User Interface Software Technology :Overview

Presenters
Shenshen Han
Hana Cho

Venues

Subcommittee

Interacting with Devices: Interaction Techniques & Modalities

Developing Novel Devices: Hardware, Materials, and Fabrication

Blending Interaction: Engineering Interactive Systems & Tools

CHI 2024
Surfing the World

11–16 May 2024

CHI: **Developing novel devices**: hardware, materials, and fabrication

Research questions:

- What innovative hardware solutions are emerging in HCI?
- How do new materials and fabrication techniques expand the possibilities for device development?

Key themes:

- Engineering
- Material Science
- Industrial Design

Core sub topics, methodological approaches, theoretical perspectives within the subcommittee

Core Subtopics:

- Wearable devices, flexible electronics, and smart materials.
- DIY and maker movements in technology.

Methodological Approaches:

- Hardware prototyping and user testing.
- Exploration of new fabrication techniques.

Theoretical Perspectives:

- The role of physicality in human-computer interaction.
- Sustainability and ethical considerations in device development.

PrintScreen: Fabricating Highly Customizable Thin-film Touch-Displays

CHI: **Interacting with devices**: interaction techniques and modalities

Research questions:

- What are the latest techniques and modalities for interacting with devices?
- How do these techniques improve user experience and functionality?

Key themes:

- Computer science
- Cognitive psychology
- Design & Evaluations

Core sub topics, methodological approaches, theoretical perspectives within the subcommittee

Core subtopics

- Gesture recognition, voice control, haptic feedback, wearable technology
- Accessibility and inclusive design for interacting with devices

Methodological approaches

- User studies evaluating interaction technologies
- Prototyping and iterative design

Theoretical perspectives

- Affordances of different interaction modalities
- User-centered design

https://youtu.be/3u39VCgTJVE

CHI: **Blending interaction**: engineering interactive systems and tools

Core Research Questions or Topics:

- How are software and hardware integrated to create seamless interactive systems?
- What tools are being developed to facilitate the creation of interactive technologies?

Key themes:

- Software Engineering
- Interaction Design
- Psychology

Core sub topics, methodological approaches, theoretical perspectives within the subcommittee

Core Subtopics:

- Integrated development environments for interactive systems.
- Frameworks and libraries for creating interactive applications.

Methodological Approaches:

- Case studies of system development and deployment.
- User feedback loops in the tool and system development process.

Theoretical Perspectives:

- The concept of usability in engineering tools.
- The balance between functionality and user experience in interactive systems.

[ACM2Y Panel - How Does Your Computing Program Measure Up? - Jan 25, 2024Association for Computing Machinery (ACM) • 113 viewsLive52:15Playlist ()Mix (50+)](#)

UIST: User Interface Software and Technology

- ACM SIGCHI and CAN SIGGRAPH
- Innovations in HCI
- 20.3% acceptance rate
- Topics: Design, development, evaluation of innovative UI
- Open access

Paper requirements

- Topics: Graphical & web user interface, tangible & ubiquitous computing, virtual & augmented reality, multimedia, new input & output devices, HCI
- Novelty
- Anonymity
- Validation
- Interactive demonstration and videos

Writing guidelines

- Key questions, problem being solved, relevant literature, solution efficacy and contribution to the field
- Previous solutions & related work
- Paper completeness
- Balance in length and reviews

History

1988: the first UIST conference

1988-1990s: significant forum for HCI community

2000s: broader range of interactive tech

    mobile interfaces, ubiquitous computing, virtual reality, augmented reality

2010s: Interdisciplinary collaboration

    Intersection of CS, design, psychology

Present: Innovations in UI software and tech

Methodological approaches, theoretical perspectives

Methods:

Experimental studies, technological innovations, system implementations, user experience evaluations, and theoretical analyses

Theoretical perspectives:

Theories in user interface design, interaction models, cognitive psychology, human factors, social computing, and design methodologies
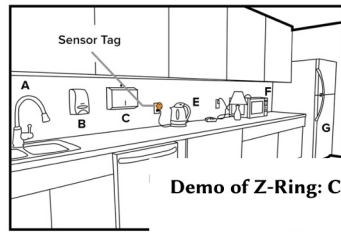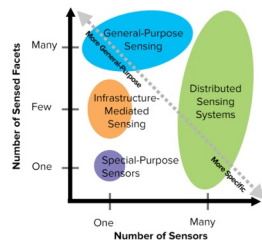
https://www.youtube.com/watch?v=ccyRzZS49lg

LingoLand: An AI-Assisted Immersive Game for Language Learning

Olivia Seow
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Harvard University
Cambridge, Massachusetts, USA

Synthetic Sensors: Towards General-Purpose Sensing

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Feeling Colours: Crossmodal Correspondences Between Tangible 3D Objects, Colours and Emotions

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Feng Feng
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Spatio-Temporal Modeling and Prediction of Visual Attention in Graphical User Interfaces

