VisRing

A Display-Extended Smartring for Nano Visualizations

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SimTech

imprs-is

Why integrate a display within the form factor of a smartring?

Always-visible
Glanceable
Private

Motivation & Background

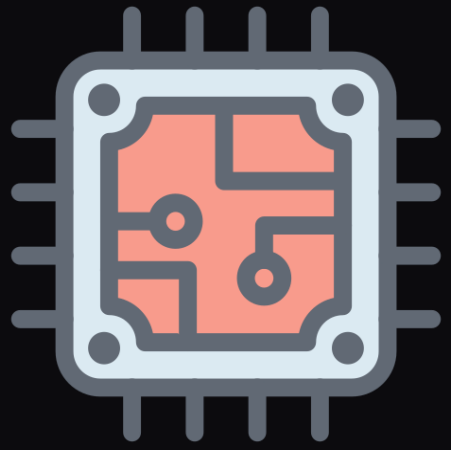
Smartwatch

Wristband

Smartring

- Smartwatch & wristband
  Rich visualization, large, mostly two-handed interaction
- Current smartrings
  small, lightweight, only digits and icons

Challenges & Approach

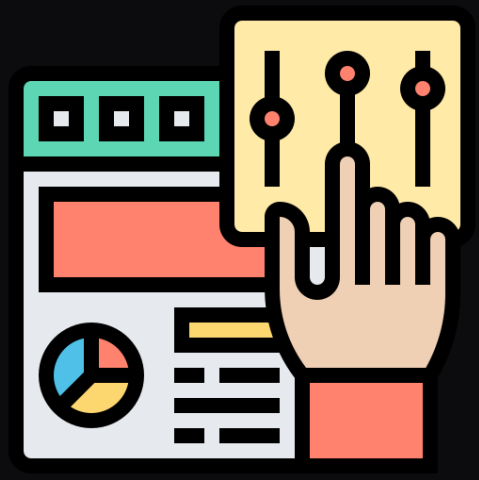


- Multiple electronic components

➢ Multi-layer flexible Printed Circuit Board

- Complex assembly process within limited space

➢ Systematic mechanical design and assembly process

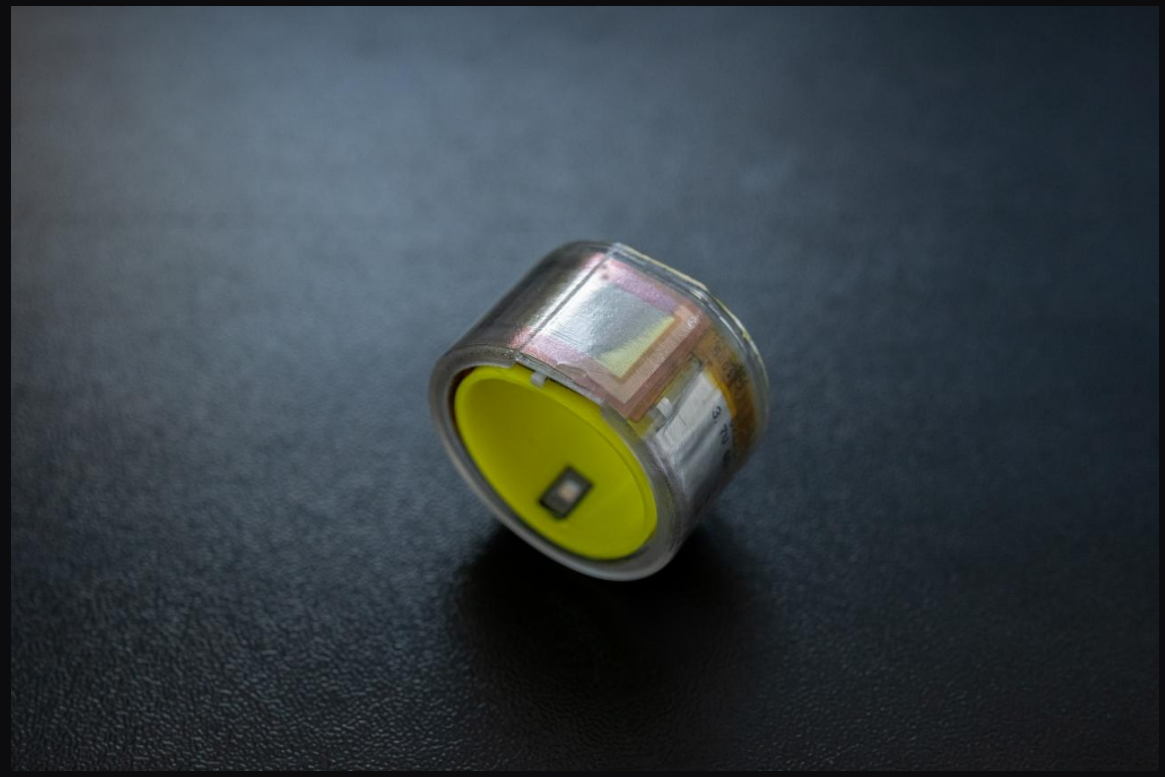


- No visualization techniques on smartring

➢ Design Nano Visualizations on a smartring

VisRing

the first smartring that incorporates a bendable OLED display for nano visualizations

