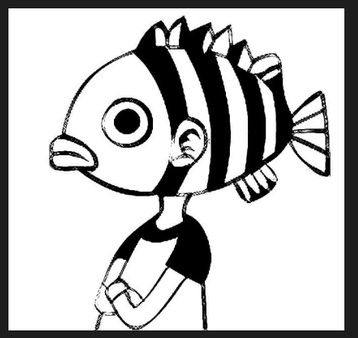
{ Slowing down the System }

Using technology to mediate a more meaningful relationship with technology



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ToC

Abstract

This project explores the current and future interactions and relationships between humans and computers. The current state of physical computing revolves around the creation of black boxes, with their own hidden machinations and obfuscated practices. These black boxes create almost pavlovian responses from humans, trying to get the humans to interact with them.

This project addresses these issues by creating slow computing interventions within the household. These interventions encourage mindful and deliberate engagements with the underpinning technology. These interventions do not eliminate technology; rather they propose a new interface that empowers humans in their tasks, instead of demanding attention.

As technology spreads and speeds up in our lives, the need exists for creation of technologies that do not leave humans by the wayside. Designed technology should not demand attention, but allow for it.

```
function Wakeup() {
    You wake up to your alarm blaring from your google
    home mini.
        Google keeps track of your usual wakeup times.

    You check your phone. A few messages you can
    respond to later. A news story about a new game
    arrives in a notification.
        You were reading about that game yesterday.

    You check your news app, skimming through stories.
        Your phone notes that you spent a bit longer
        on stories about Coronavirus.

    You get a message from your coworker about some
    issue. You respond straight away, so they aren't
    blocked by you.
        You've affected the physical state of the
        office.

    You check your amazon delivery, hoping it will
    arrive today.
        The driver is monitored by amazon and their
        position is sent to you.

    It should arrive in 2 hours. Great.

}
```

The Brief

As technology cuts deeper into our lives, it demands more of our attention, and uses our information to influence our behaviour. As end users, sometimes we are barely cognizant of these processes going on around us, as digital black boxes take ambiguously defined user data and influence our actions. The new wave of physical computing design should empower users, and create opportunities for deliberate and mindful decision making within the interactions.

// The Computer is a feedback fueled machine, constantly demanding attention and flooding with information.
// The Computer is never satisfied, just momentarily satiated. There are always more notifications, more information. The Computer wants your attention, and will use any tricks it can to demand it.

Design Proposal

To combat this, a new wave of technological design is introduced. To display this way of thinking, a suite of design products exploring the home augmentation space are designed and developed as technological interventions. These solutions each focus on different aspects of home living, but share a theme of empowerment and conscious engagement. Background processes are shunned, and notifications are condemned.

Research

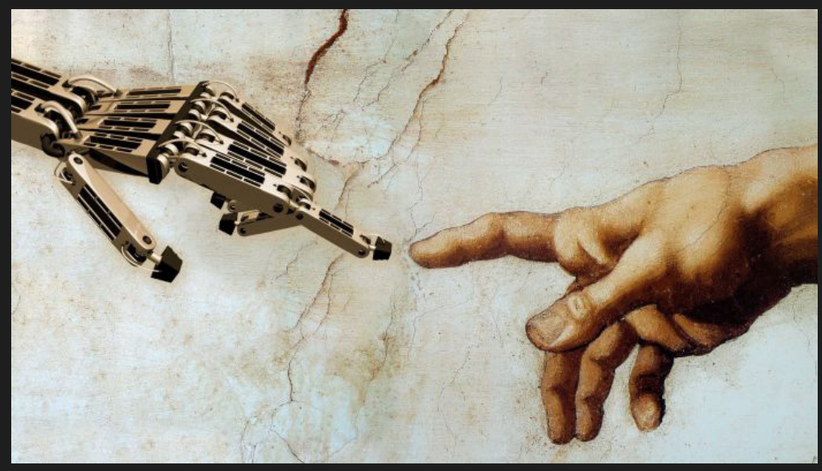
// This paper looks at HCI, Slow Computing, and the Right to Disconnect to inform the design outcomes.

HCI

Human-Computer Interaction (HCI) is a multidisciplinary field of study focusing on the design of computer technology and the interaction between humans and computers. The current landscape of HCI encourages as little friction as possible, to create products and services that work together seamlessly, reducing human input. In some cases, the computer interacts on the human. For instance, a perfectly timed social media notification can interrupt your family time, or health monitoring smartwatches tell you when to sleep. Many studies show user dissatisfaction with this model. However, the time saved and benefits from these computer-driven approaches allow these to be pushed forward, while ignoring the negatives.