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Yusuke Sugano
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Andreas Bulling
Max Planck Institute for Informatics
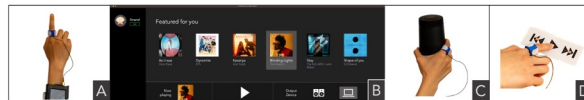bulling@mpi-inf.mpg.de

Demo of Z-Ring: Context-Aware Subtle Input Using Single-Point Bio-Impedance Sensing

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Seattle, USA

Venue comparison

1. https://www.youtube.com/watch?v=VZ95yy17Hx8&t=27s
2. https://www.youtube.com/watch?v=feferGlEIKI&list=PLqhXYFYmZ-VcViTOgxNocZOJcav2EFPPk&index=10
3. https://www.youtube.com/watch?v=8LvFckFIKyM
4. https://www.youtube.com/watch?v=aA5dNoangbo&t=26s

Articles

Framing Papers

- **Brad Myers**, Scott E. Hudson, and Randy Pausch. 2000. **Past, present, and future of user interface software tools**. ACM Trans. Comput.-Hum. Interact. 7, 1 (March 2000), 3–28.

- **Hiroshi Ishii** and Brygg Ullmer. 1997. **Tangible bits: towards seamless interfaces between people, bits and atoms**. In Proceedings of the ACM SIGCHI Conference on Human factors in computing systems (CHI '97). Association for Computing Machinery, New York, NY, USA, 234–241.

- **Jun Rekimoto**. 1997. **Pick-and-drop: a direct manipulation technique for multiple computer environments**. In Proceedings of the 10th annual ACM symposium on User interface software and technology (UIST '97). Association for Computing Machinery, New York, NY, USA, 31–39.
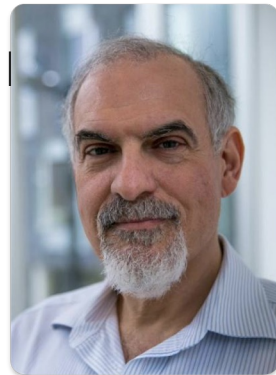
Past, present, and future of user interface software tools

TOCHI (2000) (ACM Transactions on Computer-Human Interaction)

Bibliometrics	Publication Years	Publication counts	Citation count
	1994 – 2024	873	44,211

Brad Myers

- Director and Professor of Human-Computer Interaction Institute @CMU
- ACM SIGCHI Lifetime Achievement Award in in 2017

Past, present, and future of user interface software tools

ACM Journals

- In-depth, well-developed research

- Lengthy review process

- More prestigious and long-term impact

ACM Conferences

- Preliminary or ongoing research findings

- Shorter papers with a faster turnaround

- Networking opportunities and emerging topics

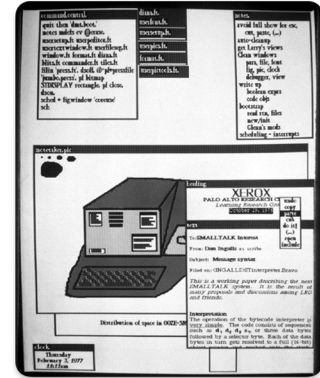# Past, present, and future of user interface software tools

Overview of the field

- Tools

- History

- Why things (not)worked

- Future

70's

90's

Past, present, and future of user interface software tools
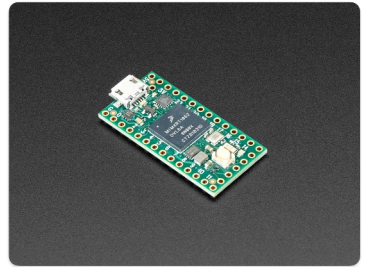
Future (Now?) Inquiries

- Low-Cost (manufacture/material)

- Ubiquitous Computing

- Machine Learning (recognition)

- XR (3D tech)

- End-User Programming

Past, present, and future of user interface software tools

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Past, present, and future of user interface software tools

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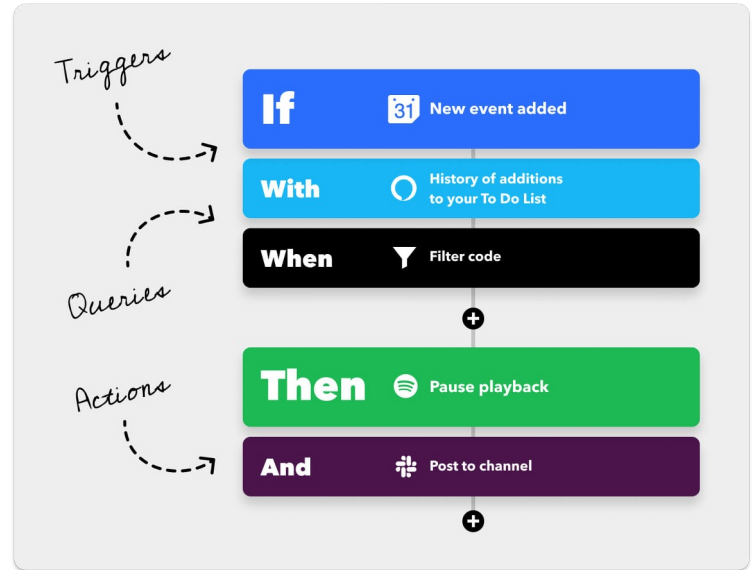- Machine Learning (recognition)

- XR (3D tech)

- **End-User Programming**

Past, present, and future of user interface software tools

- What is the type of contribution(s) articulated in this paper?
  - Empirical? Artifact? Theoretical?

