Chasing
Relevance

Reimagining the digital-physical divide in the library

Author: Shree Lakshmi Rao
Advisor: John Zimmerman
Carnegie Mellon University
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CHASING RELEVANCE

REIMAGINING THE PHYSICAL–DIGITAL DIVIDE IN THE LIBRARY

A thesis project submitted in candidacy for the degree of Master in Design in Interaction Design at the School of Design at Carnegie Mellon University.

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Shree Lakshmi Rao , M.Des Candidate

John Zimmerman, Advisor

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ABSTRACT

Technologists, designers and researcher are constantly working towards digitization of physical materials. Consumers today can read and display books on virtual bookshelves; access news from around the world instantly on their smartphone; archive and share photos with their friends on social media platforms. This represents both a gain and a loss for the consumers: losing the joy and meaning of physical objects but gaining the immediacy, dynamism, and accessibility of the digital. Users have to constantly navigate between their physical environment and digital objects. The industry treats these the physical and the digital experiences separately and this creates a tension for interaction and complicated user's understanding of products and services rooted in the physical. Designers end up designing disjointed experiences for their users as there is no existing framework in the community to help designers span this divide. In this master's thesis project I seek to understand if Critical Design can be used as a design method to investigate the digital–physical divide. Further, I use Critical Design to explore the design opportunities associated with the digital–physical divide by creating and deploying a probe in two libraries in Pittsburgh. Library patrons were interviewed post interaction with the probe. Findings are presented in this document.

ACKNOWLEDGMENTS

Are we going towards a fully digital future?

INTRODUCTION

Technical developments over the last decade have supported the creation of digital objects. Physical objects such as photographs, journals, music, books, letters and gifts have found representation in the digital state. Practices around these objects have changed as objects have moved from the physical to digital state. For example—People rarely curate photographs in handcrafted albums anymore, instead they capture and share moments on their smart phones instantly. Applications such as Instagram and Photo Booth help users capture, enhance and share photographs on social media platforms. Websites such as PhotoBucket, Flickr and Picasa help users manage and their digital photographs in ways that were not possible with physical photo albums.

Creation of digital objects has changed our practices associated with them. Changes in our practice are influenced by a combination of exponential changes in technology and industry trends. The industry separates design and development for the physical and digital worlds. By creating specialized apps and websites for global news, books, music and digital tools to support practices such as journaling, communication, and socializing; the industry is enabling a change in practice and possession. User's possessions, services and practices have all attainted digital presences, forcing users to continuously engage with the digital world, detaching them from their physical environment. This technology trend is creating a divide between people's physical environment and their digital practices.

The schism in the industry's approach to creating products and services is forcing users to constantly navigate between the digital medium and their physical environment. Designers today are faced with the challenge of designing "experiences" for their users but are limited by the industry's narrow vision of isolated experiences: separating the digital engagement from the physical environment. They either design for the physical or digital world. For example HCI research has focused on the creation of digital objects while urban design and architecture have maintained their emphasis on designing physical spaces. These separated engagements are complicating people's understanding of objects and services rendered in the physical world. This is applicable to services such as the library especially since people are struggling to understand the relevance and meaning of

purely physical services like that of the library in the age of digitization and information access.

In this master's thesis project I seek to understand if I can use Critical Design as a design method to investigate the digital–physical divide. Further, I use Critical Design to explore the design opportunities associated with the digital–physical divide. During the course of nine months I created an interactive public installation to probes people's understanding of the digital and physical worlds. This installation was places in two different libraries in Pittsburgh and people interacting with the installation were observed. Post interaction interviews were conducted with ten library patrons. From my research I learnt that people want a blend between the dynamic, accessible digital information and the physical environment. People also want digital information to slowly move away from screens and sparks social interaction in the physical space.

RELATED WORK

HCI RESEARCH

Technology is constantly evolving and supporting people in their practices. The evolution of the Internet has influenced the creation, storage and sharing of material possessions. Due to digitization, practices around digital objects have also changed. Researchers are constantly trying to understand the full range of functions and activities that can be performed in the digital medium.

Photographs are examples of material possession that have moved to the digital sphere. Smaller and faster devices, such as smart phones, enable us to constantly document, remotely view and share special moments through digital photographs. Research in the past has looked at understanding the difficulties that come with digital photographs [18]. These include archiving and retrieval. Similarly, a variety of other physical artifacts either have a digital presence or have moved to the digital world. Music sharing and discovery for example started with mixed tapes [11] that people created and shared as a medium of self-expression. As music slowly moved to digital formats, it now affords a variety of different functions including instant access, social sharing and simultaneous listening with people over the Internet [15].

Practices around retaining and documenting memories have also changed due to the intervention of technology.

People have moved from journaling, scrapbooking to blog and social media. Social media sites are moving towards a mental model of "documenting" your life, for example Facebook's timeline design was designed with the intension of representing the evolution of the user's life over a period of time. Research in this area has tried to understand the gap between the physical practice of scrapbooking, preserving memories and digital affordance that would support it.

Memento, for example, is a physical device that combines the best of the physical aspect of scrapbooking with the advantages of digital medium, namely— ability to share, collaborate, embed multimedia and search [17]. The living memory box, another research project, supports family memory archival process. The design implications from the exploratory research for the project emphasized maintaining the "physical" aspect of the memory archiving device while using the digital to reduce the "work" involved in revisiting these memories [12].

Maintaining family memories is not the only aspect of our life that is influenced by technology. Petrelli et al examine how technology can enhance traditional practices such as Christmas [10] while Odom et al consider how technology is changing people's behavior

around bereavement [13]. In practices relating to death and bereavement, digital content and its features such as persistence, accessibility and it's social aspect complicates the process. Technology has found its way to influence and impact aspects of our life that we not necessarily associate with technology. For example— religions around the world have started to incorporate technology into their practice. In the paper "No more SMS from Jesus" [1], Bell talks about how technology has been incorporated into religious practices. For example mobile service providers in Malaysia help users find Mecca. She also highlights how people have started using technology to actively allow devotees to engage with religious practices anywhere in the world. Technology is starting to change religious practice, which was once personal and deeply rooted in sacred spaces, to a social practice that can be done anywhere.