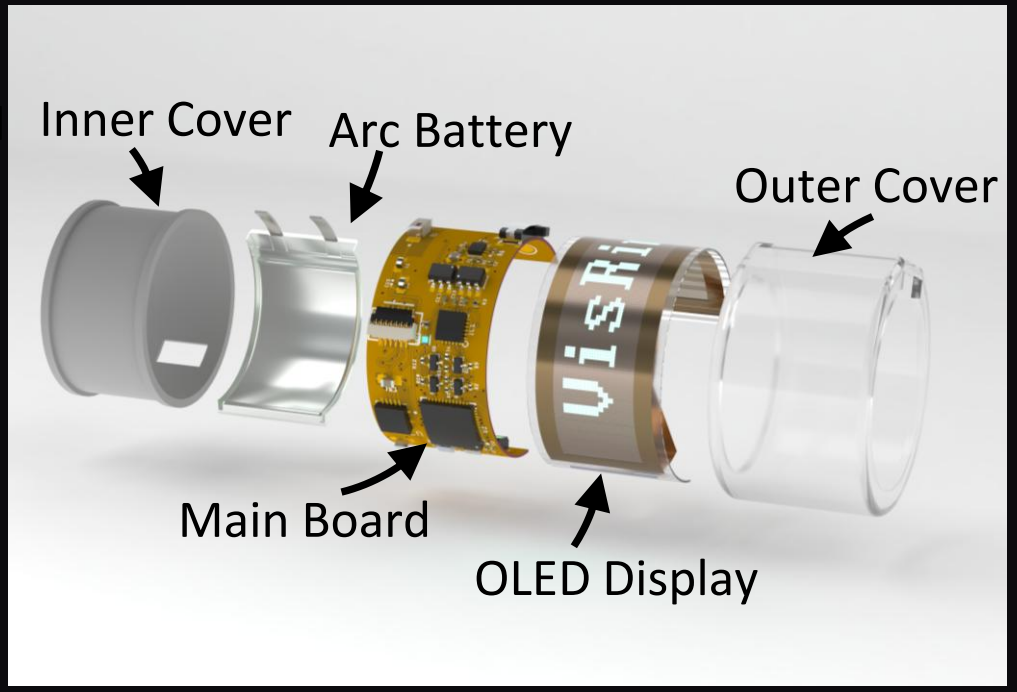


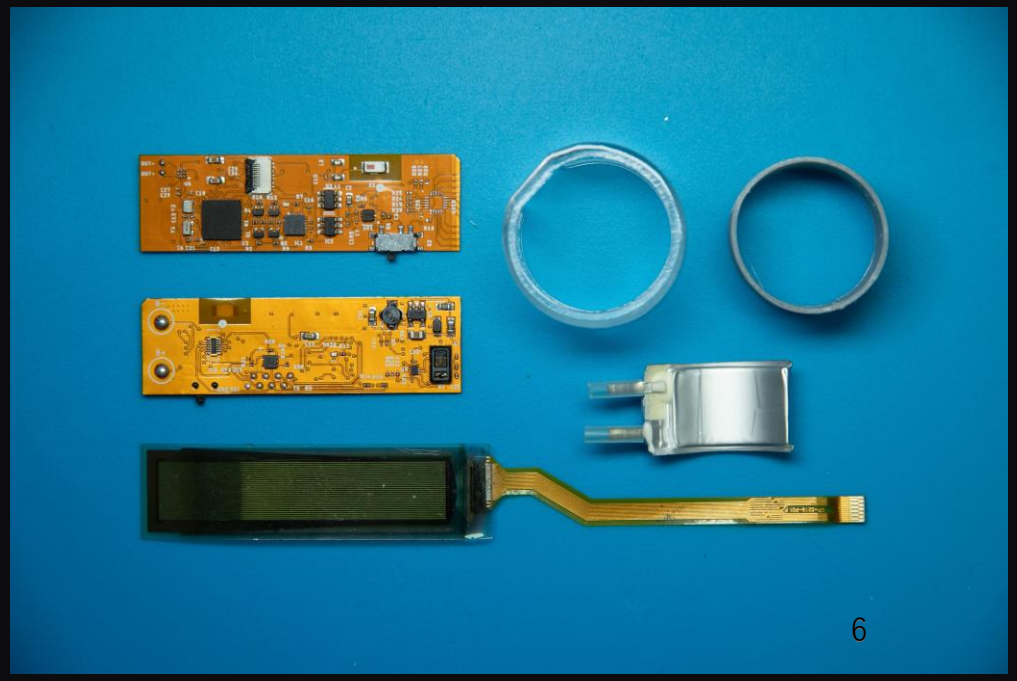
Feature List

- Flexible display spanning 270° to 360°
- Nano Visualizations
- Wireless communication (BLE)
- Multiple sensors (motion, biometric)
- Average weight: 6.6g
