Hi all, I'm Noura Howell, a new assistant professor in Digital Media. Today I'd like to talk with you all about Exploring the promise and peril of emotion AI, designing for emotional meaning-making with data, and imagining an affirmative biopolitics with data.

About me

Zoom can feel so impersonal, so first I wanted to share a bit about myself.

I did undergrad at Olin College of Engineering, then worked as a software developer at The Echo Nest and Intel Labs, and as a research assistant at the MIT Media Lab... then went to grad school at Berkeley where I was a member of the BioSENSE lab.

Having worked with data as a software engineer, and tried to understand people's needs and emotions as a designer, I got a varied and interdisciplinary perspective on both technical aspects of building technology, and social aspects of how technology influences our social interactions.

Context: Emotion AI

We need to imagine alternatives with biodata and AI.

My design research imagines alternatives with biodata.

- What if people made emotional meaning with biodata?

- What if biodata supported affirmation over insight?

Imagining an affirmative biopolitics with data

Here is our roadmap for today. First I'll introduce the context of emotion AI and some applications. I'm going to argue that we need to imagine alternatives with emotion AI and the biodata it's built on - data about human bodies and behaviors. My design research imagines alternatives with biodata and drawing emotional inferences from biodata. What if people made emotional meaning with biodata? What if biodata supported affirmation over insight? Finally, I'll end with some questions about imagining and moving towards an affirmative bio politics with data.

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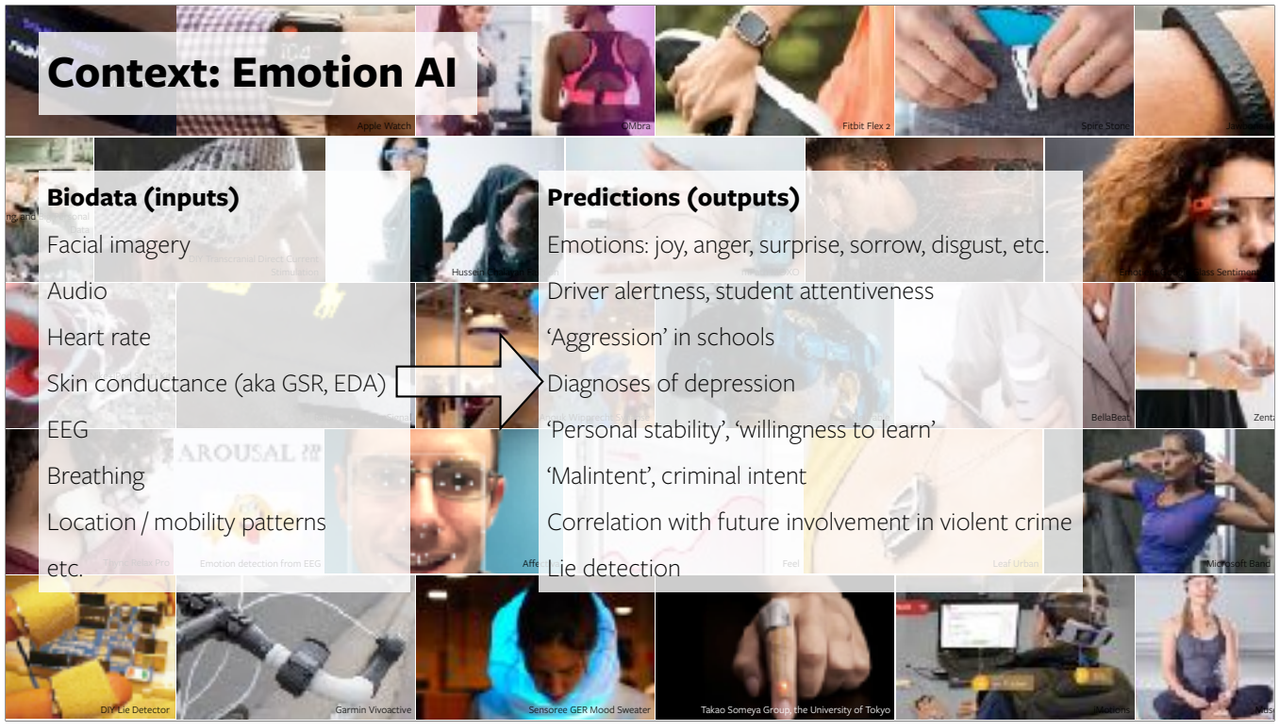


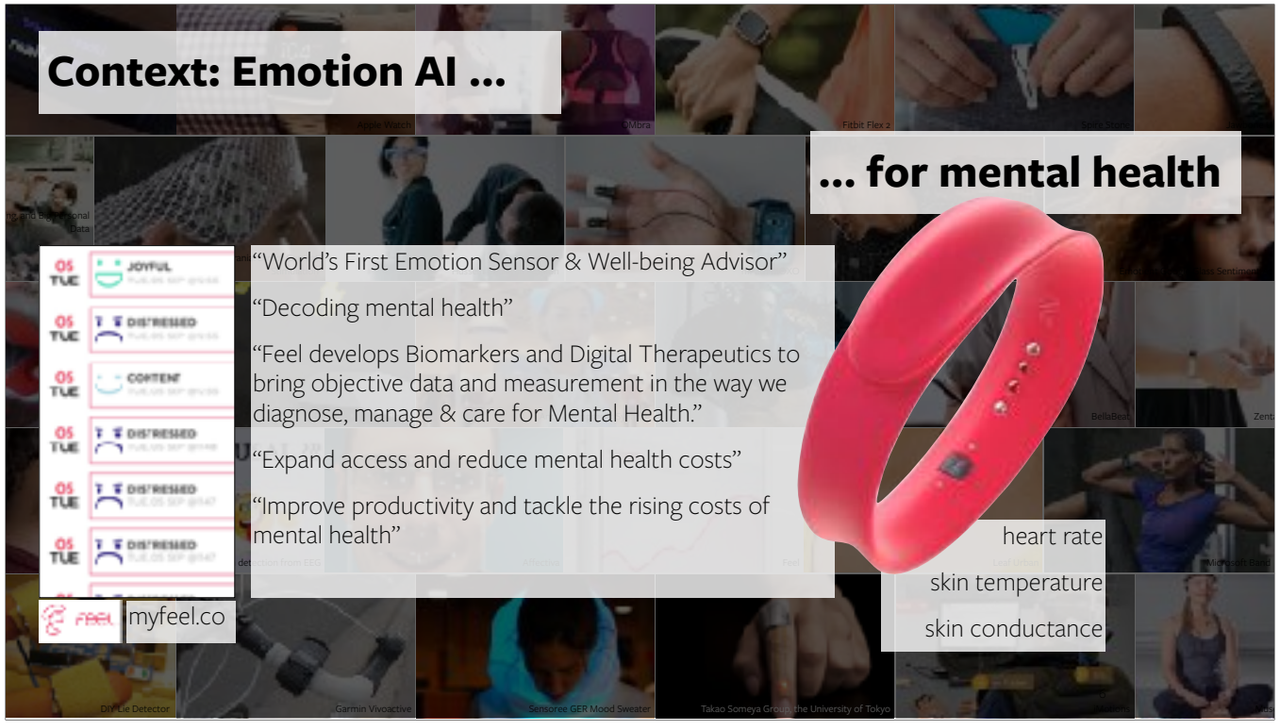
Emotion AI predicts psychological characteristics from biodata.

By biodata, I mean data about human bodies and behaviors. There are many many bio sensing technologies already out there, some wearable such as skin conductance, some that sense people remotely such as cameras or microphones.

Emotion AI analyzes biodata to try to infer psychological characteristics, especially categories of emotion. There's a lot of research behind all this - Ros Picard's Affective Computing group at MIT, for instance - and many different kinds of sensors and analysis that can go into trying to infer emotions and other psychological characteristics using physiological signals.

I'm particularly interested in how emotional bio sensing technologies get applied, how they can reshape interactions, and how - like any technology - they can help or harm people, and embed politics and values.