In this context, it is important for researchers and designers to consider how people value and appropriate physical "things" to construct memories and a sense of self but also to understand how designers can create digital artifacts that emulate the same feelings of

value and cherishment [7]. Researchers draw parallels between the two vastly different world- the physical and digital to try and understand metrics such as "value" and "cherishment" with digital objects (10). This includes "craft", as research suggests and changing digital to become more visible.

Work done by Odom et al [14] look more deeply at the personal digital possessions that people and teenagers in particular are amassing. Virtual possessions mark a change in practice associated with how we curate our "self". Virtual possessions range from digital photos to the dynamically changing content on social media sites that are shaped by the social conversation around them. People valued certain digital possessions and find different ways to emphasize that. The curate-able and social feature of virtual possession support the construction of "self".

OTHER COMMUNITIES

Art

Throughout history art has been used to reveal and challenge our existing practices and yet only a few pieces of digital media art have challenged the industry's unquestioning acceptance of digitization. The "Storyrooms" installation is designed by a group of artists who seeks to examine the user's life in the digital world and changing media culture [2]. It incites users to participate in scenarios

Library

Library research is constantly helping libraries reinvent themselves in the Information Age. Research in this space looks at different aspects of the library from reinventing the physical space to supporting patron behavior [9] etc. Some of the interesting research in the library that touches upon the digital–physical divide includes work done on understanding how technology can tackle issues that libraries face [16]. However, most of this research only considers existing technology like RFID and GPS location based services rather than digging deeper into the digital–physical divide to promote development f technology that library and its needs.

PROJECT

This project began as an exploration of the physical digital divide that people overcome in daily life as they switch from their physical space and context to digital objects and information presented on screens. Technological advances have made accessing digital information quick and easy. Users have to constantly navigate between their physical environment and the digital world. This constant access to digital information also complicates user's understanding of the activities and services that are rooted in the physical space. Designers are in charge of building memorable and holistic experiences for their users but have not been provided any framework for designing in this space between the physical and digital worlds.

Using traditional user centered design to understand how as designer we can design for the future has limitations. User centered design focuses on understanding the user's current needs to address them design solution. People, however, are lost in the day-to-day activities, not allowing them to step back and question the larger meaning and implication of the segregation between the digital and physical worlds. To get people to see what is happening in their world, I decided to use Critical Design to probe the physical–digital divide.

Critical Design is a critical theory based approach to help designers question assumption and narrow preconceived notions about the role that technology plays in life. Anthony Dunne and Fiona Raby at the Royal College of Art London popularized Critical Design in their book

the Hertzian Tales [3]. This methodology questions the status quo and forces people to reflect on practices and artifacts. Dunne and Raby use Critical Design to make the "invisible" visible. For example Dunne and Raby's The Placebo Project gives the user a glimpse into the secret life electronic objects and questions the user's unquestioning adoption of these objects. This project contained a series of prototypes that showcase different "attitudes" towards the subject of electromagnetic waves. For example The Loft was a place to shield objects from electromagnetic fields and the compass table reacted to electromagnetic objects in its vicinity. The projects Nipple Chair was created to remind user's that an electronic objects extend beyond the visible. These different prototypes all work towards getting the users to question their exiting acceptance of technology and their functions.

This project is heavily influenced by the approach and attitude of Dunne and Raby but also incorporates the research utility of "probes" as popularized by Bill Gaver. Bill Gaver et al have focused on using speculative design to create probes that gather qualitative information about people's practice and use around the home; putting it in context to gather user attitudes [5]. The information collected from these playful yet provoking probes such as cameras, journals and other documentation devices is used for inspiration. Probes have been applied in a variety of ways by researchers in the past. Information probes have moved probes away from their initial function of serving as inspiration to designers to a methodology that only serves to collect information in problematic design spaces. Technology probes have been used to gather information and test technologies in context where as empathy probes have been used to gather a more diverse range of user data that is experimental.

While this project employs technology to probe the digital physical divide in context of the library, the probe does not only serve as a medium to gather information as technology probes have been used in the past. The qualitative data gathered from the probe is not used as inspiration for a final design concept within the library it serves to bring new knowledge to designers about this opportunity space.

GENERATIVE RESEARCH

Observation,
expert interviews
and literature review

Identifying themes

Sketching concepts

Experience prototyping

PROBE DEPLOYMENT

Research with the probe

PROCESS

For inspiration for probes concepts I engaged in three interrelated activities— observation, identifying themes and sketching out ideas. The ideas were then used as the basis for experience prototypes. Based on the feedback from the experience prototyping sessions, the probes were refined in form and function to create provocative installations that probed themes in the library and the digital physical divide.

The research conducted can be broken down into two sections— generative research, this includes all the research leading to the conceptualization and creation of the probe and the probe deployment phase. The latter phase of research includes research with the probe in the library.

Generative research includes all activities that informed the creation of the probe. The form and function of the probe was informed by the research conducted in the libraries and conversations with library administration. Themes were then identified. Concepts for probes were developed based on these themes. Three experience prototyping sessions were carried out with colleagues to refine, tweak and identify the most provocative concepts. The process followed within each aspect of the generative research process is highlighted below.

GENERATIVE RESEARCH

OBSERVATION

Observations were made in four different public libraries in Pittsburgh— Carnegie Library of Pittsburgh in Oakland (main), Squirrel Hill, Downtown and Southside; two research libraries on Carnegie Mellon University campus— The Hunt library and Sorrel Library. Observations in the libraries showed usage patterns and patron behavior. These insights were used as inspiration for probe concepts.

Engaging with the library at different levels— from passively observing people and the functioning of the library to actively taking part in library initiated activities exposed the difference between the libraries. The size and layout of the libraries also impacts library usage and what the library offers to its users. For example, CLP main was a hub for social activities. The location and availability of space in CLP allows the library staff to engage their patrons in book readings, talks, computer classes, job hunting, poetry readings and language classes where as the Downtown library functioned mainly as a location for Internet access and an area for people to take shelter from the cold for free. In both public and research libraries, the

café area created an informal atmosphere where people engaged in conversation, collaborated on projects or just hung out and read a book.

