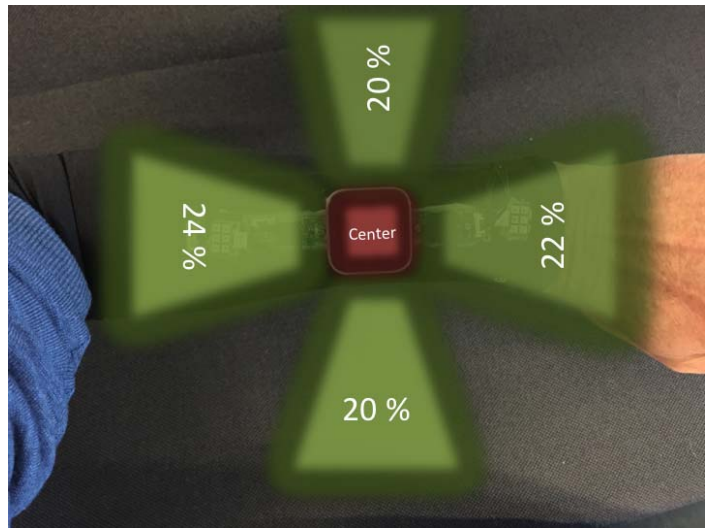
"How would you move your eyes to decrease the temperature?"

"How would you move your eyes to unlock the door?"