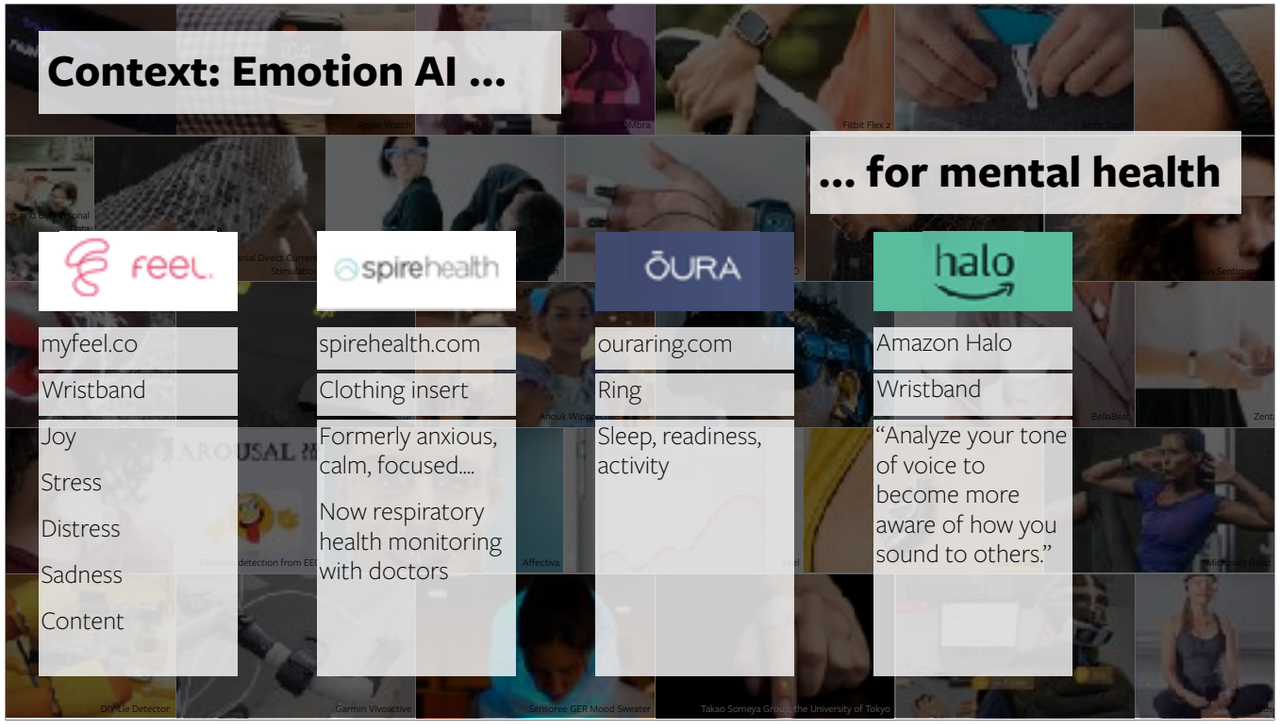
So let's quickly look as some examples of real-world emotional bio sensing technologies.



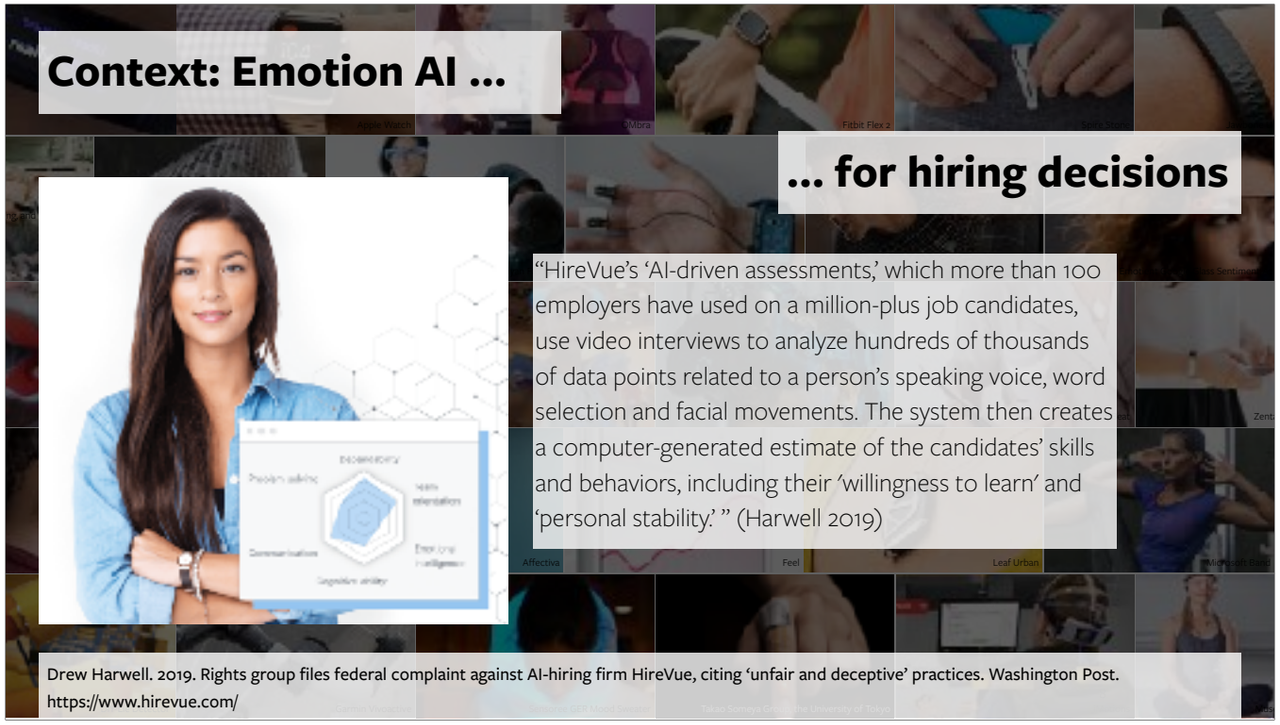
For example, the Feel wristband claims to be the "World's First Emotion Sensor & Well-being Advisor", "Decoding mental health" and "bringing objective data and measurement in the way we diagnose, manage, and care for mental health" - quoting their home page.

I had the privilege of meeting their co-founders a few years back, and they seem to have good intentions of wanting to destigmatize mental illness and make therapy more accessible and affordable. And yet, I'm suspicious of the company's appeal to employers - to improve productivity and reduce health care costs by trying to partially automate therapy.

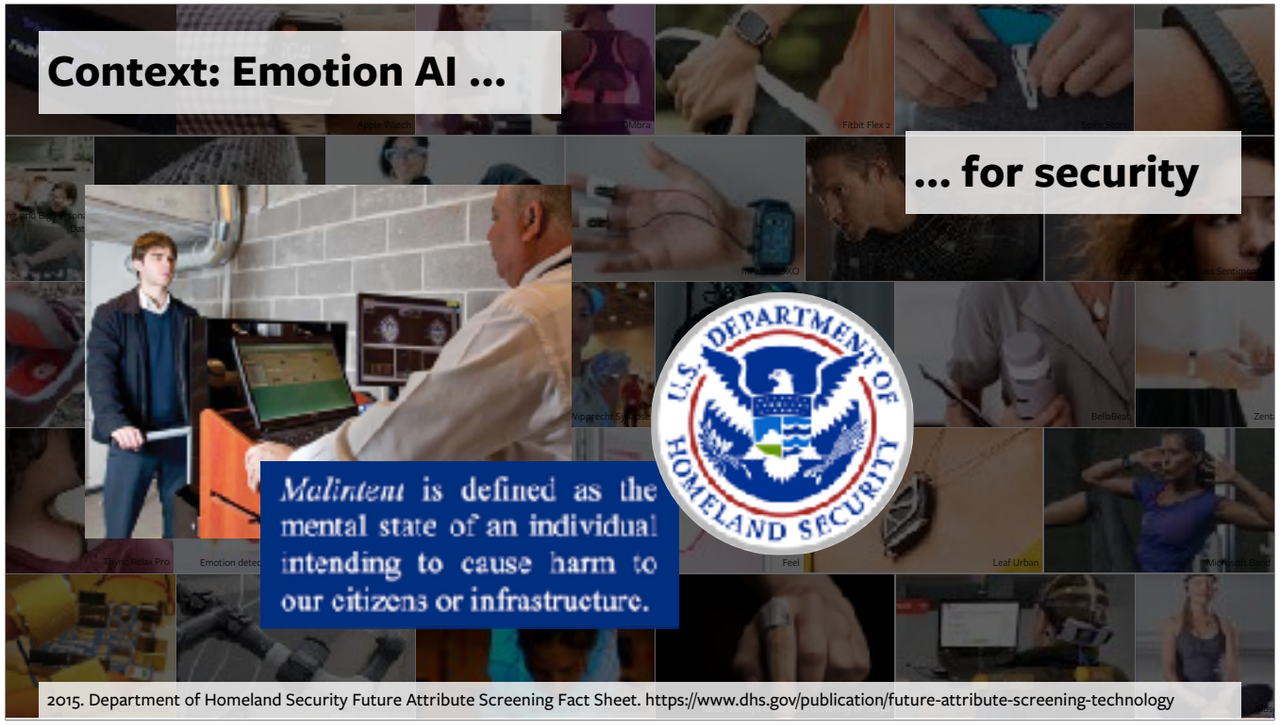
Also, as with a lot of emotional biosensing, the underlying technology is claiming to detect discrete, universal categories of emotion that transcend culture, context, and language. This is a very reductive way to represent human emotional experiences. A few years ago Feel was claiming they could automate Cognitive Behavioral Therapy, but now at least they include video sessions with a human therapist as part of their program. I think this speaks to the importance of human interpretation of emotion.



