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# Augmented and Virtual Reality

Lika Liu

# Augmented (Hyped) Reality

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Author:  
Keiichi Matsuda  
[https://www.youtube.com/watch?  
v=fSfKICmYcLc](https://www.youtube.com/watch?v=fSfKICmYcLc)

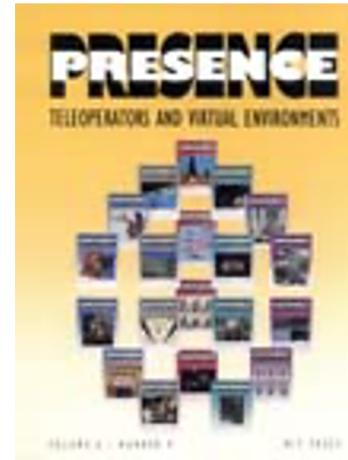
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# Augmented Reality through Wearable Computing

- Published in *PRESENCE: Virtual and Augmented Reality*, 1997

The longest-established academic journal that is devoted to research into teleoperation and virtual environments (3D virtual reality worlds)

- Authors: (The Media Lab, MIT) Thad Starner, Steve Mann, Bradley Rhodes, Jeffrey Levine, Jennifer Healey, Dana Kirsch, Rosalind W. Picard and Alex Pentland





## MIT Wearables, Version 1.0

Left-top to bottom right: [Rehmi Post](#), [Thad Starner](#), [Jennifer Healey](#), [Lenny Foner](#), [Dana Kirsch](#), [Bradley Rhodes](#), [Travell Perkins](#), [Tony Jebara](#)

Not pictured: [Richard W. DeVaul](#), [Nitin Sawhney](#), [Maggie Orth](#), [Steve Schwartz](#), Chris Metcalfe, [Kevin Pipe](#), Joshua Weaver, Pamela Mukerji

Alumni: [Thad Starner](#), [Steve Mann](#)

<https://www.media.mit.edu/wearables/lizzy/>

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# Augmented Reality through Wearable Computing



**Thad Starner**

Professor at Georgia Tech

Founder and director of the Contextual Computing Group

Ph.D in Media Arts and Science (1999) from the MIT Media Laboratory

Wearable computing pioneer

Coined the term "augmented reality" in 1990 to describe the types of interfaces he envisioned for the future

Has been using a head worn display as part of his daily life since 1993

**Research Areas:**

Wearable Computing, Human-Computer Interaction

# Thad Starner

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# Augmented Reality through Wearable Computing



**Steve Mann**

Professor

Electrical and Computer Engineering at University of Toronto  
Ph.D in Media Arts and Science (1997) from the MIT Media Laboratory

"Father of Wearable Computing"

Cofounded InteraXon, makers of the Muse brain-sensing headband  
Founding member of the IEEE Council on Extended Intelligence (CXI)

**Research Areas:**

Augmented reality, computational photography, particularly wearable computing, and high dynamic range imaging

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# Augmented Reality through Wearable Computing



**Rosalind W. Picard**

Professor of Media  
Arts and Sciences  
Co-Director, Faculty  
Chair, MIT

**Research Areas:**  
Affective  
computing



**Bradley Rhodes**

Research scientist  
Ricoh Innovations



**Jennifer Healey**

Senior Research  
Scientist  
Adobe

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## Augmented Reality through Wearable Computing

- Created a text-based wearable augmented reality that integrates search engine, data storage and overlay text.
- Surveys context-sensing technologies (such as physically based hypertext, 3D graphical overlays and tags, hyper-fisheye) enables augmented reality to be more personal and adaptable.
- Argues that wearable augmented reality can act as a personal guide to physical spaces and also adapts for its user's ability (p.395).