In addition, Carnegie Library of Pittsburgh administrative staff and librarians were consulted through the early part of the design process to understand the feasibility of the concepts and to gather insights based on their experience working in the library. Most members of the administrative staff at the Carnegie Library of Pittsburgh have been working with the institution for more than a decade. Some librarians even have experience working in research libraries in Ivy League universities. Younger librarians bring new knowledge from library science programs. These conversations were rewarding and influenced the direction of the probe concepts.

Who owns the books? 📖 ?
↓
checked out

on the shelf

IMMEDIATE / TEMPORARY
USE

IMPORTANT   INDIFFERENT   ASHAMED
          |
       INHERITED   BORROWED

RANDOM
                              OWNERSHIP
STEAL
  |
COVETED

MEMORIBILIA
        EXPENSIVE
   | /
  BUY
   | ＼ CHEAP
STATUS
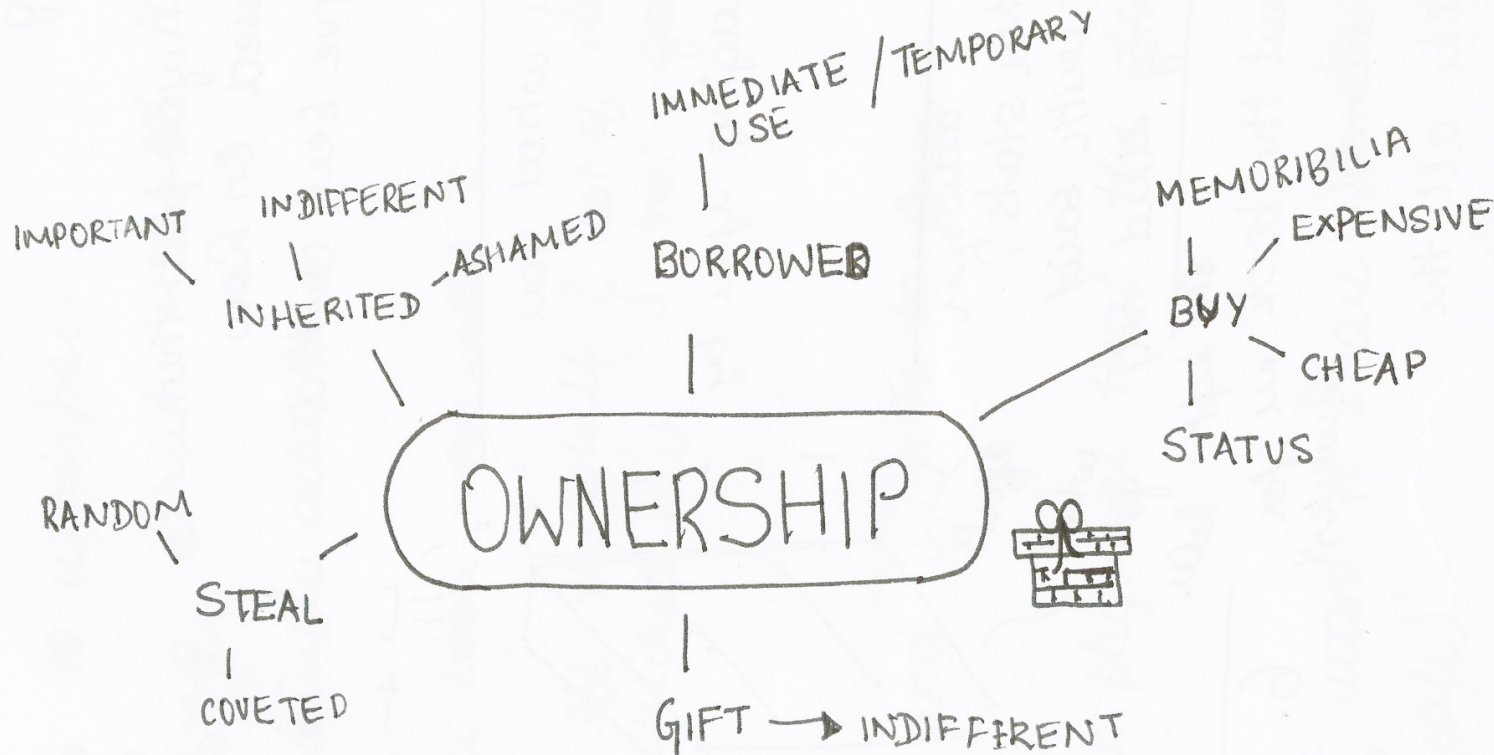
GIFT → INDIFFERENT

IMPORTANT/   DON'T LIKE ANYMORE
MEMORY
ATTACHED TO
GIFTER

ASSOCIATED   (HOUSE.)
WITH YOUR NAME   WHAT YOU OWN
(BANK ACC, TWEETS?)
FB PIC ?
                    POSSESSIONS
WHAT IS YOUR'S
BUT BORROWED
(HOUSE RENTED /
TOOLS / BOOKS BORROWED   HAVE   (IN YOUR HOUSE)

"What is the function of the library?"

"What can the digital reveal that is hidden by the physical"

IDENTIFYING THEMES

From the observations in the libraries and conversations with experts and fellow designers, and recent articles about the state of the library in the media, I started identifying specific areas of tension and interested.
I asked a few questions to identify themes that are relevant to the physical–digital divide and the library— what is the library? What is the function of the library? What does the library mean to you (participants)? What can the digital reveal that happens in the physical? Are you (participants) what you read?

Some of the themes and areas of tension that were revealed are:

Ownership
Self presentation
Placelessness of digital information
Responsibility
Revealing

SKETCHING CONCEPTS

Once the areas of tensions were recognized, ideas to highlight and challenge these tensions were sketched out.

WHINY BOOK BIN BOOKS
This concept probes the idea of ownership in the context of the library and digital information. As patrons of the library, do you know the books you borrow? If you don't what are your responsibilities associated with it?