Feel is not an isolated example, there are many other products that use emotional bio sensing for mental health, some examples here, just moving along for the sake of time

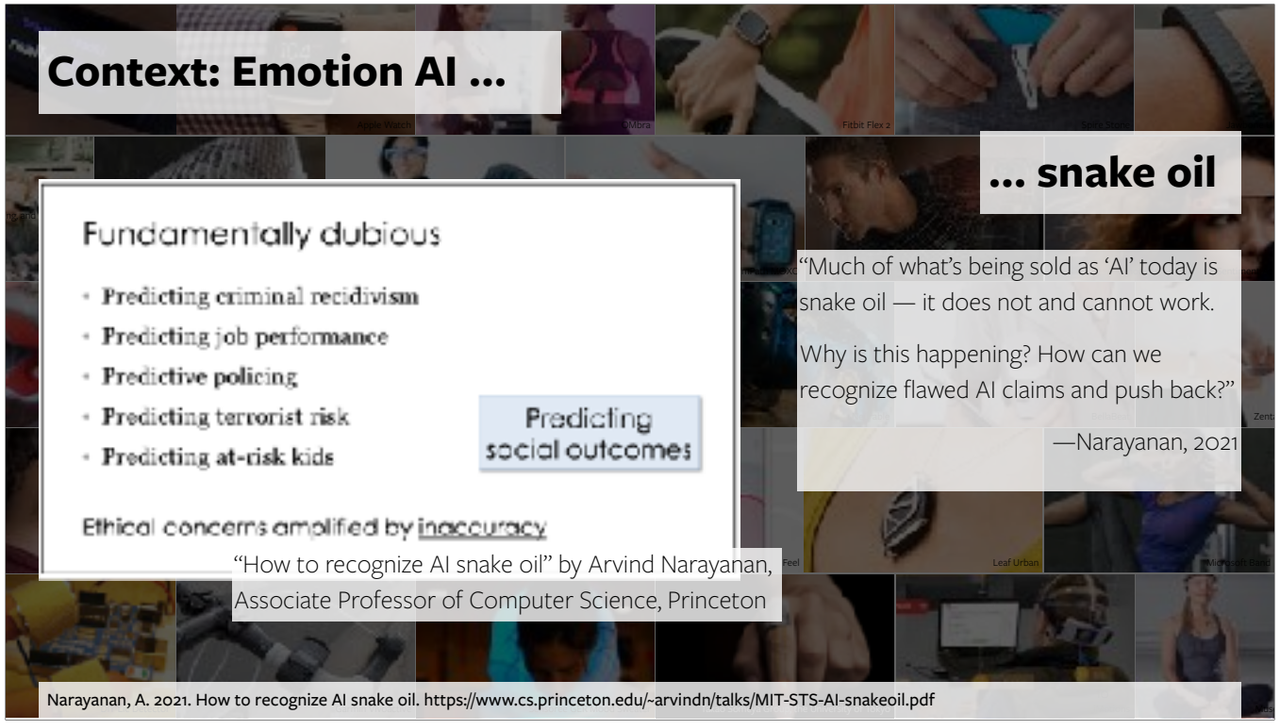


HireVue is an online hiring platform. Job candidates can go through a series of online assessments, and record video responses to interview questions. Hiring managers can watch their videos later and utilize HireVue’s algorithmic judgments of things like the job candidate’s ‘willingness to learn’ and ‘personal stability’. HireVue’s algorithmic judgments are based on the video of facial movements and audio of the voice. EPIC, the Electronic Privacy Information Center, filed a complaint against HireVue with the FTC for ‘unfair and deceptive’ practices.



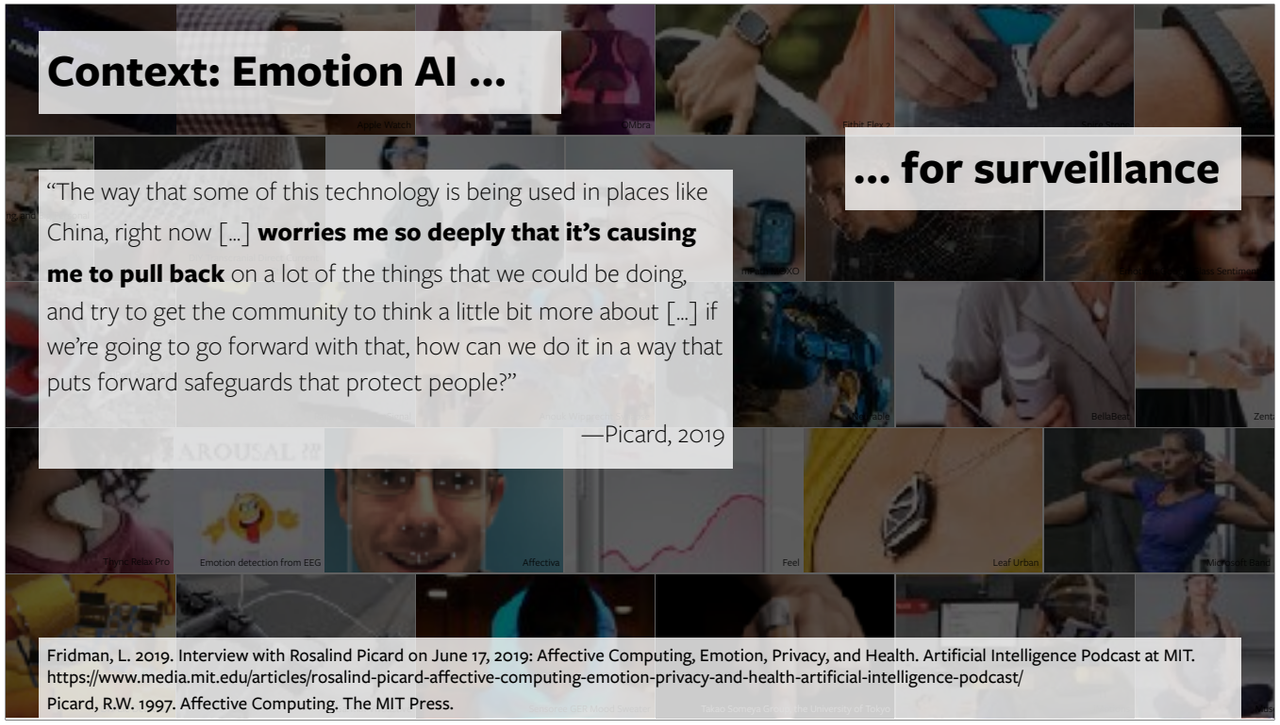
As another example, the Department of Homeland Security has some troubling project proposals around detecting “malintent” especially at airports, where malintent is defined as the mental state of an individual intending to cause harm to our citizens or infrastructure. As if that is a discrete mental state that can be ‘detected’ using physiological signals.

The risk of false positives in this context is extremely upsetting - It could wrongfully label someone a security threat or a terrorist.

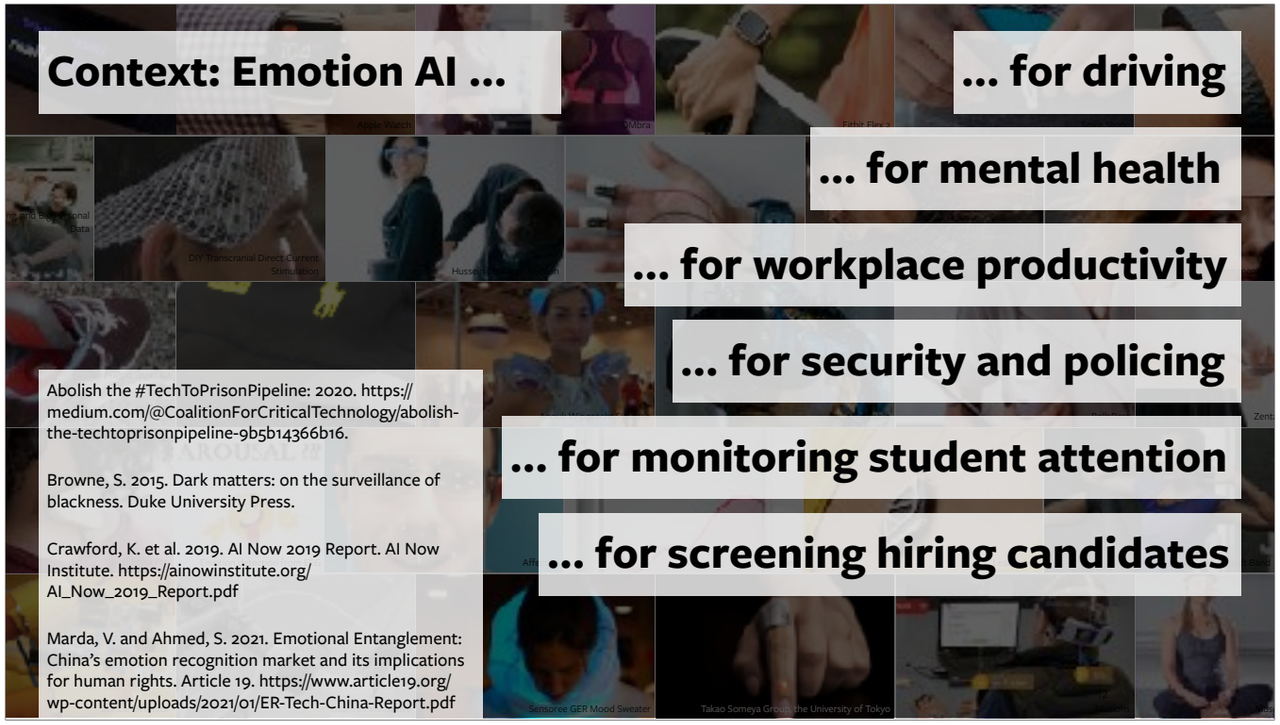


Arvind Narayanan, Associate Professor of Computer Science at Princeton, recently described many emotion AI applications as snake oil.
Quoting him, [read the quote]