- Overall cost: ≈$35

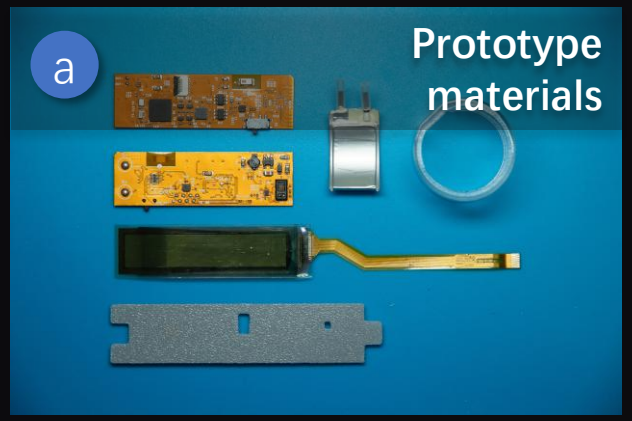
VisRing Overview

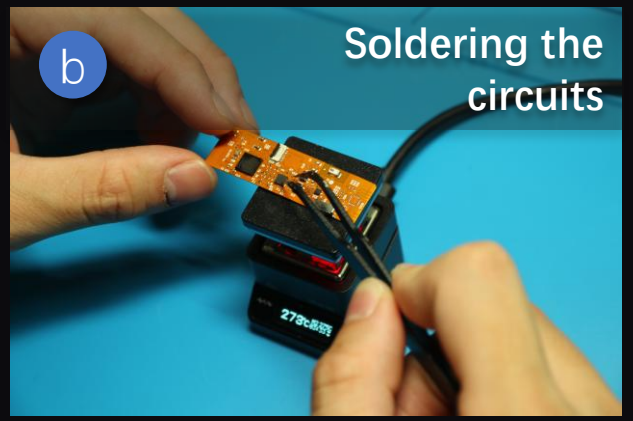
Four components
(1) Flexible PCB
(2) Flexible 160x32 Grayscale OLED
(3) Curved Battery
(4) 3D-printed Housing