This probe is associated with the book bin available outside the Carnegie Libraries in Pittsburgh. As the user approaches the book bin to return his books, he/ she will hear a chorus of voices. The voices will have a melancholic tone to them, as if they're sad. As the user drops his/ her books into the book bin, he/ she will be able to hear the books plead with him/ her to not return them back to the library.

WEIGHING SCALE
This concept probes the idea of self-presentation and the opacity of digital information. Opacity of digital information here refers to the lack of transparency of the digital information you are creating, who tracks it and

why. This probe monitors all the digital information that libraries collect about its patrons. The information includes demographic details such as their location, name and information about the books that patrons borrow, the time period for which the books were borrowed. This probe considers what happens when the digital can reveal patterns in you behavior that is being secretly monitored.

The probe is a simple weighing scale with additional functionalities. When a patron stands on it, the weighing scale reveals his/ her weight by displaying the weight of the total number of books he/ she has read. This information is publicly displayed and compared to other patrons.
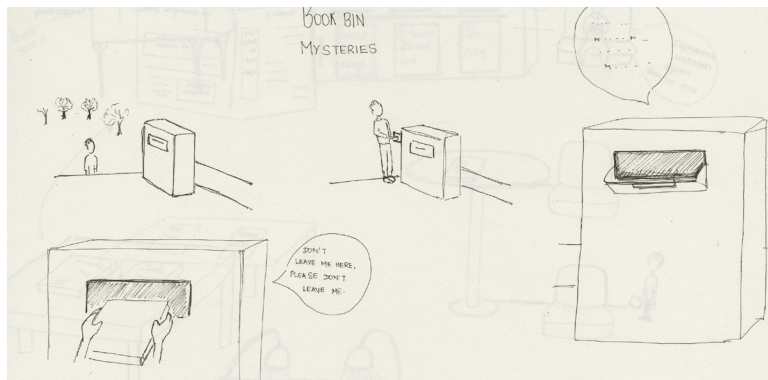
The seductive shelf

This concept probes the meaning of the library and the kind of information the digital can reveal about your physical movements. For example, when people are looking for books in the library, they wander through the library and pick up books, read the back and then make a decision on borrowing them. In the physical space, people are browsing but their digital information shows us the final books they check out, which ones they return immediately and which ones they renew. The physical space reveals a scene similar to dating, the patron is "browsing" for options.

Using the underlying dating metaphor, this probes considers it form the book's perspective, where the book is trying to seduce the patron to borrow it. The book tries

Storyboard for the concept
The Whiny Book Bin

to accomplish this by referencing the patron's earlier reading patterns, "I know you like fantasy novels. JK Rowling, in a recent interview, said that I am one of the best books to read this year." The book accesses recent digital information from the internet to tie it together with the patron's reading habits (in this case the user not only likes fantasy but is also a fan of JK Rowling).

Wanderings of a lonely book
Wandering of the lonely book was a concept that looks at probing the sense of community within the library and the opacity of digital information. Books have a lively life that we don't know about. Which part of Pittsburgh were they in? How long were they away?

Wandering of a lonely book aims to show the patron
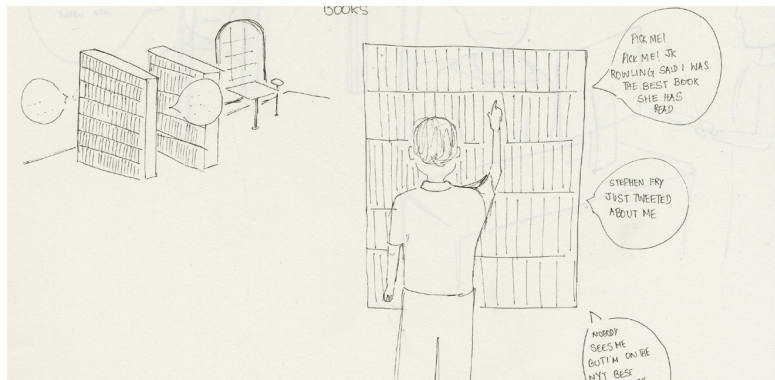
where the book that he or she is checking out has gone in the past. Maybe there are other copies of this book still out there, making the most of the outside world before they are returned to the shelves of the library.

Find your love
If the library is truly a matching service that helps you browse and find the right book, is it like a dating service? This concept probes the meaning of the library and the dynamism of the digital world.

Digital information is curated and personalized for the viewer, helping them discover content and artifacts that are similar to the one they are reading . What if the library is trying to set you up using the information it has been collecting about you and your reading habits?

The sketch on the left shows the Seductive Shelf concept.

THE SASSY LIBRARIAN

This concept probes the idea of responsibility. In what ways are you responsible for the library? The sassy librarian is an experience probe where the librarian informs the patron of the status of a book that he/ she is checking out. For example, for books that are not taken out regularly the librarian would say, "Thank you for taking Sally out, she hasn't been out in a while", giving the library the same function as an old age home. This probe was informed by conversations with library staff who talked about old books that don't get checked out often end up in the archives or are sold to raise funds for the library.
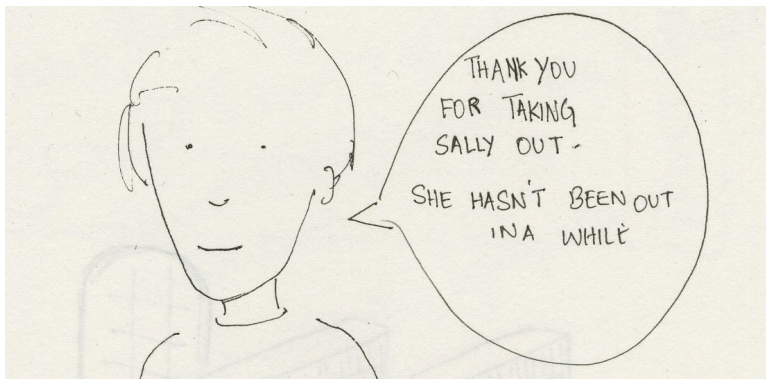
I KNOW WHAT YOU WANT

This probe considers the amount of information patrons have automatically provided to the library by just using

its services. If you are what you read, what does the library know about you and how will that impact you. This probe considers a service model that allows the library to use your information to personalize advertising for you. Companies will buy audio time slots that the library will play for you depending on its relevance to you and your reading habits.