He describes trying to use AI to predict social outcomes as fundamentally dubious. This includes some of the applications we just looked at for predicting future job performance or predicting terrorist risk.



Emotion AI relies on techniques of affective computing, which uses sensors and biodata and algorithms to predict emotional categories. Ros Picard, Professor at MIT Media Lab, basically started the field of affective computing, she literally wrote the book. Picard says, [read the quote]



Emotional AI has spread way beyond individual mental health applications. It's being used for security and policing, for monitoring student attention and teacher effectiveness, for screening hiring candidates, and other applications. The AI Now Institute's report summarizes many existing applications for emotion recognition AI. And the report by Marda and Ahmed investigates emotion AI in China and how, when used for surveillance, emotional bio sensing violates human rights.

Surveillance typically aims to sense people without their knowledge in a way they can't avoid.

Here, rather than representing emotion as sort of general-purpose categories like "happy" or "sad" spanning a range of emotions, with surveillance the focus is typically more on ranking people as 'better' or 'worse' - Ranking teachers based on automated estimates of whether their students paying attention - Ranking job candidates based on categories of 'confidence' and 'positive affect' analyzed in their video interview - Judging whether an airline traveler is 'safe' or has 'terrorist intentions' based on their biodata. The emotional representations are more closely tied to value judgments about performance or criminality.

People's biodata can be collected, analyzed, and interpreted without their knowledge or consent, and used to make unfair, harmful judgments about them. Such as labelling someone a bad student, rejecting their job application, or labelling them a terrorist.

Experts with the Coalition for Critical Technology point out that trying to infer psychological characteristics from physiology extends a legacy of phrenology - racist pseudoscience that was used to try to justify inherent racial superiority in some and and 'detect' criminality, inferiority, or 'barbarism' in others based on physical characteristics. And, even with more recent efforts to

reduce bias, improve fairness and transparency, and so on, time and again in practice surveillance tends to reinforce patterns of historical and ongoing oppression.

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We need to imagine alternatives with biodata

Browne - Critical Biometric Consciousness

Buolamwini, J. and Gebru, T. 2018. Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification. Proc. Machine Learning Research.
Browne, S. 2015. Dark matters: on the surveillance of blackness. Duke University Press.
Rhue, L. 2018. Racial Influence on Automated Perceptions of Emotions. Technical Report #ID 3281765. Social Science Research Network.

My work is inspired by Browne's call for a 'critical biometric consciousness'. Browne, Associate Professor of African and African Diaspora Studies at UT Austin and Research Director of Critical Surveillance Inquiry, connects biometric surveillance with patterns of historical and ongoing oppression, especially along axes of race and gender.

We need to imagine alternatives with biodata

Browne - Critical Biometric Consciousness

"There is a notion that these technologies are infallible and objective and have a mathematical precision, without error or bias on the part of the computer programmers..." (Browne, p.115)

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She explains, "There is a notion that these technologies are infallible and objective and have a mathematical precision, without error or bias on the part of the computer programmers." OK, I think anyone who has had to debug their code knows that computer programmers make mistakes sometimes. But, not everyone is a coder, and society still seems willing to invest a great deal of trust and authority in technologies especially AI.

We need to imagine alternatives with biodata

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A critical biometric consciousness "entails informed public debate around these technologies and their applications, and accountability by the state and the private sector" (p. 116)

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Browne critiques over-confident claims to objectivity and accuracy with biometric surveillance technologies, and calls for informed public debate around these technologies and their applications, and accountability by the state and the private sector.

We need to imagine alternatives with biodata

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"Importantly, a critical biometric consciousness must acknowledge the connections between contemporary biometric information technologies and their historical antecedents" (p. 118)

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And, "importantly, a critical biometric consciousness must acknowledge the connections between contemporary biometric information technologies and their historical antecedents" - problems with biometric surveillance are not isolated technical bugs, they extend patterns of historical and ongoing systemic oppression.

In recent years perhaps a critical biometric consciousness is starting to grow. AI bias has become well known, for example intersectional biases in facial recognition along race and gender. And there has been some more public debate and critique of tech companies' data collection. Some cities have banned facial recognition technology. Yet in other cities, police departments have started using Clearview AI facial recognition, which has led to wrongful arrests of Black men.

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How can computing and design researchers engage a critical biometric consciousness?

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How can computing and design researchers engage a critical biometric consciousness?

To be clear, I don't think my work directly 'answers' Browne's call for a critical biometric consciousness. But it's a really important source of inspiration for me and I think this call could have a broader influence in HCI! :)

We need to imagine alternatives with biodata

How can computing and design researchers engage a critical biometric consciousness?

Whitney, C.D., Naval, T., Quepons, E., Singh, S., Rick, S.R. and Irani, L. 2021. HCI Tactics for Politics from Below: Meeting the Challenges of Smart Cities. CHI.

Wong, R.Y. and Mulligan, D.K. 2019. Bringing Design to the Privacy Table: Broadening "Design" in "Privacy by Design" Through the Lens of HCI. CHI.

Sturdee, M., Lindley, J., Linehan, C., Elsden, C., Kumar, N., Dillahunt, T., Mandryk, R. and Vines, J. 2021. Consequences, Schmonsequences! Considering the Future as Part of Publication and Peer Review in Computing Research. CHI'21 Workshop.

How can computing and design researchers engage a critical biometric consciousness?

Most of us in HCI aren't involved in directly building out the next giant biometric surveillance infrastructure that's obviously intended to oppress people. We're often working at a much smaller scale, and have a lot more control over the situation to make sure that participants in studies are treated well, the technology works equally well for everyone involved, and our lab group interactions are fair and supportive. That's important. That's like a good baseline minimum.

We need to imagine alternatives with biodata

How can computing and design researchers engage a critical biometric consciousness?

As HCI influences industry practice, what values, techniques, and norms does HCI promote with that influence?

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But how can we do more? As HCI research influences broader practice by tech companies and the government, what techniques and values are we promoting in our HCI research? And how might those techniques and values get adopted, adapted, co-opted by others who are working at larger scales?

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Privacy, participatory design, ethnographic work...

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Of course HCI privacy researchers are already all over this. And some participatory design and community-oriented HCI work that works with community groups to resist and dismantle oppressive systems of surveillance.

We need to imagine alternatives with biodata

How can computing and design researchers engage a critical biometric consciousness?

As HCI influences industry practice, what values, techniques, and norms does HCI promote with that influence?

Privacy, participatory design, ethnographic work...

But also, design researchers building biosensing technologies can play a role in imagining critical alternatives.

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In addition to that, I also see more opportunities for design researchers to rethink their engagement with biodata and especially emotion AI with biodata, by imagining alternative futures with biodata.

We need to imagine alternatives with biodata

Sociotechnical imaginaries are "collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared under-standings of forms of social life and social order attainable through, and supportive of, advances in science and technology." (Jasanoff, p.4)

Jasanoff, S. and Kim, S.-H. 2015. Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power. University of Chicago Press.

OK, so what is all this talk about imagination with technology development anyway. Well, sociotechnical imaginaries can help get a handle on thinking about the role of imagination in technology development.

A sociotechnical imaginary is a socially and institutionally held shared vision of a desirable future that includes not only technology but also shared ways of living that go along with that technology.

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How society imagines the future of technology and ways of living with technology influences the future.

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How society imagines the future of technology, and ways of living with technology, influences the future. It influences what kinds of technology get built, what startups get venture capital funding, what questions researchers ask, what laws policymakers enact.