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# Making It Personal: Addressing Individual Audience Members in Oral Presentations Using Augmented Reality (2020)



**Dhaval Parmar**

Postdoctoral research associate

Working with professor Timothy Bickmore

Northwestern University

Ph.D in Computer Science with a specialization in Virtual Reality from Clemson University  
Research area: human centered computing

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# Making It Personal: Addressing Individual Audience Members in Oral Presentations Using Augmented Reality (2020)



**Timothy Bickmore**

Professor, Associate Dean of Research  
Northwestern University

Ph.D in Media Arts & Sciences, MIT Media Lab in 2003

**Research area**

Human-computer interaction

Dialogue systems

Intelligent virtual agents

Avatars

Personal health informatics

Human-robot interaction

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## Making It Personal: Addressing Individual Audience Members in Oral Presentations Using Augmented Reality (2020)

- An augmented reality that uses 3D graphical and textual overlay for the speaker to receive real-time feedback from the audience.
- Displaying information in an unobtrusive way is still a challenge 20 years from Starner's work.
- “It is easy to cross the boundary between useful information and overwhelming clutter”.

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## Discussion

Wearable augmented reality attempt to provide informative or entertaining overlays on the physical world (Starner, 395). The wearable computer models its user's knowledge, actions, goals and even emotions in order to assist the user unobtrusively.

**Q1: What are limitations of existing non-wearable ubicomp technologies?  
Is wearable augmented reality the ultimate solution? Pros and Cons?  
(Arthur, Jo, Jason, Neeraj)**

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# Envisioning Ubiquitous Computing (2012)



## Stuart Reeves

Assistant Professor

Mixed Reality Lab, School of Computer Science

B.S Computer Science and Ph.D in HCI, University of Nottingham

Recent publication: Stuart Reeves, 2019. How UX practitioners produce findings in usability testing ACM Trans. Comput.-Hum. Interact.. 26(1), 3:1-3:38

## Research areas

Human-computer interaction, collaborative computing, design research

Ethnomethodology and conversation analysis

Ethnomethodology is the study of how social order is produced in and through processes of social interaction. It generally seeks to provide an alternative to mainstream sociological approaches. In its most radical form, it poses a challenge to the social sciences as a whole.

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## Envisioning Ubiquitous Computing (2012)

- Analyzes how early ubicomp envisionings have played an instrumental role orienting research understandings to a particular set of assumptions about ubicomp technology design.
- Locates and exhibits some of the historical ways in which ubiquitous computing has used envisioning.
- Disentangle ways in which envisionings in ubicomp can be interpreted: as a *forecast* of future environments, as *projection* from existing technologies, and as a *fictive* scenario-based depiction of a socio-technical environment.
- Discusses benefits and dangers of envisioning: determinism in narratives and trajectories; future is the present; disentangling fiction from envisioning; focus versus diversity

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## Discussion

“...thus technology here is assigned a transformative power and trajectory, and, crucially, ubicomp is framed in the context of a societal mission and change(p. 1574). “

**Q2: What are the current /future societal situations that are amenable to ubicomp solutions? Envision: what are possible future directions for ubicomp?(Jo, Colby)**

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## Discussion

Weiser's envisioning specifically focused on supporting everyday interactions, context awareness, capture of everyday experience, 'natural' interfaces and 'calm' computing.

**Q3: 30 years have passed since Weiser proposed the idea of ubicomp, how much have we achieved Weiser's envision (Dennis)? Or as Bell and Dourish suggest, 'ubiquitous computing' has arrived into our everyday lives, but this presence and our future is different from Weiser's envisioning?**

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## Discussion

Reeves demonstrates what ‘envision’ means in ubicomp, and how it can be read and interpret as projection, forecast, and fiction.

**Q4: What are the benefits and danger of envisioning  
(Colby,Maruf,Jason)? In what ways envisioning could benefit or harm  
your own research(Neeraj)?**

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## Discussion

VR vs Ubicomp

VR: technology being used to draw users into a generated reality,

Ubicomp: technology is seen as being designed to fit in with the reality of the everyday world

**Q5: Will ubicomp stay on the inverse direction of virtual reality? Is there a future where the boundary between augmented and virtual reality can not be clearly defined (Jo, Arthur)**