Shown on the left is the Sassy librarian. On the right are two versions of a similar concept (1) I know what you want (2) AdSpace

AdSpace

It is a refine version of "I know what you want" and probes the dynamism of the digital space and questions our disparate reading habits when it comes to digital and the physical. By showcasing the worst of your digital experience in your physical life, AdSpace hope to bring people to the realization the vast difference between the physical and the digital that continues to complicate their lives. AdSpace looks at how the library can use existing information about its users to customize their reading experience with relevant ads embedded in the books they read.
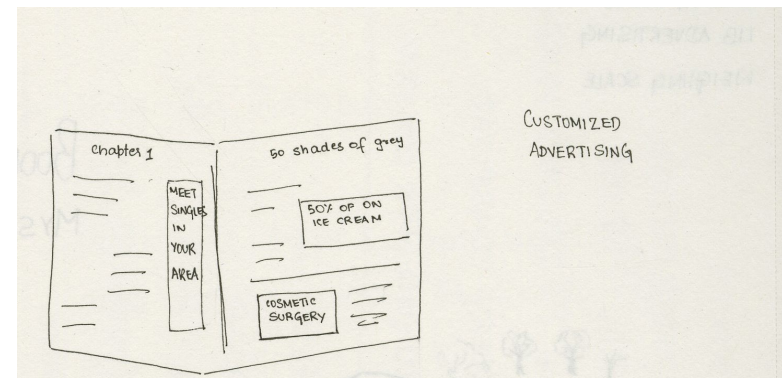
Refining ideas

During the course of conceptualization, sketches and ideas were shared with the library administrative staff to understand the feasibility of these ideas. The library has for a long time been a safe place for people to gather knowledge in whatever they choose. This has also made the library a place for controversy. Different governments in the United States have tried to access library member data to find out the kind of things that people are reading (--citation--), the libraries guard the information and they have about their patrons. Since some probes' effectiveness is based on their ability to use patron data, they had to be refined and/ or cut out from the probe concepts.

Experience Prototyping

Two experience prototyping sessions were conducted with fellow designers in the graduate design studio on the Carnegie Mellon University campus. Over the period of two hours, 4–5 design students in each session were invited to a section of the studio that was modeled as a library. Students were then briefed on the different "areas" of the library and asked to perform activities in sequence while imaging experiencing taking place in the library. The students were provided paper to write down their thoughts as they experienced the probe. At the end of sessions, a joint conversation was conducted to understand which concepts were most provocative.

"Is nothing sacred anymore?"

## "…I opened the book I like and I saw ads. It feels very invasive"

In the first prototyping session the studio classroom was divided into four different sections, the book bin section, the racks, the digital catalog access area and finally check. The participants were asked to walk through these areas with four different tasks in mind—
- Return a book
- Find a new book to read for the weekend
- Search through the library catalog
- Check out the book

Fellow designers provided very good feedback on the prototypes. Some concepts drew out unexpected responses while others, people liked and supported. For example in the "find a new book to read" task the technology probe used was "The Seductive Shelf". Participants found this concept disturbing and forced them to confront the dynamic and immediate nature of digital information while participants liked the probe "Find your love".

After the first experience prototyping session, concepts were narrowed down to "Find your love", "The seductive shelf", "AdSpace" and "The sassy librarian". The second experience prototyping session was conducted with five design graduate students who were new to the project. In this session, the content and form of the probes were tested to understand the most provocative and relevant probes. For example, The Sassy Librarian probe had two versions— digital, where the message was displayed on a screen and the original version.
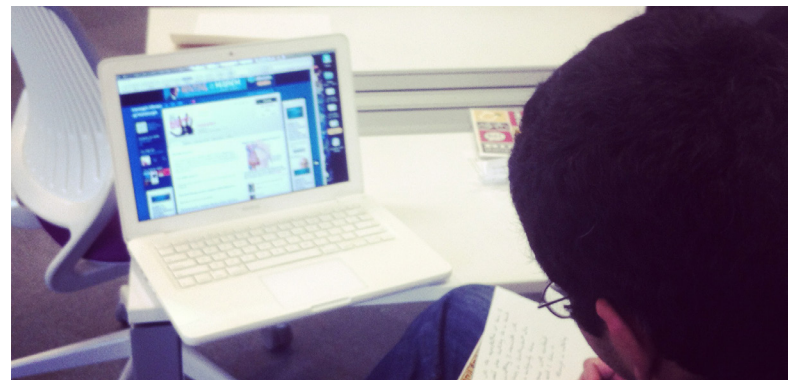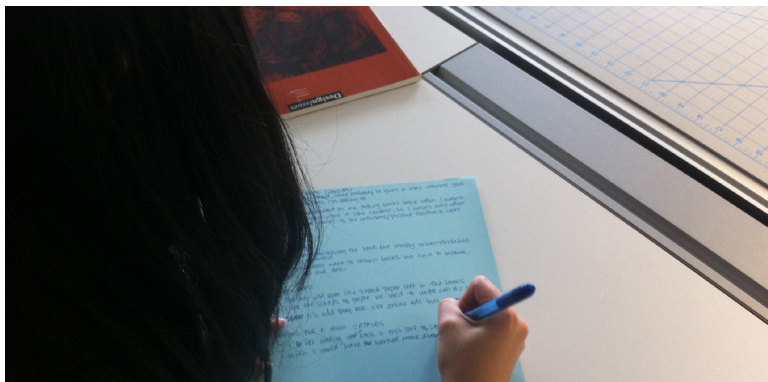
PROBE DEPLOYMENT

The second half of the research process occurred in two libraries. The Hunt Library and Carnegie Library of Pittsburgh Oakland were chosen because of their layout and foot traffic. Over the period of two weeks in the two libraries, patrons of all ages stopped to interact with the installation, because of their interest in one of the two books in the installation. Patrons were observed as they interacted with the installation. If the patron continued to interact with the installation after hearing the audio feedback for a period of more than 5–10 seconds, they were approached as their interaction with the installation ended and asked for an interview.