For example, technology will make us more efficient, and being more efficient is a good thing. Or another example, the internet will make us connected as part of a global community. This is one I feel like I grew up with, all the optimism and excitement about the internet when we first got it at home with a dial-up connection, but when I tried to run this idea past my students last fall they were pretty cynical about it.

I would argue that the trust in emotion AI to make reliable predictions is in part bolstered by a sociotechnical imaginary about the power of data. I might be stretching the term here, but I think it's a helpful way to consider the weight of that societal narrative that data is the most authoritative way of knowing and making decisions.

Sociotechnical imaginaries operate at a societal scale. As individuals, we might have different interpretations of them, we might even disagree. My students didn't believe in the narrative of a positive global online community. Personally, I'm not on board with the idea that being more efficient is always a good thing.

And yet, we still operate within a societal discourse of prevalent sociotechnical imaginaries. They influence what research gets funding from NSF, how mainstream media reports on technology - what counts as a shiny new innovation, what happy promises or doomsday predictions people make with technology, and what stories get told about how we might live with technology in the future.

This leads to really important questions such as, Do you feel included in those stories of where technology is headed? Who do those stories include, and who gets left out? Because they operate at a societal level, sociotechnical imaginaries can be really hard to shift.

We need to imagine alternatives with biodata

Benjamin - Captivating Technology & Liberatory Imagination

Davis, A.Y. and Kelley, R.D.G. 2012. The meaning of freedom. City Lights Books.

Appadurai, A. 2008. Modernity at large: cultural dimensions of globalization. Univ. of Minnesota Press.

Benjamin, R. 2019. Introduction: Discriminatory Design, Liberating Imagination. Captivating technology: race, carceral technoscience, and liberatory imagination in everyday life. Duke University Press.

In light of the issues we examined with emotional biosensing surveillance, how can design researchers resist, rework, and reimagine emotional bio sensing?

Ruha Benjamin, Professor of African American Studies and founding Director of the Ida B. Wells Just Data Lab Ruha Benjamin, and a keynote speaker at CHI this past year, describes how technology not only captivates our imagination, but is also part of discriminatory mass incarceration in the U.S.

We need to imagine alternatives with biodata

Benjamin - Captivating Technology & Liberatory Imagination

"How, then, might we craft a justice-oriented approach to technoscience?" (Benjamin, p.11)

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"How, then, might we craft a justice-oriented approach to technoscience?" (Benjamin, p.11)

"**Dangerous limits have been placed on the very possibility of imagining alternatives.** These ideological limits have to be contested. We have to begin to think in different ways. Our future is at stake." (Angela Davis, quoted by Benjamin)

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For advice, Benjamin turns to Angela Davis's advice on mass incarceration and abolition: [read the quote]

We need to imagine alternatives with biodata

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"How, then, might we craft a justice-oriented approach to technoscience?" (Benjamin, p.11)

"**Dangerous limits have been placed on the very possibility of imagining alternatives.** These ideological limits have to be contested. We have to begin to think in different ways. Our future is at stake." (Angela Davis, quoted by Benjamin)

Imagination is "no longer mere fantasy (opium for the masses whose real work is elsewhere), no longer simple escape (from a world defined principally by more concrete purposes and structures), no longer elite pastime (thus not relevant to the lives of ordinary people), and no longer mere contemplation (irrelevant for new forms of desire subjectivity)... **The imagination is now central to all forms of agency, is itself a social fact, and is the key component of the new global order**." (Arjun Appadurai, quoted by Benjamin)

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Imagination can be really powerful.

[read the quote]

Benjamin calls for liberatory imagination, to imagine and foster and build alternatives

Design futuring, critically-oriented design research

"**Design futuring** approaches, such as speculative design, design fiction and others, seek to (re)envision futures and explore alternatives" (Kozubaev et al., p. 1) to invite discussion and reflection about alternative futures

Dunne, A. and Raby, F. 2013. Speculative everything: design, fiction, and social dreaming. The MIT Press.

Kozubaev, S., Elsden, C., Howell, N., Søndergaard, M.L.J., Merrill, N., Schulte, B. and Wong, R.Y. 2020. Expanding Modes of Reflection in Design Futuring. Human Factors in Computing Systems.

Design futuring offers ways to imagine alternatives with technology.

[read the quote]

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Critically-oriented design research (speculative, critical, adversarial, discursive, reflective, etc etc etc design research approaches) help people critically reflect on technology

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Critically oriented design research approaches, such as speculative design, critical design, discursive design, reflective design, critical making, etc, are intended to help people critically reflect on and debate technology and its societal implications

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These approaches can be well-suited for raising critical biometric consciousness

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I think design futuring and critically oriented design research can invite discussion and reflection about alternative futures and in so doing help raise a critical biometric consciousness

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Imagining an affirmative biopolitics with data

My design research imagines alternatives with data

As some examples of the kind of design futuring work I do, before diving into projects in more detail, a quick overview of some of my work.

Much of my work looks at fostering open-ended emotional interpretation with highly ambiguous tangible data displays. Along with collaborators I've worked on fabric that gently gradually shifts colors in response to data in real time. Also detecting laughter from conversation and representing that as lights, chocolate, and keepsake soundbites in a delicate bottle.

OK, so from all this I got a handle on how we can have very tangible, embodied, emotional experiences with biodata, interpreting biodata, and ways of knowing with biodata. In a sense these are cutting edge real time data displays, but people aren't looking at a time series graph trying to find patterns. They're touching soft handwoven silk in between their fingers, or looking at a chocolate bar graph and remembering a conversation with their dad on the phone where they laughed, or noticing their friend's shirt and asking them how they are feeling.

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Imagining an affirmative biopolitics with data

What if people made emotional meaning with data?

Devendorf, L., Lo, J., Howell, N., Jung, L.L., Gong, N.-W., Karagozler, M.E., Fukuhara, S., Poupyrev, I., Paulos, E. and Ryokai, K. 2016. "I don't want to wear a screen": Probing perceptions of and possibilities for dynamic displays on clothing. CHI'16 - Best Paper Award.

Along with collaborators, we used color-changing fabric to create real-time data displays. This is different from typical screen-based data displays in a few ways. Instead of emitting light, it gradually changes color. It's slow. It's subtle. It's low resolution. And it looks and feels just like regular fabric.

[Click to play, mute yourself, sip water]
[unmute, describe what is happening for part of the video]

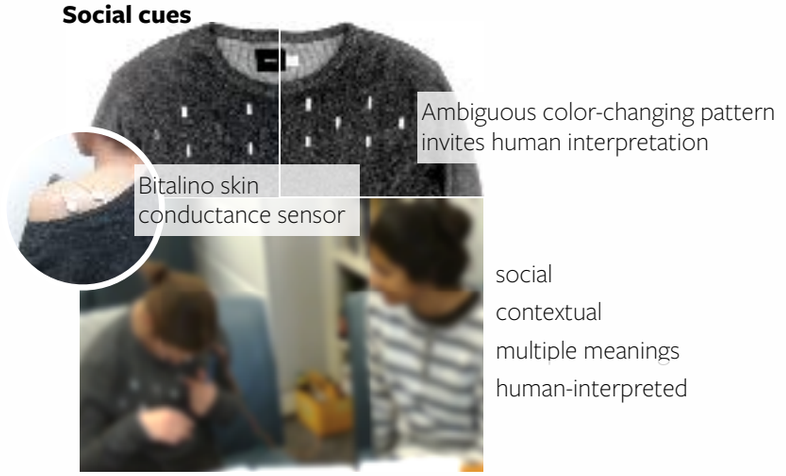
Using color-changing fabric as a data display can provide a very different experience with data compared to, say, screens.

What if people made emotional meaning with data?

Biosignals

feel. myfeel.co

Social cues



social
contextual
multiple meanings
human-interpreted

Gaver, W.W., Beaver, J. and Benford, S. 2003. Ambiguity As a Resource for Design. CHI.

Howell, N., Devendorf, L., Tian, R. (Kevin), Vega Gálvez, T., Gong, N.-W., Poupyrev, I., Paulos, E. and Ryokai, K. 2016. Biosignals as Social Cues: Ambiguity and Emotional Interpretation in Social Displays of Skin Conductance. Designing Interactive Systems.

I developed Hint, a t-shirt that changes color in response to the wearer's skin conductance. When the wearer's skin conductance spikes, small white rectangles gradually appear.

Micro-fluctuations in skin conductance are associated with various kinds of excitement such as feeling stressed or happily excited. For example, if you are giving a talk and feeling nervous about it, you might get sweaty palms - a spike in skin conductance. Or, if you are just having a great conversation with a friend and feeling happily engaged, you might also get an increase in skin conductance. So, skin conductance is inherently ambiguous - it can indicate positive or negative kinds of emotional excitement.

Leveraging ambiguity as a resource for design to invite open-ended interpretation, the color-changing pattern is intentionally highly ambiguous - it responds to a spike in skin conductance by gradually changing colors. So, it indicates that a moment of emotional excitement may have occurred, but leaves there rest up for interpretation.

