RE-IMAGINING THE FUTURE OF CITY TECHNOLOGY WITH THE HEART SOUNDS BENCH

PROBLEM STATEMENT

Pervasive and growing visions about the future of technological innovation in cities involve enrolling sensors and data models for increasing efficiency and surveillance. These models use data-driven categorizations that increase people's risks of being unfairly categorized as unproductive, unfit, criminal, or unwell. These risks are higher for populations already vulnerable due to relational markers such as race, class, or gender.

If we can change how we envision the future of cities to engage sensing and data in fundamentally different ways, we can make city living more welcoming and inclusive for all. I propose radically re-imagining the role of sensing and data in urban visions through design.

BACKGROUND & MOTIVATION

'Smart city' visions of urban technological innovation promise improved efficiency, safety, and happiness, often relying on sensors and data-driven [3,5,16,17,24,27,35,37,40]. Wearable trackers promote productivity, physical fitness, emotional wellness, and self-improvement [42–48]. Google Alphabet's Sidewalk Labs plans to revamp Toronto city with sensors [19,21,26,49,50]. Robots, patrolling public or private space, use sensors to detect and report 'anomalies' as security risks, often conflating the existence of homeless people with crime [11,20,39,41,51]. Video surveillance can be used to predict 'percentages' of joy, contempt, or anger, heartrate, and 'hostile intent' threats at airports [9,28,32,52,53]; while mobile phone and social media data is linked to depression [10,34]. These categorizations carry emotional connotations and are part of the space called 'emotional biosensing', or emergent ways of knowing our emotional selves and others through data.

Critiquing this, privacy and law scholar Nissenbaum argues that such pervasive surveillance is unjust and tyrannical [29]. Social computing expert Crawford cautions against corporate data-driven interventions into civic infrastructure [12]. Widespread sensing technologies in daily life make data-driven judgments about people's physical un/fitness, mental un/wellness, and criminal/terrorist risk [22]. These categories are not neutral: some are 'normal' and some are 'other'.

The 'other' category is usually seen as sub-optimal, in need of improvement, control, or discipline, or as something to be feared. This can contribute to otherization, a process whereby a person or group of people comes to be viewed or treated as inherently different and alien (e.g., racism, xenophobia) [36,54]. While data-driven approaches often claim to escape social prejudice with objective insights, they can instead reduce humans to categories, bolster structural inequality, and increase risks for groups that already face otherization [2,2,6–8,15,30,31].

As an inspiring alternative, visionary urban scholar Jacobs calls for cities to celebrate "a great and exuberant richness of differences and possibilities, many of these differences unique and unpredictable and all the more valuable because they are" [23:220–221].

PROPOSAL: HEART SOUNDS BENCH

The Heart Sounds Bench (shown above) revitalizes the humble public bench to re-imagine smart city visions through design research methodology

[1,13,14,18,33,38]. It leverages a well-established form of medical data—heart sounds, via stethoscopes—to augment the experience of bench-sitting. Contesting the smart city push for efficiency, benches provide a place to rest and do nothing, for free. Contrasting widespread surveillance, the Heart Sounds Bench senses data only when people choose to activate the sensors. Instead of making reductive categorical judgments about people—such as linking heartrate to emotional categories [4,46] or future involvement in violent crime [25]—the data is sonified and then immediately deleted, and people can form their own emotional interpretations. Sitting on the bench with another, hearing each other's heart sounds, invites a quiet moment of calm listening and connecting on a deeper level.

Thus far I have completed a pilot study of the bench indoors. Participants reported feeling connected to a shared life energy including themselves, people across the world, and plants and animals. Next steps are long term public deployment, requiring rebuilding the bench to be stronger.

My contribution takes the form of designing and making fully functional sensing technologies, offering rich qualitative experiential descriptions of how people interact with these artifacts, and outlining promising design directions to shift the future of technological innovation for cities. This design does not offer an immediate solution to the complex problems of data surveillance; rather, it helps shift the way people think about these issues and offers promising new directions.

METHODS: DESIGN, MAKE, INTERACT

As a design researcher, I design, make, and study interactions around fully functional sensing technologies. I draw from AI researcher Agre's critical technical practice as well as design research approaches known as critical, speculative, and reflective design [1,1,14,33,38]. These approaches provide greater understanding of complex sociotechnical issues by challenging assumptions, raising questions, and fostering discussion. I draw from hands-on making and engineering skills to realize these designs as fully functional technologies with sensors and data displays. I draw from qualitative research approaches like probes, participant observation, semi structured interviews, and elicitation techniques to garner rich experiential insights about how people interact with these technologies. While the design artifacts themselves contribute to ongoing discussion of how to design sensing technology, I also

provide rich insight about how people experience these artifacts, situated in the real social and emotional contexts of their everyday lives. These findings lead me to contribute design guidelines to improve future technology to better respect diversity and support many ways of feeling.

BROADER IMPACT

Questions of how we make meaning with data, and how data shapes ways of knowing, are of growing importance in both academic discussion and the lived emotional experience of our everyday lives.

Data surveillance in public space poses risks of data-driven categorization for people already vulnerable due to relational markers such as race, class, or gender. My project intervenes by fostering critical discussion and bold re-imagining around the role of sensing and data in smart city visions. If we can change smart city visions to engage sensing and data in fundamentally different ways, we can make technological innovation in cities more welcoming and inclusive for all.

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