Hunt Library
The installation was placed in the hunt library for a period of two weeks starting April 1st to April 12th 2013. After conversations with library staff at the Hunt Library a location by the door was identified for the installation. It was immediately revealed that the location near the circulation desk and close to the exit on the first floor of the library makes it difficult to conduct post interaction interviews. The installation was moved towards the Maggie Murph café on the premises of the library. Observations were carried out in the library at different times during the workweek and over the weekend. The interaction times varied and were mostly brief and hence

did not qualify for in depth interviews. Some students who interacted with the installation tried find out how the installation worked. These users also, did not qualify for the interview. Of the few who qualified for the interviews, many users kept the conversation short as they were rushing to talks, classes and meetings. This could have been a function of the location. From the interviews it was evident that patrons at the Hunt library were having difficulties associating the context of the installation to their environment.

The installation Talking Books was created with the "browsing" context in mind. Students use the Hunt Library premises for collaborative work and homework. The library acts as an alternative location for schoolwork rather than serving as a location for people to discover books and read at their leisure. This is when it became apparent that the location and context for a Critical Design piece such as Talking Books is very important.

Carnegie Library of Pittsburgh
The installation was moved from the Hunt Library to the Carnegie Library in Oakland for a weekend in April after consulting librarians to find a day with the most amount of foot traffic. The installation was placed at an optimal location on the first floor of library.

This image shows installation Talking Books in Hunt Library on Carnegie Mellon University campus near the cafe.

The two final concepts were
realized in foam-core to
understand a suitable form.

FINAL CONCEPTS

In the beginning of the spring semester, the two final concepts AdSpace and Seductive Shelf were moved to the phase of probe design and development. To understand the best form for the concepts given the context, each probe was evaluated separately. Three guiding design principles informed the form for the final probe concepts:

Incite engagement — the installation should support different levels of engagement.

Simple interaction — by ensuring a simple interaction I can ensure that people with different levels of comfort in technology will still be drawn to interact with the installation. I wanted to keep the interaction simple to ensure that I don't take the emphasis away from the issues that I am probing.

Emphasize novelty — while I did not want my installation to attract attention for not "fitting in" the library, I still wanted the installation to different enough to get people to notice it.

ADSPACE

For this concept to be fully realized it was important to create a sense of "personalization" of the physical advertising in the books shown to users. As shown in the sketches, the form changed drastically from its original form to fulfill this requirement. The time required to implement the final design would have exceeded one semester and therefore, Talking books was the only concept that was finally executed.
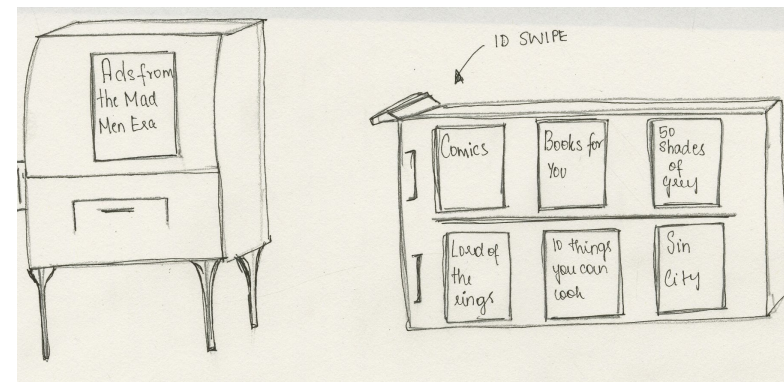
The sketches show the evolving form of the AdSpace concept.

The image to the right shows the development of prototypes. By creating prototypes, I was able to test the feasibility of the concept.

TALKING BOOKS

The Seductive Shelf or Talking books probe evolved over and iterative the design process. While the final probe maintains few of the features of the initial design from the Seductive Shelf, the form changed from a shelf of books to a table. The form and features of the probe changed through the course of the prototyping process. This part of the design process was also iterative. Multiple variations of the installation's features were tested in the graduate design studio for feedback. The final design of Talking books consists of two books on display on a table. Two separate lamps illuminate the books.

Using an entire shelf with a few books that provided audio feedback was not feasible from the technology perspective. Few of the issues I encountered with the installation's initial form of a "shelf":

How does the shelf know which book the user picked up to give the user the correct audio response?
I was toying with the idea of using cameras embedded above the user to do image recognition to find out the exact book the user picked up. The error rate for this would be very high because the image capture would depending on how the user is holding the book etc. To overcome this, I also considered embedded a small circuits in the book that would play audio when the user

opened it. This idea was influenced by the commercially available singing greeting cards. The issue with this approach is that I can only provide one or two audio clips and I would be taking away from the feeling of "dynamic" digital content.

What if the user walks away with the book?
This is an issue I faced even with the final design. Placing books on the shelf encourages users to treat it as a part of the library and not recognize the aspects that makes it different (notice the audio). A shelf of books has specific connotations associated with it, including some embedded behaviors. People might stop to read one of the books or might just walk away with a few.
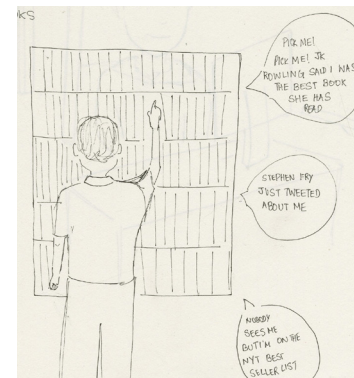
Talking Books is derives from my intial concept "The Seductive Shelf" (shown on the left). The concept was not technical feasible in the given timeframe and hence the form was modified.

Where will the shelf go?
Considering the physical layout of the library, if I created a shelf then I would have to ensure that it fits into the library's model where the shelves are places. In both the libraries the shelves were either on a different level from the café or separated from it by because of the library layout. Since the number of patrons who browse the shelves are a small subset of the total number of library visitors on any given day, the probability of a patron coming across my installation would have been low.

How will I ensure that users walk up to my shelf?
This is similar to the issue stated above, by placing my installation at a location that has a lot of foot traffic; I hoped to engage as many users as possible. This would have been difficult with a shelf.