Pairs of friends wore these shirts while having a conversation. They socially interpreted Hint's biodata display in a variety of ways, such as feeling empathy, fear, embarrassed, or passionate while debating.

As we saw before a lot of work with biosensing tries to extract these "signals" of our "true state". For example, Feel provides a few discrete categories of emotion.

In contrast to that, I think Hint provides something more like a bio-cue or a social cue. It's seen socially, the meaning is emergent in context, it can have multiple meanings, and the meaning is interpreted by humans.

That project showed interesting potential for ambiguous displays of skin conductance. Building on that, I redesigned the shirts to be more robust, and studied them with pairs of friends wearing the shirts throughout two days of their daily lives. It's called Ripple because the color-changing threads make a sort of ripple effect as they change color one by one.

What if people made emotional meaning with data?

Ripple: color-changing fabric skin conductance display

What if people made emotional meaning with data?

Ripple: color-changing fabric skin conductance display

What if people made emotional meaning with data?

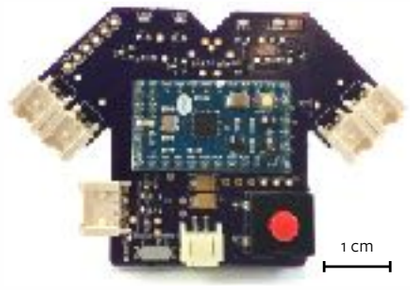
Ripple: color-changing fabric skin conductance display

What if people made emotional meaning with data?

Each pinstripe is a single conductive thread.

~ 2-7Ω resistance

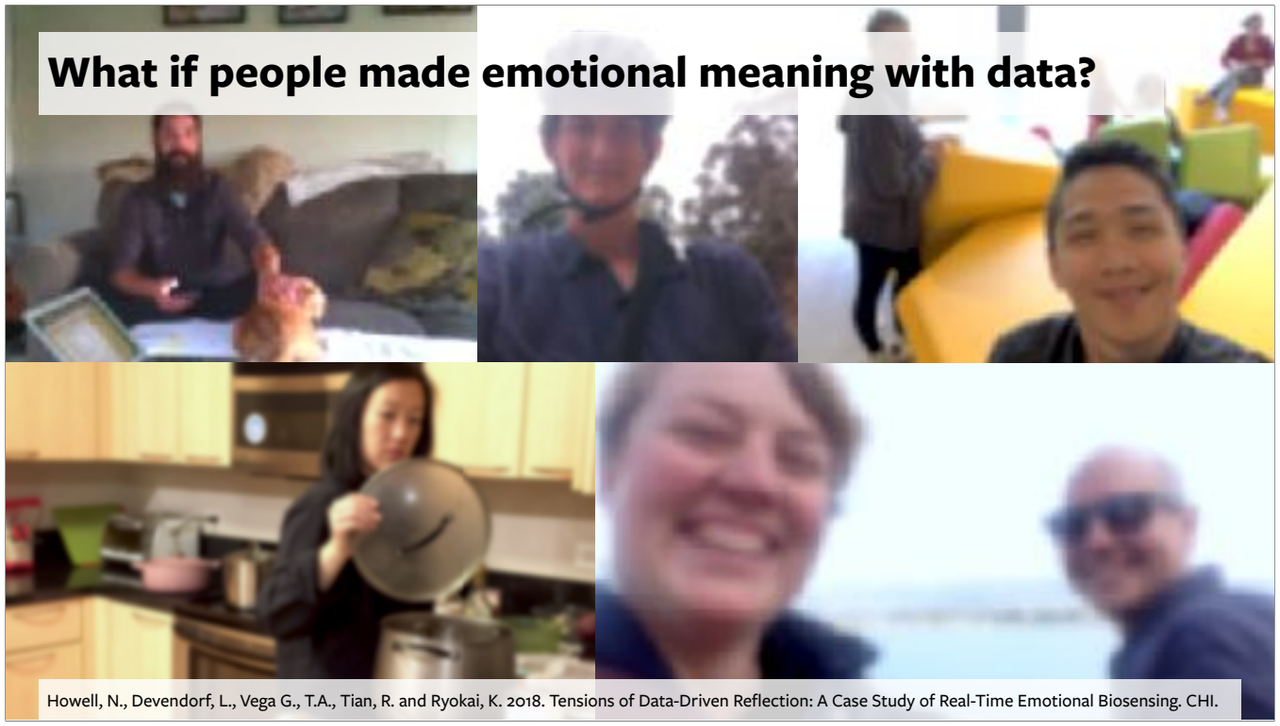
~ 450mA when on (100% duty cycle) or off (0%) via Arduino-controlled transistor



Howell, N., Devendorf, L., Vega G., T.A., Tian, R. and Ryokai, K. 2018. Tensions of Data-Driven Reflection: A Case Study of Real-Time Emotional Biosensing. CHI.

Another major design challenge for Ripple was that we wanted to study emotional interpretation in the context of participants' daily lives.

So, we made the technology lightweight and robust with a printed circuit board.



Participants wore Ripple while biking, doing the dishes, petting the cat - interpreting the display throughout many varied contexts of their daily lives.

As expected, sometimes the display prompted pairs to reflect on their feelings together. For example, a pair of spouses participated in the study just as they were about to move out of the country. They observed her display changing colors and attributed it to her stress about their upcoming move. They described how it prompted a conversation about how he can best respond to support her through that stress. In contrast to individual-focused emotional biosensing technologies, Ripple prompted social interpretation and social support.

Yet, I also observed tensions emerging. Some participants compared their displays and wanted them to change about the same ‘amount’.

Over lunch this same couple noticed that his shirt kept changing while hers did not. On the other hand, he complained his display had been on nearly nonstop during all of lunch.

suggest a desire for their displays to change about the same ‘amount,’ perhaps to support a sense of shared emotional experience over lunch.

But they also raise a question about what is an ‘amount’ here anyway? As a designer I tried to move away from an easily ‘quantifiable’ display of emotion, but even with Ripple’s highly ambiguous display people are making comparisons about ‘amounts’ of emotion...

What if people made emotional meaning with data?

Another tension: Lack of display response ~ lack of emotion ??

Insecurities around about how they 'should' feel

Thinking the display reveals their 'true' feelings (or lack thereof)

Authority of data

Biopower: Who or what has the authority to produce knowledge about feelings, bodies, health, life

Biopolitics: Contestations about biopower

Rabinow, P. and Rose, N. 2006. Biopower Today. BioSocieties.

Another tension that emerged: Some participants seemed to map a lack of display response to a lack of emotion. Some participants expressed concern that the shirt not responding might indicate that she was not a very emotional person, or in one case a participant worried that she was "broken and unfeeling".

Participants would sometimes worry about why the display was ***not*** changing colors and interpret this as meaning they were ***not*** having feelings at that moment. This opened up some insecurities where they worried about how they 'should' be feeling, and believing that the display is revealing their 'true' feelings - or lack of feelings.

Why didn't they just dismiss the display as flat out wrong? Other pairs of participants came back and told me the data display was totally unreliable, that it didn't mean anything at all. Honestly I was happier with that outcome - they felt able to disagree with and dismiss the data display - they trusted their own interpretation. Why, then, did other participants seem to believe that the data display was showing the truth of their emotions? Even when that felt wrong to them?

I think it's related to this sociotechnical imaginary about data as an authoritative way of knowing, data as somehow more trustworthy than our own feelings and our own bodies.

The authority invested in biosensing technology and the data produced by it makes it all the more important to carefully consider how the design of these technologies influences emotional interpretation.

What if people made emotional meaning with data?

Reimagining emotional biosensory data

screen	—>	fabric
precision	—>	ambiguity
individual	—>	social
data as digital, extracted	—>	data as material, entangled
detect and categorize	—>	invite open-ended reflection

OK, let's take a step back and reflect on some of the ways that these designs reimagine emotional biosensory data.

Instead of presenting biodata on a screen, biodata is presented as subtle color changes in fabric in clothing.

Instead of precision, the data and display are highly ambiguous to invite open-ended interpretation.

Instead of an individual display, these designs invite social interpretation.

Instead of treating data as digital or extracted, data is present in a very material form, and entangled with embodied and social context.

Instead of seeking to detect and categorize emotion, these displays mediate perception and participants decide the meaning of the display.

Context: Emotion AI

We need to imagine alternatives with biodata and AI.

My design research imagines alternatives with biodata.

- What if people made emotional meaning with biodata?

- **What if biodata supported affirmation over insight?**

Imagining an affirmative biopolitics with data

What if data supported affirmation over insight?

Smart city biosensing

With this project, I shift away from thinking about about individually worn wearable biosensors, toward thinking about biosensors embedded in the ‘smart city’ - to engage some of the concerns with emotional biosensing for surveillance that we talked about earlier.

What if data supported affirmation over insight?