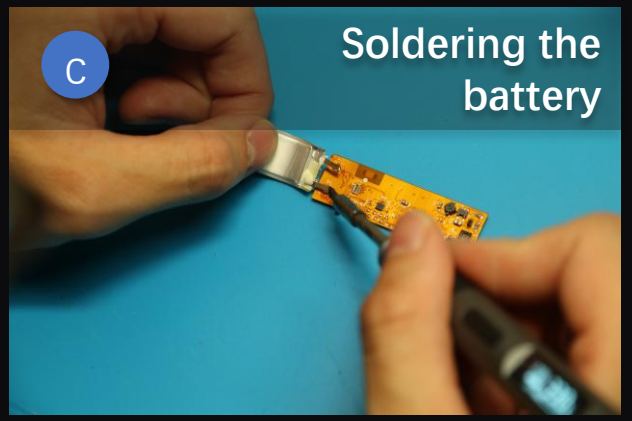


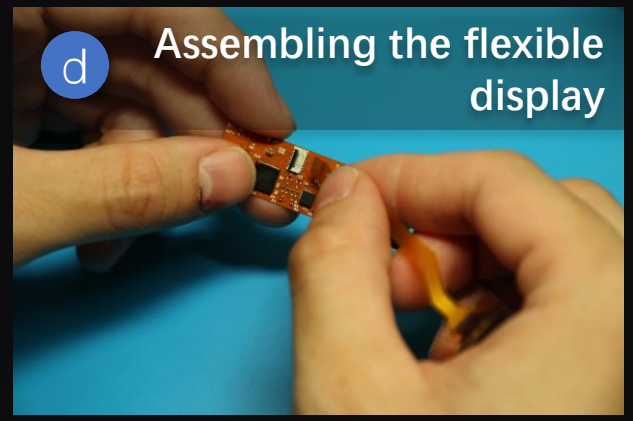


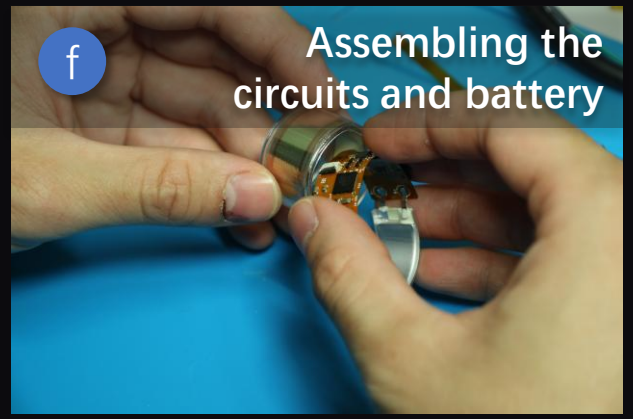
Assembly Process











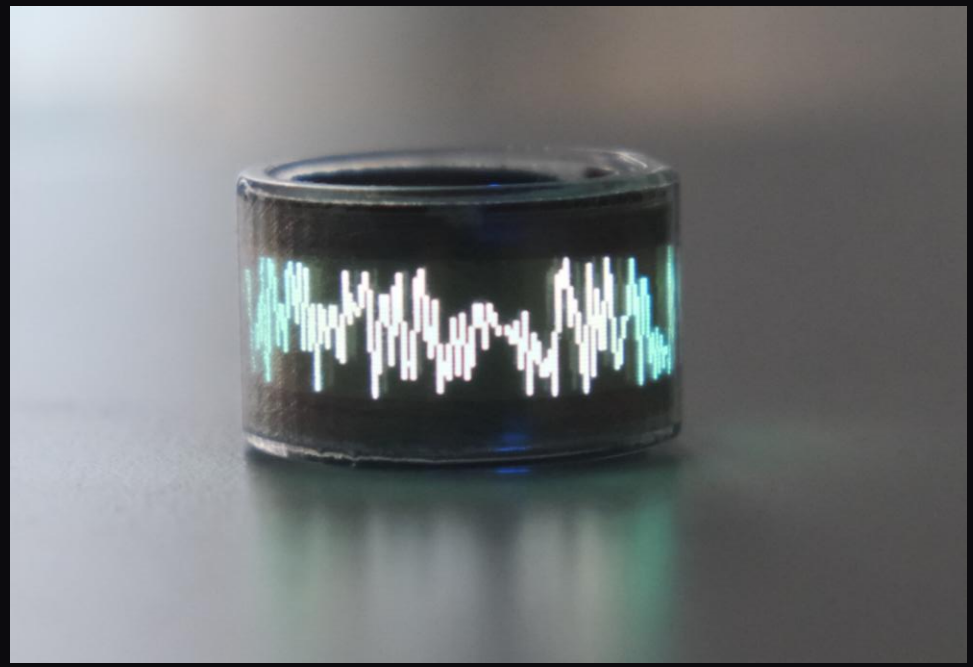

72
BPM

Micro → Nano Visualization

- Smartwatch
- Small
- Glanceable

F. Grioui, T. Blascheck, L. Yao and P. Isenberg, "Micro Visualizations on a Smartwatch: Assessing Reading Performance While Walking," 2024 IEEE VIS, pp. 46-50, doi: 10.1109/VIS55277.2024.00017

- Even smaller (e.g., 32x160 px)
- High aspect ratio
- Curved
- Partially hidden
- Private and public