The image on the right is one of the initial sketches of Talking Books created to address issues of The Seductive Shelf.
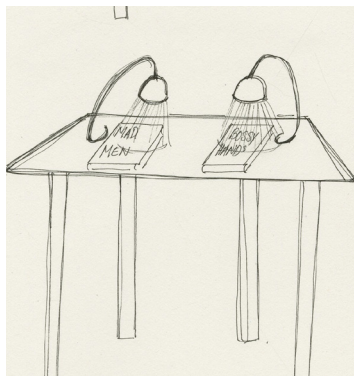
New form
Initially I considered using a coffee table to display the books because the library patrons have an existing mental model of what a coffee table offers but slowly I came to realize that the installation should be at a specific height for users to even notice it. The form needed to be simple enough to fit into the library. The white tablecloth is a simple differentiator that makes the display look "special"

compared to other objects in the library and yet does not give away the technology that it hides. The lamps were chosen both for their aesthetic and functional appeal. The broad head has space to enclose both an LED light and a camera.

The final two books chosen were Mid-Century Ads: Ads from the MadMen era and Best of American Comics 2011. These two books were chosen from a series of best sellers and other books. They were chosen after talking to librarians in CLP and parsing through information about them on the Internet. Both the books have attractive covers and reference popular media.

Talking books consists of two ingratiating books that are eager to inform you of their credentials. They draw these from a variety of digital sources in real time. This is an imitation of user's online behavior of corroborating a new story with multiple different online sources. The two books on display name-drop and wait to see the user's reaction. If the user pauses, the books immediately tell you more about themselves. If the user continues to interact with the books, the books realize that the user is very interested in their content and talks for a longer period. If the user walks away from the installation, the books go silent and wait for the next person to interact with them. The books are eager for the user to check them out because they realize that the longer they are on display without being checked out, the higher the probability of them going into the archive.

AUDIO

The audio feedback provided by the installation was refined multiple times to ensure that it did not distract the user from the issues at hand. Instead of using a recording from a real person I chose to use a "computerized" voice to emphasize the digital nature of the audio. This was done using the VoiceOver feature on the iPhone.

(Top left) Prototype development. A foamcore prototype of the final concept was evaluated by placing it in the graduate design studio. The form and features were refined based on the feedback. (Clockwise from the top right) Shows the development of the probe.

Decoding the findings from port-interaction interviews with patrons in Carnegie Library and Hunt Library.

FINDINGS

Following people's interactions with the installation, brief interviews were conducted. Six patrons at Hunt library and four patrons in Carnegie Library of Pittsburgh were interviewed. The interviews were unstructured and mostly led by users' responses to questions about their library usage and their understanding of the "future" of the library (physical) and the digital world.

Advantages of digital

Quick and accessible

The digital world provides instant access to its users and reduces the time spent finding information. F-CLP-004 readily admitted that the Internet has drastically cut down the time she spent researching. In the past F-CLP-004 spent hours in the library's using the card catalog system.

"With a single query today I can get a list," she said "I can do this at home in my PJs. I love the availability." When asked about their use of digital platforms, F-CLP-003 said that she considers the digital-world excellent for communication with friends and family around the globe. F-CLP-004 believes that digital medium simplifies the time and skill required to create expert quality materials. "As an artist it took me many years to master charcoal strokes," she said "but on the iPad I can create the same expert strokes with minimal effort and time."

Dislike about the digital

Tedious
Users found digital media tedious and difficult to use. Participant M-CLP-001, said that he feels like he will "break" the digital and another participant, F-CLP-003 said that if she has to navigate through more than four screen to do anything online, she usually gives up. Others were concerned over the lack of transparency in the digital information. One user, M-CLP-001, said that he does not want people to know what he is reading, suggesting that people have a loss of control over their actions in the digital world.

Exclusive
Users felt that digital information can be access by only a few. "Older books have been digitized but the Kindle came along and decided to make money off of it instead of offering it for free." M-CLP-001 said discussing the models that companies use to make online content more "exclusive".

Information overload
Participants were concerned about the information overload in the digital world— "There is so much information online and if I go away for a day I end up with a million emails. Most of them are bullshit" F-CLP-004

said. This participant also admitted that information available online is abundant but shallow.

Isolates
Another point of concern was the "isolation" that came with engagement with digital information. "When I am online for many hours, I feel disconnected and cold", participant F-CLP-004 said. Talking about the impact on the community, the participant asked, "We lose connections between people if spend all our time on the Internet. When we can't connect with each other, how will we connect with people from other cultures?"

Digital= screens
Participant associated the digital world with screens and talked about their dislike of this medium. Participant F-CLP-003 added that people stare at screens all day and they don't want to stare at any more screens.

Advantages of the physical

Comfortable
Two users emphasized the "comfort" they had with the

physical aspect of the library, one even labeled it a "safe haven". F-CLP-004 is comforted by the fact that the physical experience is uncensored.

INCLUSIVE

People emphasized the "inclusivity" of the physical experience. People felt that services like the library are always welcoming because they are free. "When I was growing up, I came here all the time because it was free. You didn't feel poor in the library" F-CLP-004 said talking about the inclusivity that physical spaces offer. She added that the physical space affords serendipity.

SOCIAL

All participants enjoyed the social opportunity that the physical world offered. "I like bumping into people here," F-CLP-003 said, "I like the events they have here (library)." One user believed that the physical offers social stimuli and creative stimuli that cannot be replaced by any other medium.

DISADVANTAGES OF THE PHYSICAL

NOT AGE INCLUSIVE

"I'm 66 years now and soon it will start becoming harder for me to get out" F-CLP-004 said talking about the disadvantage of the physical world.

TIME ABSORBING

At least two participants mentioned the time taken to physically search for reference information in the library to conduct any kind of research in the past. F-CLP-004, talked about the time and energy investment that goes into building skills and expertise in the physical world.