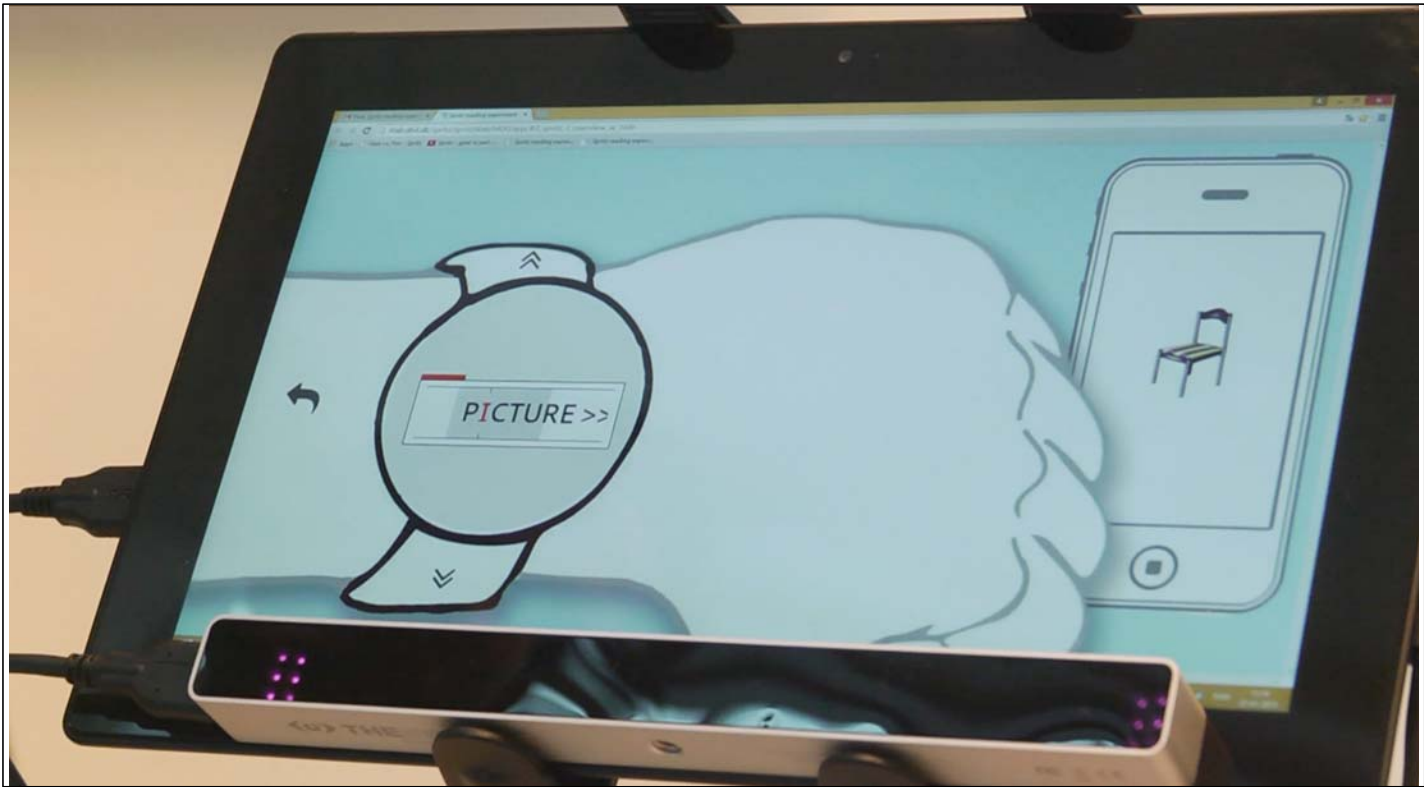"How would you move your eyes to go back in the menu on your smartwatch?"
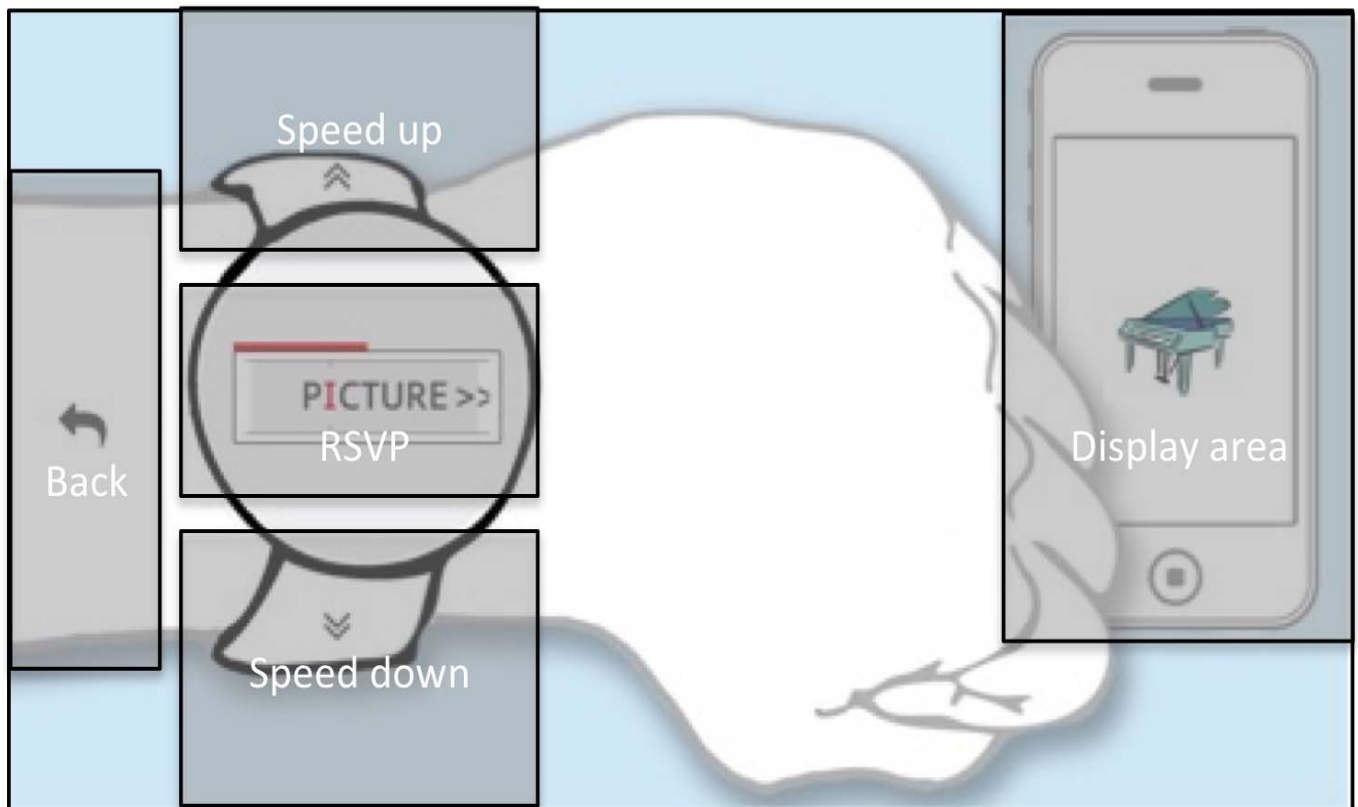
Observations