In the conference proceedings for Seven HCI Grand Challenges (2019), the need for meaningful human input in autonomous systems is stressed. Technology should empower human feats and ingenuity. To this end, the concepts of transparency, understandability, and accountability need to be baked into any HCI driven design. A computational system should not hide it's workings. It should be clear and concise in its function, and operate at a certain level of ethical practice. However, a system should not introduce busywork or increased cognitive load merely to arbitrarily increase engagement. The interactions between a human and their computers need to be simple and empowering.

// Computers are more discreet, and less discrete



Slow Computing

Slow Computing (also known as Slow Technology) is a design methodology that pushes back against the hyper efficiency of modern technology. While this is a reasonable goal when looking at industry or science, the effects can have negative impacts on the social side, with people becoming addicted and reliant on technology. As a methodology, slow computing emphasises creating symbiotic relationships that can change in nature, leaving room for reflection and interpretation. This formed relationship invites users to actively engage with these technologies. This relationship removes them from the background, and brings them into the same actant space as humans, while not bringing them to the same level.

Slow computing as a research method allows designers to become more critical of the work they produce; and more cognizant of the consequences. Current HCI design is benchmarked by efficiency; ease of use, fast learning, and immediate visible results are the goal. While these are important, they actively contrast humanistic goals such as learning and understanding a system, learning when to apply the system, and considering the consequences of the technology in use. The process of slow computing design can help to strike the balance between these two sets of ideals.

// "There is a danger that as technology moves from the office into our homes, it will bring along with it workplace values such as efficiency and productivity at the expense of other possibilities" Bill Gaver, 2001

Right to Disconnect

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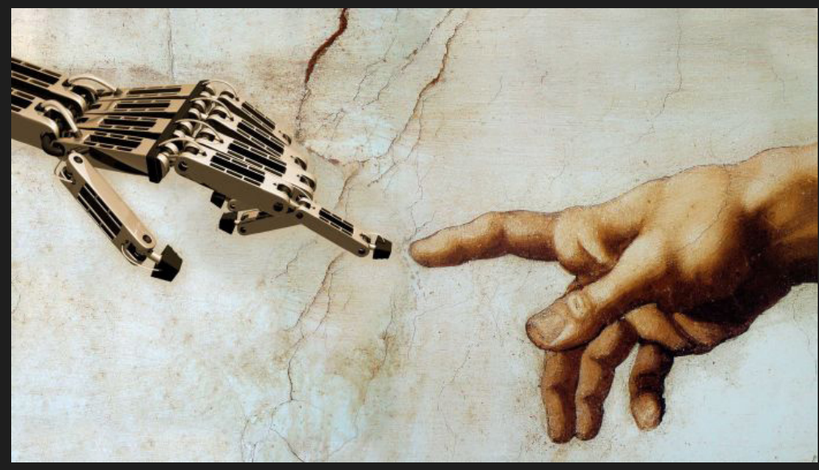
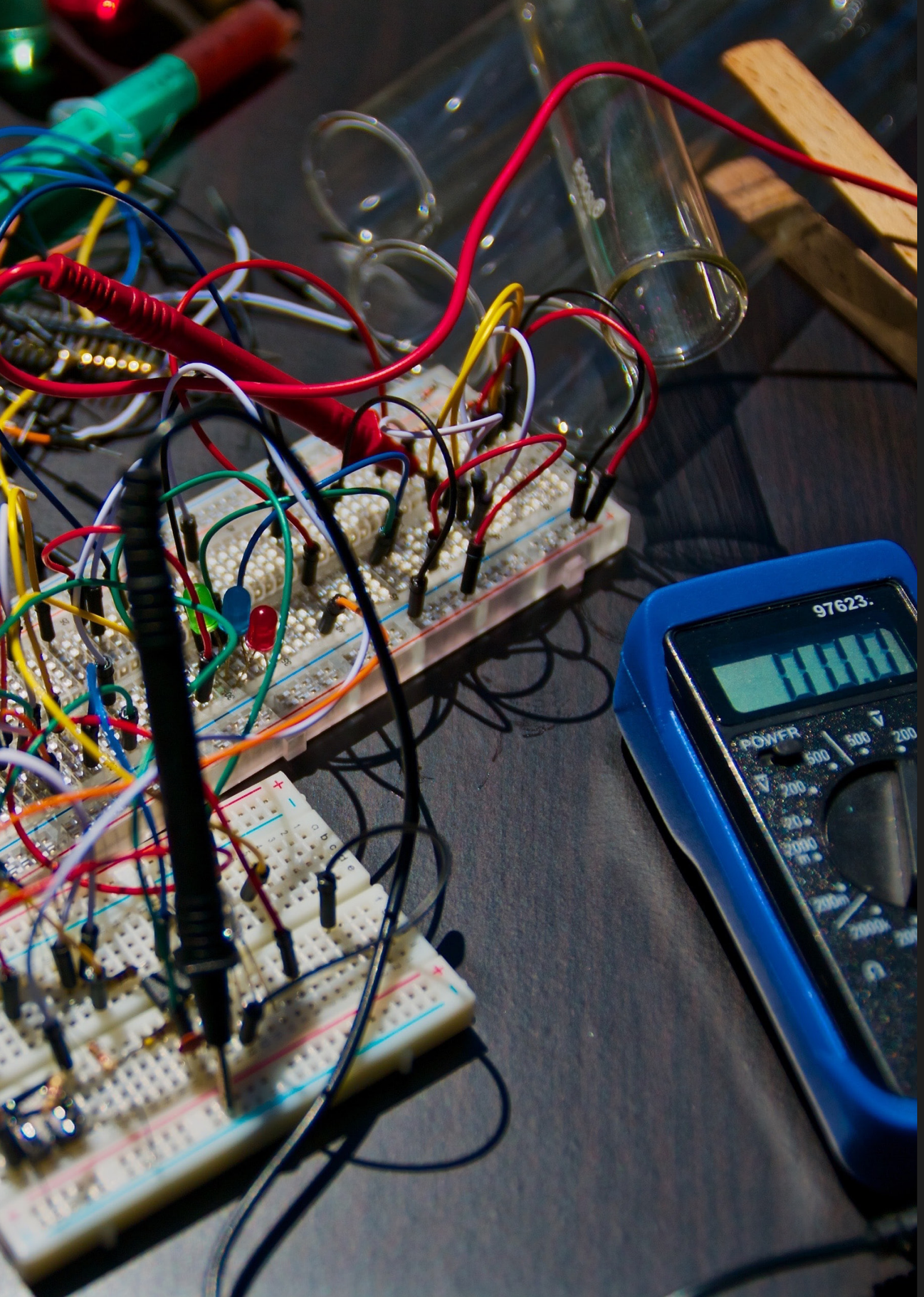