Smart city biosensing

Smart city: sociotechnical imaginary, a shared vision of future technology and future ways of living

Sadowski, J., and Bendor, R. 2019. Selling Smartness: Corporate Narratives and the Smart City as a Sociotechnical Imaginary. Science, Technology, & Human Values.

By “smart city”, I mean a collection of narratives, proposals, and ideas around using embedded sensors and data in the cityscape. This shared vision for the future of cities can be thought of as a sociotechnical imaginary.

What if data supported affirmation over insight?

Smart city biosensing

Smart city: sociotechnical imaginary, a shared vision of future technology and future ways of living

Sensors, data —> clear insight —> safer cities and healthier people

Sadowski, J., and Bendor, R. 2019. Selling Smartness: Corporate Narratives and the Smart City as a Sociotechnical Imaginary. Science, Technology, & Human Values.

In this vision as it is usually presented, with more sensors we can get more data to get more insights, to know more and more aspects of human behavior and daily life in the city. By understanding more clearly, more transparently, through the use of computational models, cities can be made safer, and we can help people be more productive and more fit.

Maybe sounds good at first glance right?

What if data supported affirmation over insight?

Smart city biosensing… is problematic

Smart city: sociotechnical imaginary, a shared vision of future technology and future ways of living

Sensors, data —> clear insight —> safer cities and healthier people

Sadowski, J., and Bendor, R. 2019. Selling Smartness: Corporate Narratives and the Smart City as a Sociotechnical Imaginary. Science, Technology, & Human Values.

Yet, as we saw before, when biodata is enrolled for surveillance, this can too easily go awry.

What if data supported affirmation over insight?

Smart city biosensing... is problematic

Smart city: sociotechnical imaginary, a shared vision of future technology and future ways of living

Sensors, data —> clear insight —> safer cities and healthier people

Surveillance is not safety.

Latvala, A., et al. 2015. A Longitudinal Study of Resting Heart Rate and Violent Criminality in More Than 700 000 Men. JAMA Psychiatry.

Wang, C., Pun, T. and Chanel, G. 2018. A Comparative Survey of Methods for Remote Heart Rate Detection From Frontal Face Videos. Frontiers in Bioengineering and Biotechnology.

Surveillance is not safety. Surveillance is not applied to everyone equally, and there are many examples of seemingly objective data-driven insights that in practice reinforce societal bias against marginalized groups.

What if data supported affirmation over insight?

Smart city biosensing... is problematic

... safer for whom? discriminatory for others

Buolamwini, J. and Gebru, T. 2018. Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification. Proceedings of Machine Learning Research.

Controversial Face Recognition Firm Clearview AI Is Teaming Up With ICE: 2020. https://www.msn.com/en-us/news/technology/controversial-face-recognition-firm-clearview-ai-is-teaming-up-with-ice/ar-BB17Z982. Accessed: 2020-09-02.

Grother, P., Ngan, M. and Hanaoka, K. 2019. Face Recognition Vendor Test (FRVT) Part 3: Demographic Effects. Technical Report #NISTIR 8280. National Institute of Standards and Technology, U.S. Department of Commerce.

Hill, K. 2020. Another Arrest, and Jail Time, Due to a Bad Facial Recognition Match. The New York Times.

Hill, K. 2020. Wrongfully Accused by an Algorithm. The New York Times.

For example, Clearview AI facial recognition technology is used by some police departments to try to find suspects.

It is well established that facial recognition technology is less accurate for people with darker skin, and Clearview AI has been linked to wrongful arrests of Black people. Computer vision for a safer world... for some people and not others.

This is not the smart city I was hoping for.

What if data supported affirmation over insight?

Reimagining smart city biosensing

Need to **“reimagine what smart urbanism means and create counter-narratives that open up space for alternative values, designs, and models”** (Sadowski & Bendor, p. 541)

Sadowski, J., and Bendor, R. 2019. Selling Smartness: Corporate Narratives and the Smart City as a Sociotechnical Imaginary. Science, Technology, & Human Values.

Reflecting on some of these smart city visions, what I’m arguing for is...

We need to reimagine what smart urbanism means and create counter-narratives that open up space for alternative values, designs, and models.

This project joins with others in taking up this call and reimagining the role of sensors and data in the smart city.

I want city living to feel more like this. Someone made a bench into the rocks by the sidewalk. You can just sit a while, for free, without paying any money or giving up any data. You don't have to exercise or be productive either, just take a breather. Slow down.

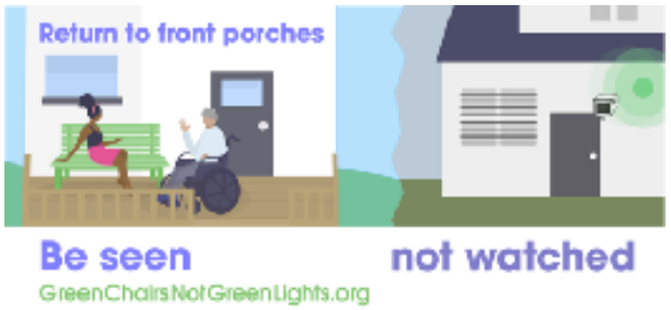
This was the starting point for me thinking about affirmation as an alternative design goal for biosensing in smart cities.

Though perhaps not usually discussed in these terms, affirmation can occur in public space: Benches affirm the needs of passerby to sit and rest. The stranger on the street who provides directions, or one who holds open a door for the person coming after. Of course, these daily affirmations of one's existence and needs are unequally experienced depending on privilege. I draw designerly inspiration from these mundane moments of affirmation, while remaining reflexive about my social position and social norms.

Some key reworkings of the smart city ideas here are that instead of surveillance, or sensing from above, people on benches see and sense each other and other people on the street level.

And instead of emphasizing efficiency or exercise or productivity, benches emphasize rest and slowing down.

What if data supported affirmation over insight?



“Green Chairs, Not Green Lights is a counter-campaign to Project Green Light. It calls on us to return to our front porches and see each other. It takes seriously the need to **end the conflation between surveillance and safety**, and to move from watching each other to seeing each other. Through our collaborative research, we determined that governmental entities, law enforcement and organizations who create, organize, enforce, or innovate from a **security or surveillance mindset, tend to make already marginalized community members less safe**.”

Recently I learned about the project Green Chairs Not Green Lights. Project Green Light is a surveillance program by the Detroit Police Department with cameras that stream live to the police headquarters.

[Read the quote]

With all that in mind, to rework the role of sensors and data in smart cities toward an experience of affirmation, I designed the heart sounds bench. It amplifies the heart sounds of bench sitters and invites a peaceful moment of rest and listening.

Here are two people experiencing the bench for the first time.

[mute your Zoom mic]

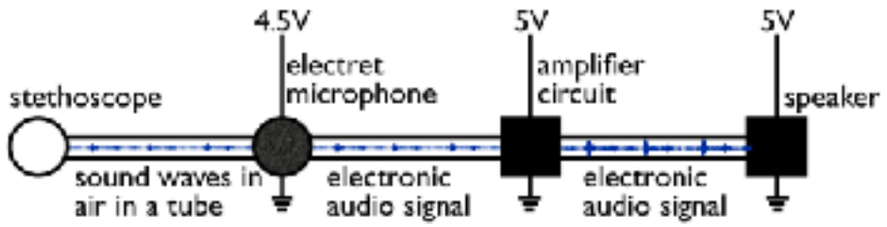
[sip water]

[unmute]

The two people just sit on the bench and listen to their heart sounds.

What if data supported affirmation over insight?

System



The technical setup is simple. A traditional medical-grade stethoscope hooked up to a microphone, hooked up to an amplifier, then to a speaker. The data is not saved, and it is displayed sonically not visually. Happy to talk shop offline. The technology is not new. The focus of this project is the new embodied experiences with data that this design explores, and how that can help reconfigure the role of sensors and data in smart cities.

What if data supported affirmation over insight?

Study

19 participants: 9 women, 10 men, aged mid twenties to mid thirties

8 pairs, 3 solo participants due to scheduling issues

20 minutes quiet bench time, 45-60 minutes post-interview

I invited pairs of strangers to experience the bench to probe social experiences of hearing one's own and another's heart sounds.

Many participants found listening to their own heart sounds to be a unique and compelling experience, and found it awkwardly intimate but also nice to hear another person's heart sounds. They often chatted while sitting together, or just sat quietly listening to their heart sounds.

What if data supported affirmation over insight?

"**It's a nice reminder of what's pulsing through everybody.** It's nice to be able to hear somebody else's heartbeat, just makes you that much more aware of that you're around somebody else who's living and breathing...

It just seems really sweet to me to hear that, to hear **somebody else's, the life pulsing through them."**

One of the more surprising findings that emerged was that many participants described feeling a sense of shared life energy including them self, their study partner, and people across the world. As one participant described it,

[read quote]

She talks about appreciating hearing her study partner's heart sounds, and takes that as a reminder of what's pulsing through everybody. Other participants similarly talked about hearts beating together across the world or feeling more connected to a shared sense of being alive.