- 86 % of all enacted control actions would be done by (combinations of) going up, down, left or right

- The object controlled would always be attended during the imagined input sequence
  - 40 % of the times as the first fixation
  - 60 % during the sequence

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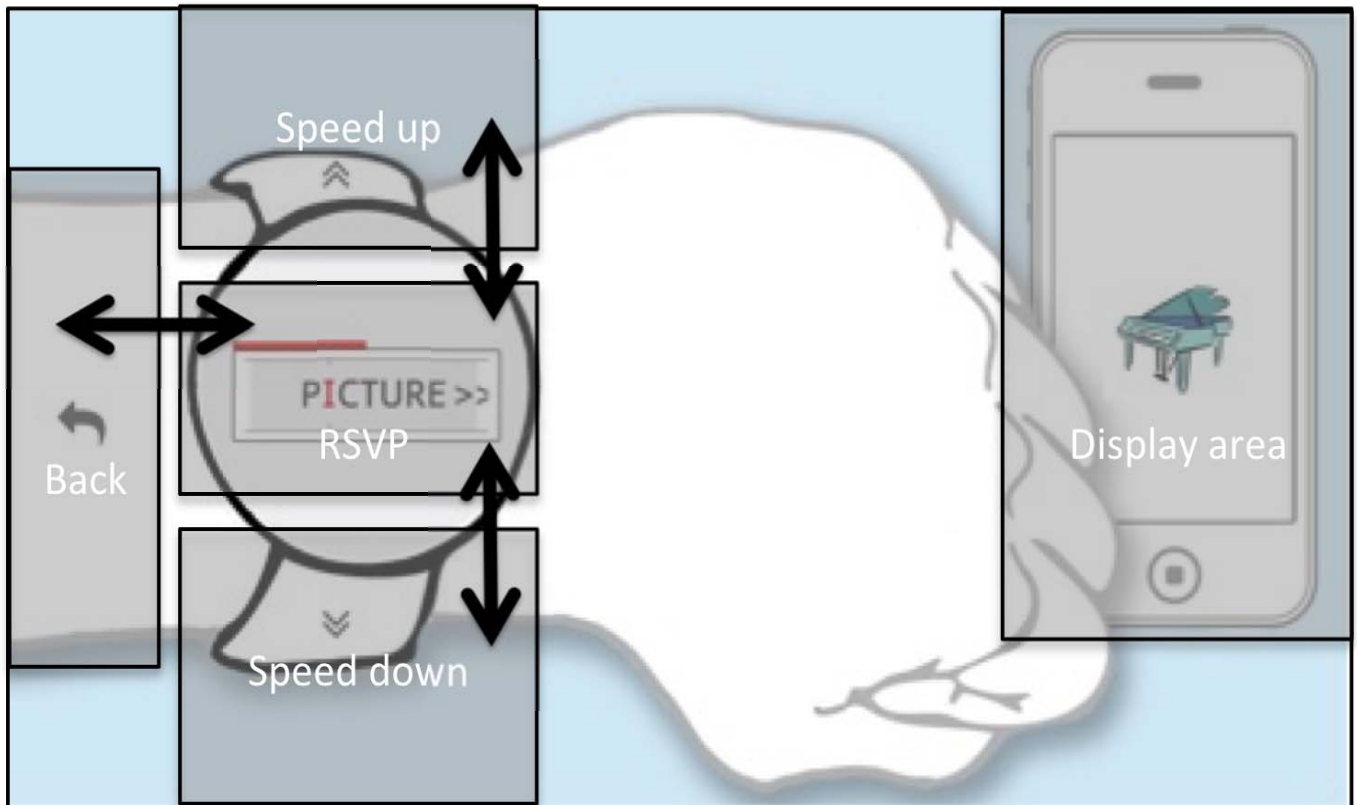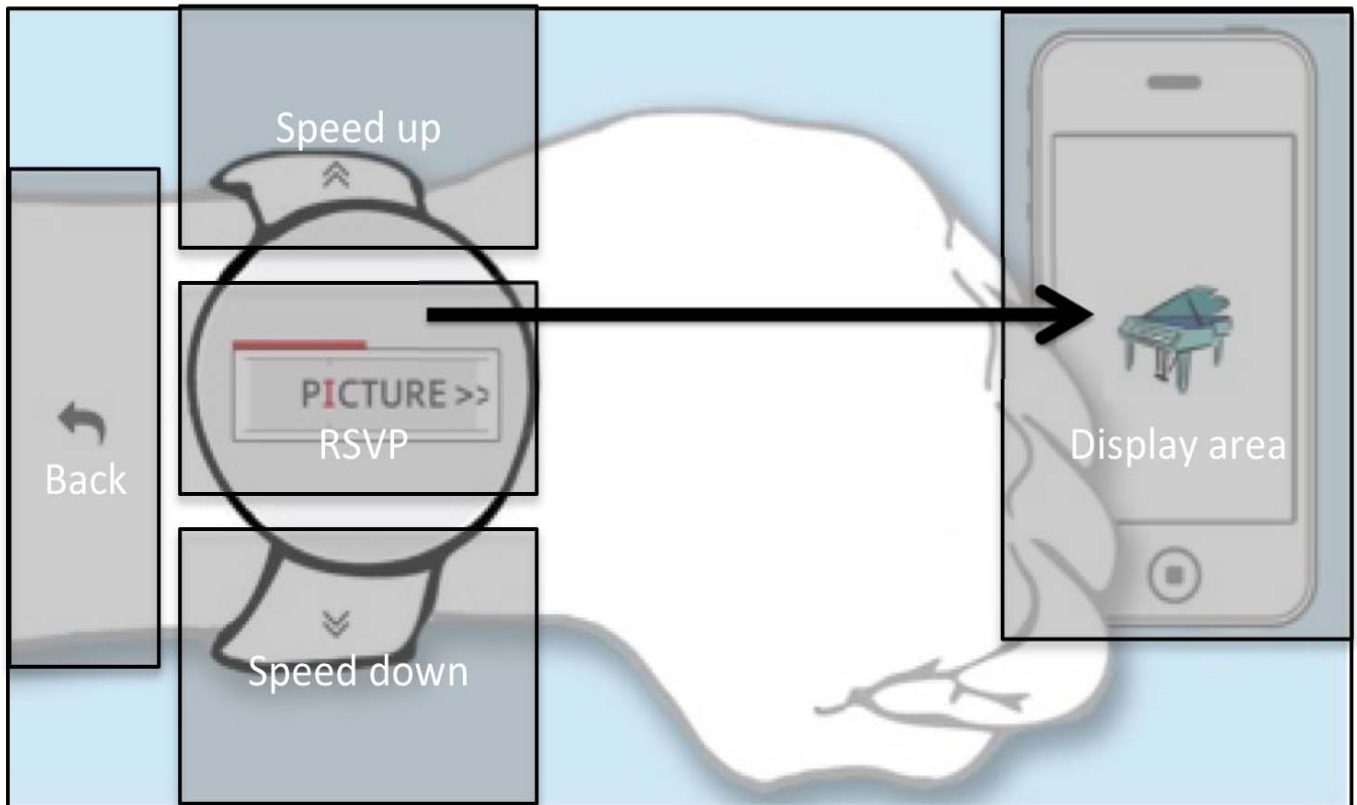
Gaze interactive areas