Tangible Bits

"Tangible bits: towards seamless interfaces between people, bits and atoms"

CHI (1997)

Bibliometrics	Publication Years	Publication count	Citation count
	1981 – 2023	23,680	544,444

Hiroshi Ishii

- Professor of Media Arts and Sciences
- Associate Director of MIT Media Laboratory
- Director of Tangible Media Group @MIT
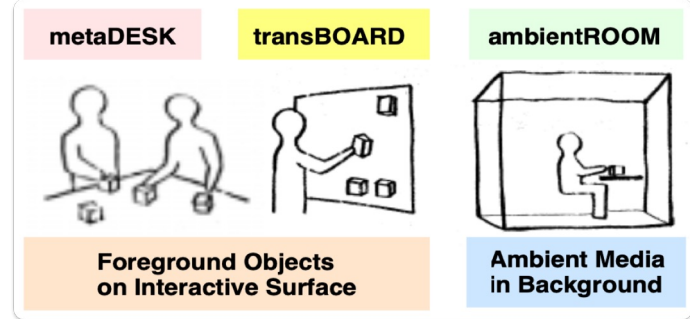- ACM SIGCHI Lifetime Research Award in 2019

Tangible Bits

Key Takeaways

- Bits & Atoms

- 3 Concepts

- Ubiquitous Computing

- AR

- Optical Metaphors

Tangible Bits

Key Takeaways

- Bits & Atoms
- **3 Concepts**
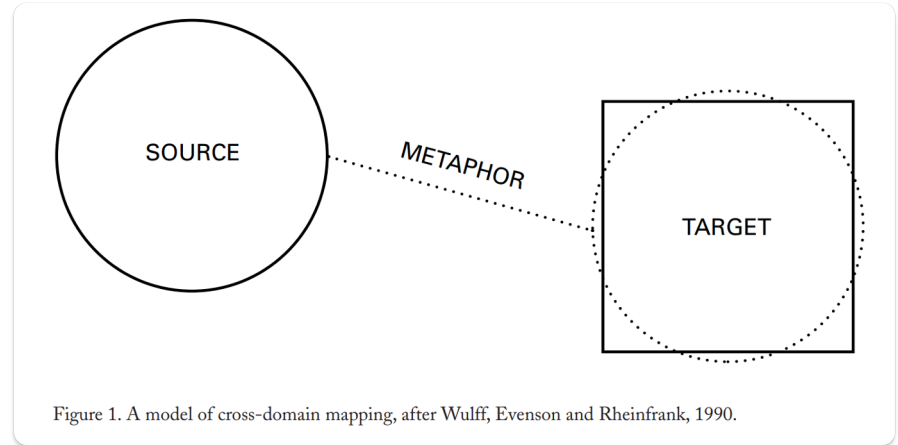- Ubiquitous Computing
- AR
- Optical Metaphors

Tangible Bits

Key Takeaways

- Bits & Atoms

- 3 Concepts

- **Ubiquitous Computing**

- AR

- Optical Metaphors

Tangible Bits

Key Takeaways

- Bits & Atoms
- 3 Concepts
- Ubiquitous Computing
- AR
- **Optical Metaphors**

Figure 1. A model of cross-domain mapping, after Wulff, Evenson and Rheinfrank, 1990.

Tangible Bits

- What are some common metaphors you see in current software user interfaces?

Pick-and-drop

"Pick-and-drop: a direct manipulation technique for multiple computer environments"

UIST (1997)

Bibliometrics	Publication Years	Publication count	Citation count
	1988 – 2023	2,893	80,106

Jun Rekimoto

- Professor, Interfaculty Initiative in Information Studies @The University of Tokyo
- Fellow, CSO (Chief Science Officer), Kyoto Research Director, Sony Computer Science Laboratories, Inc.

Pick-and-drop

Pick-and-drop/Tangible Bits/Past, present and future

Key Takeaways

- Ubiquitous Computing

- Augmented Reality

User Interface Communities

ACM Conferences

Conference
CHI
CHI: Conference on Human Factors in Computing Systems

Conference
UIST
UIST: User Interface Software and Technology

Conference
CSCW
CSCW: Computer Supported Cooperative Work

Conference
DIS
DIS: Designing Interactive Systems

User Interface Communities

Q & A

THANK YOU