Although it's factually obvious that she and her study partner are both alive - we're not getting any data-driven insight here - taking a moment to appreciate that shared living and breathing seemed to be a positive experience for many participants.

What if data supported affirmation over insight?

Opacity

Reflecting on this lack of insight from the heart sounds - heart sounds as a kind of data are pretty opaque for many people - there's some opacity at work here. Doctors get medical insights from stethoscopes, but the audio of the Heart Sounds Bench is not really suited for that. For most people heart sounds are opaque because they did not really feel that they gained any specific insight about the other person by hearing their heart sounds - yet there was a sense of connection and maybe people came to accept and appreciate one another a little bit more.

What if data supported affirmation over insight?

Opacity

(Transparency)

Sensors, data —> clear insight —> safer cities and healthier people

This is quite different than the role of sensors and data we saw earlier, where sensors and data were used to get clear insights. Instead of this clarity or transparency, we have opacity.

Instead of using sensors and data to ‘know’ humans more and more transparently, to know and understand and categorize and analyze every part of human behavior via data and computational models, the Heart Sounds Bench presents a fairly opaque stream of data that doesn’t really result in insight or clarity.

What if data supported affirmation over insight?

Opacity

(Transparency)

Sensors, data —> clear insight —> safer cities and healthier people

Opacity pushes back against transparency.

Opacity pushes back against transparency, and this helps reimagine the role sensors and data in smart cities.

Opacity can be a way to challenge and rework ways of knowing, and what we can or should claim to be able to know about people through data. And to be clear, while the opacity of algorithms is laudably critiqued elsewhere, here I'm talking about something else - about the opacity of humans.

In thinking about opacity in these terms I'm drawing from Glissant, a postcolonial philosopher from Martinique who advocated for Creole languages from his position in a French colony.

Glissant analyzes language as a way of knowing, and the limits of translation, but I think his argument is also useful for thinking about how we try to understand people via data.

What if data supported affirmation over insight?

Opacity

> "If we examine the process of **'understanding'** people and ideas from the perspective of Western thought, we discover that its basis is this requirement for **transparency**. In order to understand and thus accept you, I have to **measure** your solidity with the ideal scale providing me with grounds to make comparisons and, perhaps, judgments. I have to **reduce**... I relate it to my **norm**. I admit you to existence, within my system." (p. 189-190)

Glissant, É. 1997. For Opacity. Poetics of Relation. The University of Michigan Press. 189–194. Translated by Betsy Wing.

So, quoting Glissant here,

[read the quote]

Data-driven categories and models often try to understand people in terms of measuring them against an ideal scale embedded in the computational model to make comparisons and judgments. Data-driven categories have a tendency to reduce things into categorical norms, and something gets lost in translation.

What if data supported affirmation over insight?

Opacity

"We clamor for the right to **opacity** for everyone." (p. 194)

Glissant, É. 1997. For Opacity. Poetics of Relation. The University of Michigan Press. 189–194. Translated by Betsy Wing.

So after outlining the problems with transparency, Glissant continues,

[read the rest of the quote]

Opacity pushes back against the transparency of this reductive way of knowing. It's much more respectful to acknowledge what we don't, and can't, understand about others.

Smart city visions, instead of pushing for the transparency of trying to know and model everyone perfectly, could instead use more of this respectful acknowledgment of difference and shared appreciation across difference.

What if data supported affirmation over insight?

Reimagining smart city biosensing

So, we've covered a lot of ground, let's take a step back and synthesize how the Heart Sounds Bench helps reimagine smart city biosensing.

What if data supported affirmation over insight?

Reimagining smart city biosensing

efficiency —> sitting still

Instead of an emphasis on efficiency, the Heart Sounds Bench invites people to sit still and rest.

What if data supported affirmation over insight?

Reimagining smart city biosensing

efficiency —> sitting still

surveillance —> respectful intimacy

Instead of surveillance, or seeing from above, there was a person-to-person sense of respectful intimacy.

What if data supported affirmation over insight?

Reimagining smart city biosensing

efficiency —> sitting still

surveillance —> respectful intimacy

data, analysis —> sound, listening

Instead of data analysis, it's about listening to the live sounds of your own and another's body.

What if data supported affirmation over insight?

Reimagining smart city biosensing

efficiency —> sitting still
surveillance —> respectful intimacy
data, analysis —> sound, listening
insight —> affirmation

And instead of some clear cut actionable insight, what occurs is an experience of affirmation - perhaps a kind of emotional insight - something we already logically knew - we're alive, duh! - but this time with feeling. This is respectfully tempered with an acknowledgment of the opacity, the limitations of what we can really know about another person from their heart sounds. It's appreciating someone without needing to understand them perfectly.

To re-imagine the role of sensors and data in smart cities, I'm reworking things at every level of the design - from what counts as data, to ways of knowing, to what counts as insight.

Imagining an affirmative biopolitics with data

Biopower: Who or what has the authority to produce knowledge about feelings, bodies, health, life

Biopolitics: Contestations about biopower

Data and algorithmic systems driven by them have been granted too much power; they are treated with too much authority as ways of knowing the world. Grant them less power. (Alkhatib 2021)

—> Biodata and biometric surveillance systems have too much biopower

Emotional biosensing for biometric surveillance disproportionately harms marginalized people, extending patterns of historical and ongoing systemic oppression.

—> Instead of being oppressive, how can emotional biosensing affirm and support the diversity, richness, and irreducible complexity of human experiences?

Tierney, T.F. 2016. Toward an Affirmative Biopolitics. Sociological Theory. DOI:https://doi.org/10.1177/0735275116678998.
Alkhatib, A. 2021. To Live in Their Utopia: Why Algorithmic Systems Create Absurd Outcomes. CHI.
Rabinow, P. and Rose, N. 2006. Biopower Today. BioSocieties.

What we've kind of been dancing around this whole talk is issues of inequality and power, or bio power and bio politics. Biopower is about who or what has the authority to produce knowledge about feelings, bodies, health, and life. Biopolitics is contestations about bio power.

Critics of algorithmic systems argue that they have been granted too much power; they are treated with too much authority as ways of knowing the world. They suggest giving them less power, with more regulations or through designing human-in-the-loop systems for Human-AI interaction

With my work on color-changing fabric emotional displays, I was unpleasantly surprised to find how much authority some participants invested in the biodata display. They seemed to trust the data display even when it aggravating their insecurities.

With emotional biosensing for surveillance, well surveillance is already about "seeing from above", an unequal position, and the growing ecosystem of emotional biosensing for surveillance is being granted too much bio power, too much authority as a way of yielding insight about people's inner psychological and emotional state

Emotional biosensing for biometric surveillance disproportionately harms marginalized people, extending patterns of historical and ongoing systemic oppression

Throughout this talk we've been trying to find ways that, instead of being oppressive, how can emotional biosensing affirm and support the diversity, richness, and irreducible complexity of human experiences?

Context: Emotion AI

We need to imagine alternatives with biodata and AI.

My design research imagines alternatives with biodata.

- What if people made emotional meaning with biodata?
- What if biodata supported affirmation over insight?

Imagining an affirmative biopolitics with data

Imagining an affirmative biopolitics with data

What if emotional biosensing **affirmed** people's lived, embodied, emotional experiences?

e.g., Quantified Self, community-driven sensor projects, data storytelling

What if insights from biodata were **contestable**, able to be critiqued or corrected by all?

What if insights from biodata were made more **humble**, to respect the complexity of human experience and social difference?

How might **design futuring and critically-oriented design research** help imagine and debate alternative futures with emotional biosensing?

How can design researchers working with biodata help resist biometric surveillance, contribute to building a critical biometric consciousness, and foster liberatory imagination of alternative futures with biodata?

Hirsch, T., Merced, K., Narayanan, S., Imel, Z.E. and Atkins, D.C. 2017. Designing Contestability: Interaction Design, Machine Learning, and Mental Health. Designing Interactive Systems.

Howell, N., Chuang, J., De Kosnik, A., Niemeyer, G. and Ryokai, K. 2018. Emotional Biosensing: Exploring Critical Alternatives. CSCW.

How might we imagine alternatives? How might we imagine an affirmative biopolitics with data?

What if data affirmed people's lived, embodied, emotional experiences?

What if data-driven insights were contestable, able to be critiqued and corrected by all?

What if data-driven insights were more humble, to respect the complexity of human experience and social difference?

How might design futuring and critically oriented design research help imagine and debate alternative futures with emotional biosensing?

How can design researchers working with biodata help resist biometric surveillance, contribute to building a critical biometric consciousness, and foster liberatory imagination of alternative futures with biodata?

Thanks all for being here! Happy to take questions!