Nano Visualization Library

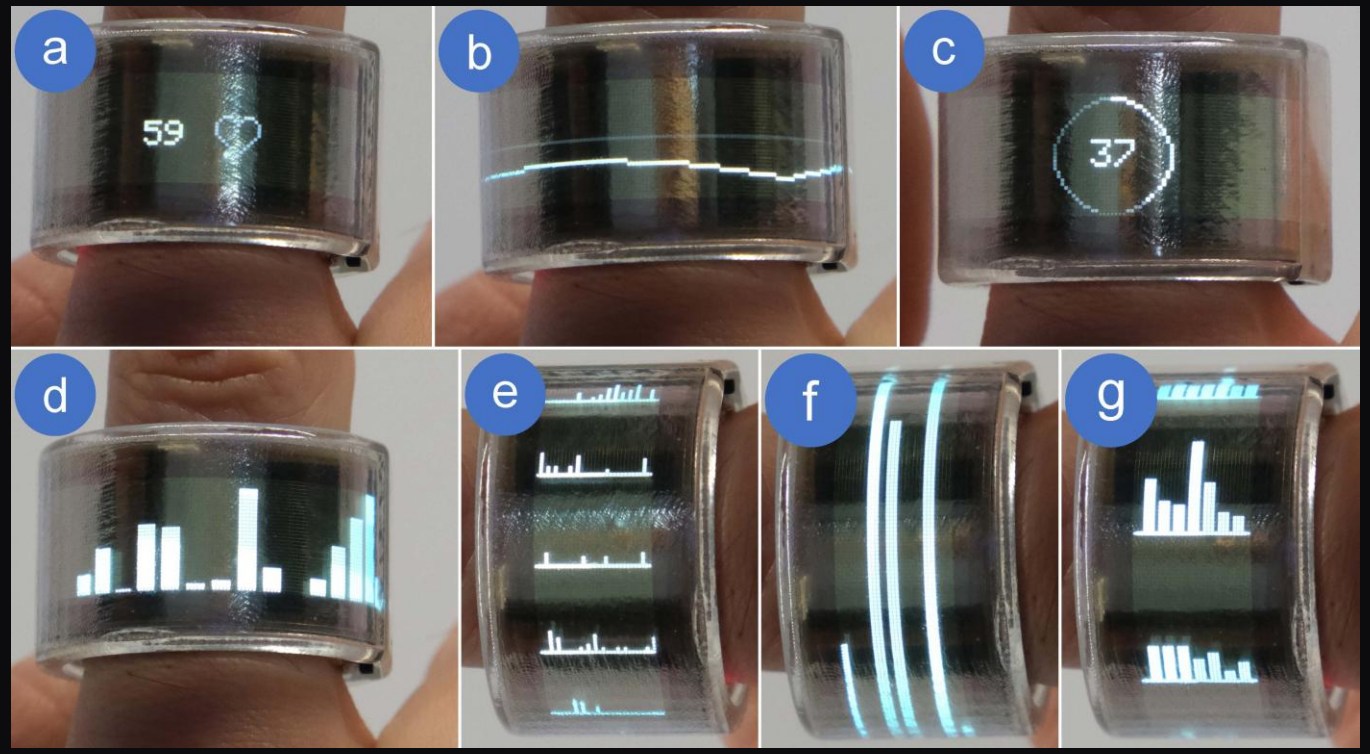
Qualitative Evaluation

User study

- 12 participants
- Walking indoors
- Experiencing hardware and visualizations

Gender	#
Woman/Female	6