Experiments

// Design probes were created and deployed as the primary design process.

Context Switching

About

This experiment started as a design question: how might we design a system that allows users to experience different physicalities for work and relaxation, without changing their location, to create clear boundaries for the user. This experiment changes a users environment at preset times, by projecting different videos and music into the space. In spaces where a human does not have the luxury of work life separation, this allows for clearer environmental signalling for different modes of living. A user sets their preferred schedule for the day of work rest and play, and the system will respond accordingly.

Reflection

The experiment was deployed in my own home and extremely successful. The combination of deliberately picking a schedule at the start of a day, and visceral transitions between the modes was effective at helping my productivity. Interestingly my notion of what constituted “work” shifted over the course of the day, meaning there is room for individual users to make their own meaning from the loose terms associated with it. As well as helping me engage with my work, it also helped my disengage easily, creating clear boundaries regarding my obligations to myself.

// Additional Information in Appendix C

Slow Messaging

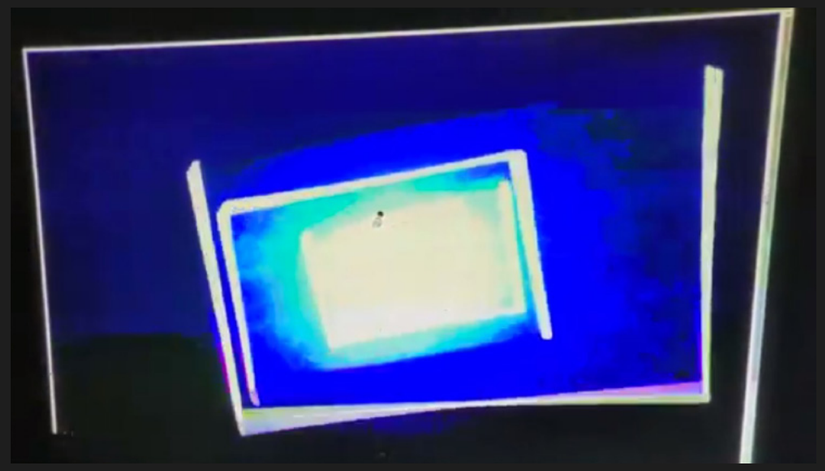
About

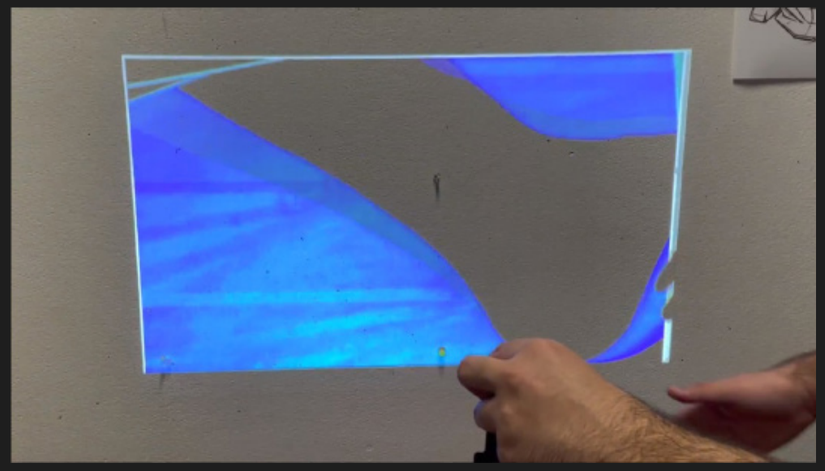
This experiment's design centered around the metaphor of a water cooler, with the design of a slow messaging board where users could take a quick break to socialize and mentally reset, without being a significant distraction. The system allowed users to write on a board that would then be sent to others to respond to. Messages were sent back and forth every hour, allowing for regular social breaks in an isolated environment.

Reflection

This experiment ended in a technical failure, rather than a design failure. The system used a webcam and projector to create the digital board. However, these pieces of technology reacted to each other in an unexpected way, creating time dissonant feedback loops of unparsable data. These visual effects created an abstracted and reactive light show. This could be manipulated by affecting both the physical world or the screen that was being projected, creating an echoed reality that mixes the users and the technological vision.

This probe is unable to continue because the development time when not using these technologies would become unreasonable.





Outcomes

// These objects propose and explore a more deliberate way to engage with technology.

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Design 2

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Analysis

This system worked and didnt work for a number of reasons. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Vivamus eget erat erat. Donec est turpis, malesuada id faucibus quis, finibus volutpat lacus. Duis nisl neque, vestibulum a metus in, sodales luctus nibh. Sed sed pharetra urna, eget placerat orci. Fusce interdum faucibus felis, id ullamcorper velit malesuada sit amet. Vivamus consectetur condimentum tellus sed accumsan. Sed mollis eros faucibus vehicula tincidunt. Interdum et malesuada fames ac ante ipsum primis in faucibus. Nulla sapien elit, cursus ac eros et, egestas posuere felis. Suspendisse eget magna ultrices, tempus elit eget, lacinia felis. Curabitur ut erat viverra, consequat magna in, malesuada magna. Maecenas eget quam massa. Donec commodo congue justo non semper. Integer gravida rutrum ullamcorper. In semper tortor ac rhoncus suscipit.

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Appendix A - Bibliography

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This article is the culmination of a conference discussion of 32 contributing researchers in the field of HCI, regarding the challenges of the field. The discussions presented were compiled into 7 "Grand Challenges'' of HCI. These were; Human-Technology Symbiosis; Human-Environment Interactions; Ethics, Privacy and Security; Well-being, Health and Eudaimonia; Accessibility and Universal Access; Learning and Creativity; and Social Organization and Democracy. The most pressing to my particular research context is Human-Technology symbiosis and Human-Environment interaction, however each aspect is closely associated with my field. Most of this article presents these as challenges when trying to integrate HCI into everyday life with a high adoption rate, so subverting some of these ideas could lead into the art/critical design space. It also stresses the need for meaningful human input and control when making autonomous systems. A good example is pilots, the systems are automatic but the pilots set the goals and monitor the levels for the system. For this, we need transparency, understandability, and accountability.

Bogost, I 2012, 'Alien Phenomenology, Or, What It's Like to be a Thing', University of Minnesota Press, Minneapolis, USA

This book is mostly philosophical, and examines the ideas around how humans have always looked at the world from a human centric view. But the opposite could be used, going against standard Kant-esque ideas of humanity giving shape and life to the world. Even posthumanism looks at non human entities from the viewpoint of humanity, and how we have responsibilities or benefits from acting certain ways. When seeking to create meaningful relationships between humans and computers, the principles in this book become useful paradigms to apply.