THE PHYSICAL–DIGITAL DIVIDE

VAST DIVIDE

At least participant suggested that technology should evolve in a way that it blends the physical and digital world. Bringing up her experience mastering charcoal, F-CLP-004 said that the difference between the physical and digital worlds is too vast and the future should ensure a seamless blending between the two. She mentioned that without the "blending" everything would "tip over", foreshadowing multiple issues that the industry will encounter in the fully digital future.

M-CLP-001 considered the "digital-physical" divide as the divide between people's access to digital information. "People don't have access to online content, so they come here (library)."

TAKEAWAYS

DIGITAL HAS TO MOVE AWAY FROM SCREENS
Users associate screens with digital information. People engage with screens throughout their workday. People use laptops and desktops to write proposals, look for information, find jobs, shop online, communicate with coworkers etc. However, people todays are not free of screens once they leave their computers. Smart phones continue to connect people to the digital world. You can connect with friends and family, initiate status updates, read news on the go and listen to podcasts. Industry trends today are supporting this constant "staring at the screen" behavior by creating online services for everything that we used to do in the physical world. While the people appreciate the advantages of the digital, they don't want to stare at screens any more.

SEAMLESS MOVEMENT FROM PHYSICAL TO DIGITAL
With the digital information contained only on screens, people feel a jarring disconnect between the physical environment and the digital material. As designers we should enable a seamless transition between the two worlds to support people in their activities.

DIGITAL EXPERIENCE SHOULD NOT ISOLATE THE USER
Most of the work done digitally involves a single user isolating himself/ herself from his/ her physical environment while engaging with digital object and contents. People recognize this to be a major disadvantage in the current model of the digital state. There is a need for the digital environment to spark social interaction in the physical space.

CONCLUSION

I strongly believe that the project met its intended goals. Through this project I intended to achieve two goals — (1) understanding how I can use Critical Design to explore grey areas in design and technology and (2) to find out how I can address the schism between the physical–digital divide. The installation was able to capture the vast differences between the digital and physical mediums. The digital information is dynamic and real time where as the information in the physical space is stationary. I was also able to tie in the form and service to the library to understand how this digital–physical divide affects it.

If I had to do things differently, the only thing I would change would be my project timeline. Looking back at my process I realize that a majority of my time was spent in conceptualizing the probes. Moving away from Human Centered Design that has been ingrained into my practice was very challenging.

If was given a second opportunity to pursue a similar project, I would definitely cut down the conceptualization time and use that for programming and working with technology. The creation of a physical installation introduced multiple variables into my process that I had no control over. Even with thorough research into the parts that I was ordering, sometimes the parts were very different from what I expected or they didn't show up on time. This induced a lot of stress that I would have been easier to handle if I had more than a semester to tackle the project. Supporting the installation was also a big learning process. I had to learn to quickly respond to malfunctions associated with all the different parts in the installation. It taught me to think ahead and find alternatives.

During the course of the year I learnt a lot about applying Critical Design, working with technology, Pittsburgh and the bureaucracy in the library. I met a lot of wonderful people who helped me through the process. The project was challenging on different levels and I learnt a great deal from it. I only wish I had the opportunity of creating more than one of my final concepts.

REFERENCES

1. Bell G. 2006. No More SMS For Jesus: Ubicomp, Religion, and Techno-spiritual Practices. *In Proc. of Ubicomp 2006.* 141-158. Springer-Verlag.

2. Collins, S. About. Storyrooms. Retrieved May 01, 2013, from http://www.miriad.mmu.ac.uk/storyrooms/about.html.

3. Cornelio, G., Ardevol, E. Practice of Place-Making through Locative Media Artworks (2011). Communications v36, i3 pp 313-333.

4. Dunne, A. & Raby, F. (2006) Hertzian Tales: Electronic Products, Aesthetic Experience, and Critical Design. The MIT Press.

5. Gaver, B., Dunne, A., Pacenti, E. Design: Cultural probes, interactions, v.6 n.1, p.21-29, Jan./Feb. 1999

6. Gaver, W. (2002). Designing for Homo Ludens. i3 Magazine, June (2002), pp. 2--5.

7. Goldstrijn, C., Hoven, E., Forhlich, D., Sellen, A. Towards a More Cherishable Digital Object. *In Proc. of DIS '12,* 655-664.

8. Hemmings, T., Crabtree, A., Rodden, T., Clarke, K. & Rouncefield, K. (2002). Probing the Probes. *Proc. of PDC 2002.* CPSR, pp. 42-50.

9. Jochumsen, H. (2012) The Four Spaces: A New Model for the Public Library. New Library world, v113 i11/12, pp 586-597.

10. Petrelli, D., Bowen, S., Dulake, N., Light, A. Digital Christmas: An Exploration of Festive Technologies. *In Proc of DIS '12*, 348-357.

11. Petrelli, D., Whittaker, S. Family Memories in the Home: Contrasting Physical and Digital Mementos. *In Proc of Pers Ubicomp '10*, 153-169.

12. Stevens, M., Abowd, G., Truong, K., Vollmer, F. Getting into the Living Memory Box: Family Archives & Holistic Design. *In Proc. of Ubi comp '03,* 210-216.

13. Odom, W., Harper, R., Sellen, A., Banks, R. 2010. Passing On & Putting To Rest: Understanding Bereavementin the Context of Interactive Technologies. *In Proc. of CHI '10*, 1831-1840.

14. Odom, W., Zimmerman, J., Forlizzi, J. 2010. Virtual Possessions. *In Proc. of DIS '10*, 368-371.

15. Voida, A., Grinter, R., Ducheneaut, N., Edwards, K., Newman, M. Listening in: Practices Surrounding iTunes Music Sharing. *In Proc.of CHI '05, 191-200.*

16. Walsh, A. (2011) Blurring the Boundaries between our Physical and Electronic Libraries: Location Awareness Technologies, QR codes and RFID tags. *The Electronic Library, v9 i4, pp 429-437.*

17. West, D., Quigley, A., Kay J. Memento: a Digital-Physical Scrapbook for Memory Sharing. *In Proc of Pers Ubicomp '07,* 313-328.

18. Whittaker, S., Bergman, O., Clough. Easy on the Trigger Dad: A Study of Long Term Family Photo Retrieval. *In Proc of Pers Ubicomp '10.* 31-43.