Man/Male	6

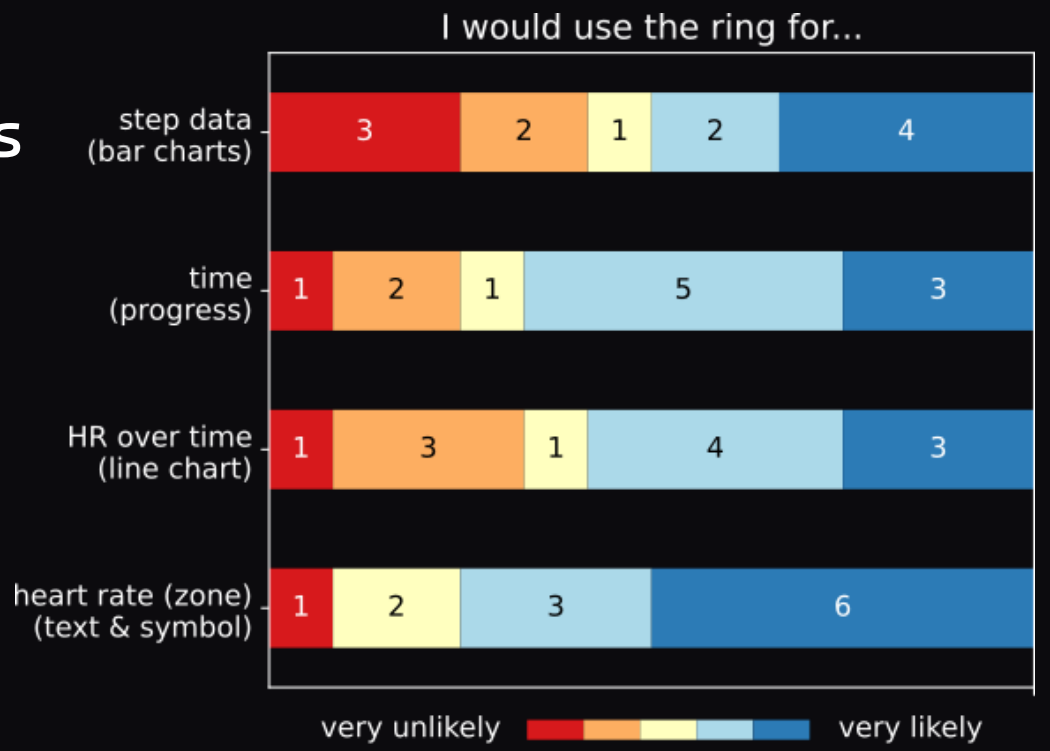
Age Range	#
18-24	4
25-34	8

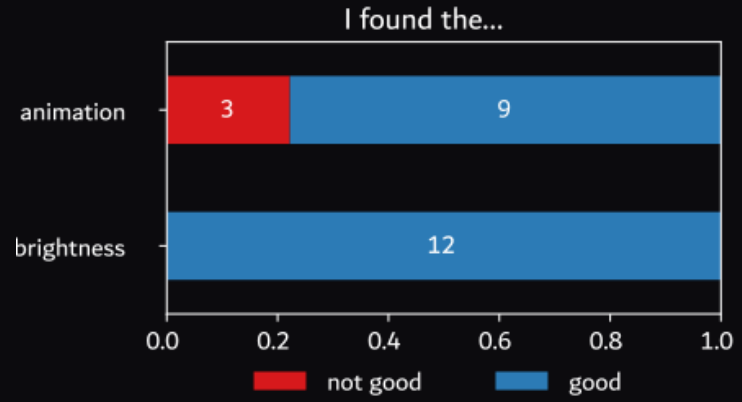


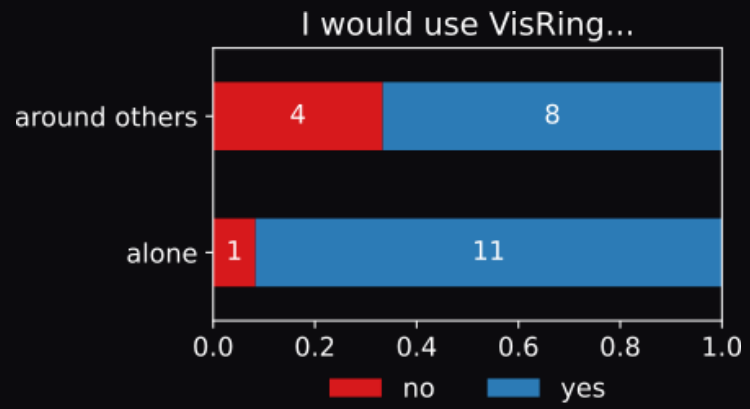
Qualitative Results