Pryzbylla, M, Romeike, R 2014, 'Physical Computing and its Scope - Towards a Constructionist Computer Science Curriculum with Physical Computing', Informatics in Education, vol.13, pp. 225-240

This paper explores how we can integrate physcomp into classrooms to teach computer science. It starts off by talking about the use of constructionism and microworlds in teaching and their general applications, before trying to apply physical computing.The paper emphasises the need for open ended and creative interactions within physical computing. The iterative nature of designing and exploring physical computing systems can be used to create learning systems that value human ingenuity. While this paper applies these ideas to curriculum, I believe there is space to bring certain ideologies into my work presented.

Nilsson, T, Fischer, J, Crabtree, A, Goulden, M, Spence, J, Costanza, E 2020, 'Visions, Values, and Videos: Revisiting Envisionings in Service of UbiComp Design for the Home', in Designing Interactive Systems 2020, Eindhoven, 6-10 July, pp. 827-839

This article looks at the tensions between passive and active ubicomp integration into a home setting, by subjecting participants to predictions and asking opinions. These produce applicable takeaways for design questions and/or challenges. The paper explores these topics specifically through food practices, to give a relatable setting. It warns against purely heading for efficiency and productivity in the homestead. Technology in the home should empower and augment a human's ability to perform feats. This stresses the importance of bringing humans into the space, not just making autonomous systems that do everything for humans.

From presenting 'calm' and 'engaging' scenarios and conducting focus group discussions, a few key points were dragged out. Participants believed that over convenience was an issue, and potentially caused more societal harm than good. Removing any form of work or social engagement they believed could lead to socially isolated individuals with less empathy, but they understand that forcing someone to do unnecessary work will make adoption less likely. Maybe making this "work" engaging is the solution here. An issue of trust was brought up when looking at technological behaviour tracking was the issue of people doing nonoptimal behaviours. One person cited that sometimes they would want to throw out food instead of donating it, and they should not have to justify that to a computer or to a community monitoring her activity. They were also worried about the types of sensors used as inputs. An interesting emergence here is that the context is important. A camera in any room is an issue, but a camera in the fridge is fine.

Participants were also worried with the taking away of agency that a completely autonomous system would ensure. Having freedom and flexibility is important for humans. For instance, a program altering your dinner recipes based on what was going off in your fridge was viewed as patronizing and intrusive, as it tells a person what to do. Participants also pointed out and were subsequently disturbed by the idea that a system giving you recommendations and sorting your life out would take away your need and eventually ability to think reasonably, and take away a person's autonomy. A fine line needs to be toed between affecting autonomy and helping users.

The authors say that convenience is not by itself a bad thing, as it opens up time for users to do more important things like spending time with family. However, the tradeoffs for convenience need to be very carefully considered. They also stipulate that while people morally are more in line with engaging computing, realistically practicality is the most important issue for adoption. This practically could be concrete like saving time, or abstract like a need for privacy. It is important to remember that convenience and efficiency are not the opposites of proactivity and sociability, in fact they can facilitate each other.

Stankovic, J.A., Lee, I, Mok, A, Rajkumar, R 2005, 'Opportunities and obligations for physical computing systems' , Computer, vol. 38, pp. 23-31

This article looks at physical computing as an extension and natural conclusion of ubiquitous computing, saying that developers must focus on the physical, real-time and embedded aspects of ubicomp. The article uses SISAL (sensor information systems for assisted living), Emergency response systems and protecting critical infrastructures.
When discussing aged care, an interesting point made is that many SISAL objects are basically useless as stand alone components, for reasons such as hard to use or too technical, too small a scope to be maintained, multiple needed and become unmanageable etc. And for this reason, they must be integrated into a ubiquitous system to be effective.
Also, having a system means that each component can cover individual needs, and cover a wider physical area. This is similar to the concept of microservices.
Physcomp can be used to marry physical services and computer networking. This has the advantage of physical objects being less independent. The article uses the example of linking air traffic control, power grid and telecommunications. In these ways, tangible systems add value to a ubiquitous computing environment.

Appendix B - Image References

Appendix C - How “Context Switcher” works

This prototype of the context switcher was built using a miniature computer (raspberry pi), a website, and a projector. I built a website that displayed different gifs and played hour long musical tracks at different times of the day. In the code, there exists an easily editable list of hours, as well as their associated “mood”. Scheduling your day just involves writing into this text file, and then saving. This page then gets loaded on the raspberry pi connected to the projector. These gifs would get diffused through the room, creating a dynamic lighting environment. After all, a projection is just a programmable light source.

The website would then check every hour what its new state should be, and update accordingly, changing the environment of the room completely. This system is consciously designed to have no background processes, no judgement of a good or bad day, no extra breaks thrown in between consecutive work hours. Ultimately the human user is responsible for the efficacy of this system.