Speed up

Back

PICTURE >>

RSVP

Speed down

Display area

Gaze gestures

Speed up

Back

PICTURE >>

RSVP

Speed down

Display area

Look-away command

Speed up

PICTURE >>

RSVP

Back

Speed down

Display area

Observations

- 27 subjects (mean age 29 years, 14 women)
- First they did a training task with a tablet pen then with gaze
- It took 231.4 seconds (S.D. = 57.1 s) to complete the task with gaze.
- Hit rates:
  - jumping back one sentence 70 % (S.D. = 45%);
  - pictures were 100 % correctly activated 100 % (S.D. = 0 %).
- The RSVP speed levels were adjusted to an average of 174 words per minute.
- 9 preferred the pen input but a majority of 18 participants preferred gaze input, mostly because they said:
  - it*was*fast*and*easy;**
  - it*made*the*text*stop*streaming*when*not*a9 ended;*
  - it*felt*less*strenuous*than*holding*a*stylus*pen*up*to*the*tablet* display *

LED leeding lights
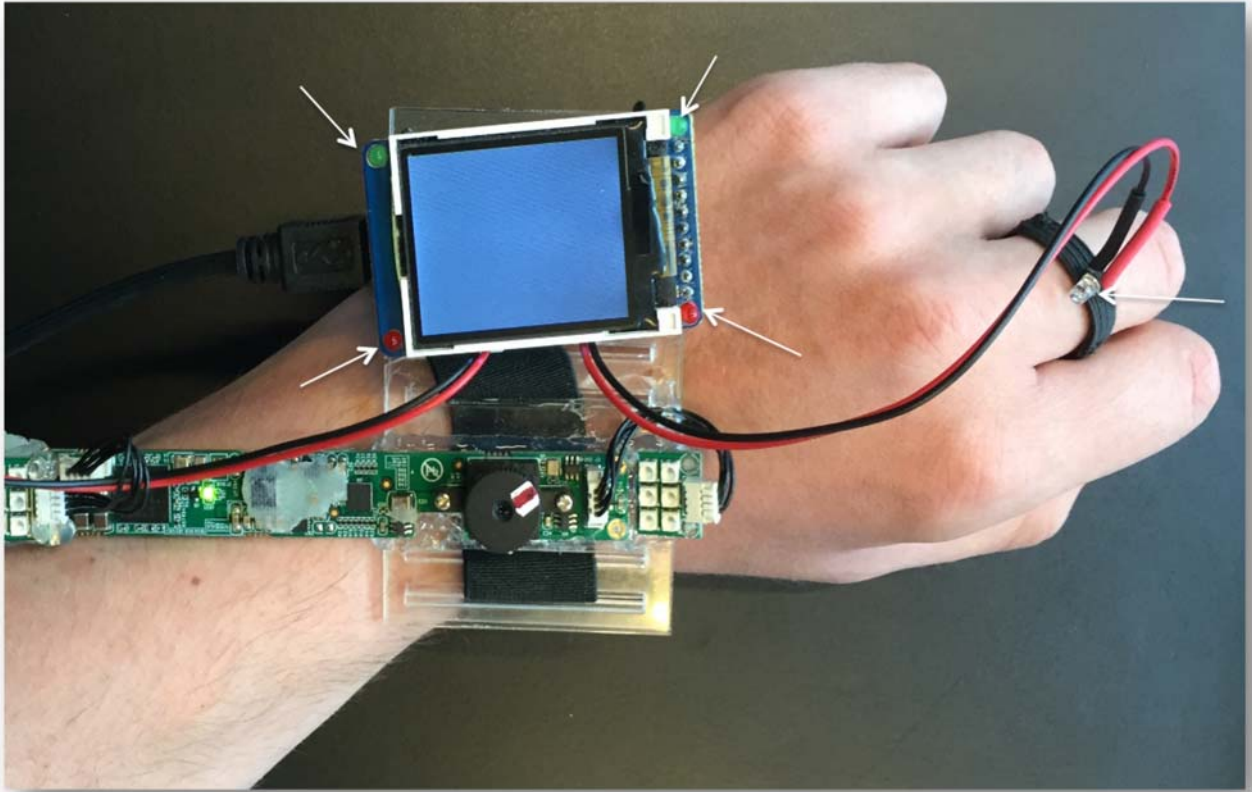
GazeWatch interaction with public displays