+ Hardware, visualizations, brightness, animation
– Size and fit, use in public

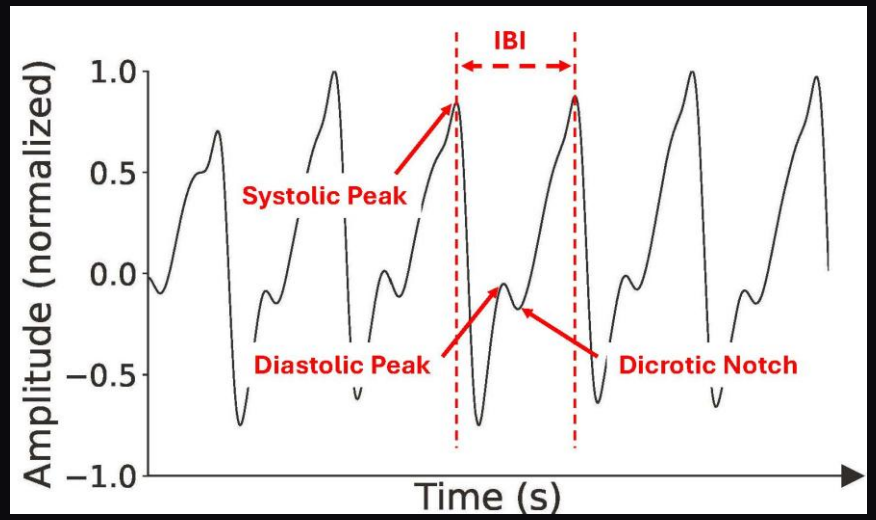
Applications
- Health/ fitness
- Outdoor
- Notifications
- Psychology
- Fashion
- Timers



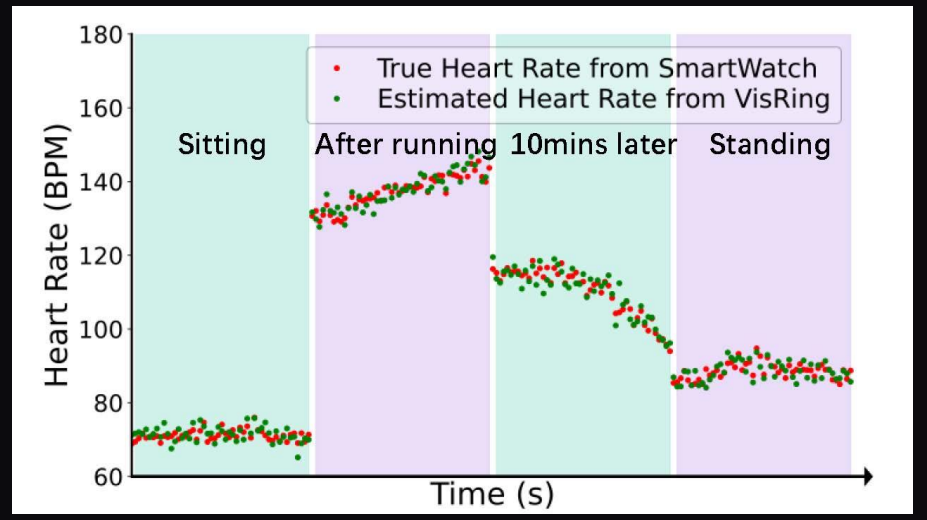




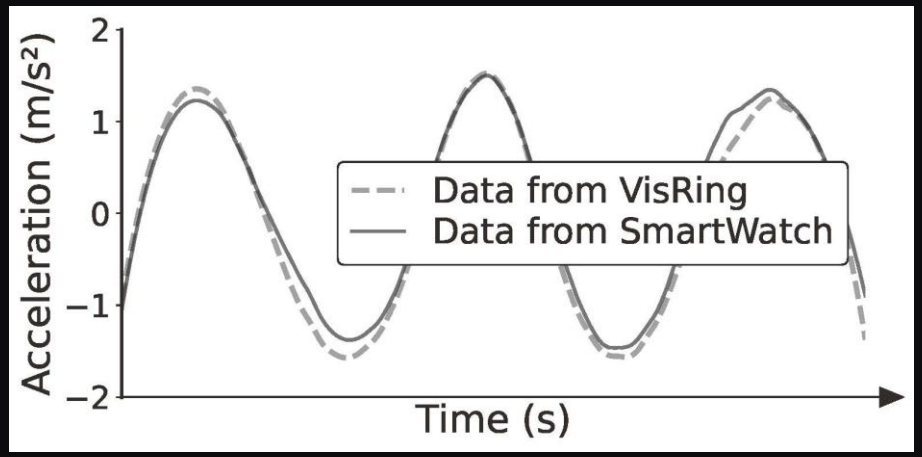
Hardware Evaluation



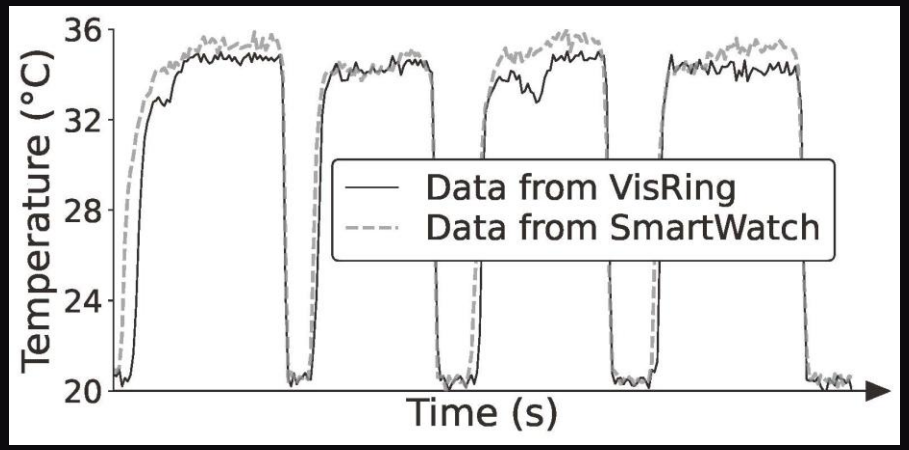
PPG data



Heart rate comparison with a smartwatch



acceleration data



temperature data

Future Work

- One-handed interaction
- Adaptive privacy
- Real-world evaluation
- Materials
- Power efficiency
- …

VisRing: A Display-Extended Smartring for Nano Visualizations

- First smartring with a bendable OLED display
- Nano visualizations definition and library
- Quantitative & qualitative evaluation

details

Currently on the job market: txl5518@psu.edu

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