

Pollen: Promoting the Exchange of Meaningful Objects

Stefanie Danhope-Smith
Savannah College of Art & Design
Savannah, GA, USA
sdanho20@student.scad.edu

Payaal Patel
Savannah College of Art & Design
Savannah, GA, USA
ppatel20@student.scad.edu

ABSTRACT

One of the most trying aspects of growing old is the loss of loved ones. Older people often experience depression as a result of this reality. Without regular contact from friends and family to amend this loneliness, a gap may exist in the individual's social welfare.

Through a unique combination of Industrial Design and Interaction Design methods, we have formed a process that allows us to explore the contextual background of a problem as well as a physical product solution. By using this process, we were able to create Pollen, an affordable product that provides companionship through the exchange of meaningful artifacts. This paper describes both the process taken to create this unique product as well as the product itself.

ACM Classification Keywords

H.5.1 [Information Interfaces and Presentation]:
Multimedia Information Systems

Author Keywords: Artificial Companionship, Industrial Design, Interaction Design, Seniors.

INTRODUCTION: AN OVERVIEW OF POLLEN

Pollen draws upon the human inclination to treasure personal artifacts [7], and allows its users to receive and share such items through a unique experience. Pollen is the unseen service that moves the Pollen cells from the sender to the recipient. The cell contains the physical object, but it also has digital memory embedded into it, allowing for the user to record a brief amount of sound to accompany their object. The audio recording enhances the meaning of the object inside of the cell, adding to its emotional and/or informative value.

Copyright is held by the author/owner(s).
CHI 2005, April 2–7, 2005, Portland, Oregon, USA.
ACM 1-59593-002-7/05/0004.

The user may record and listen to the audio when the cell has been placed on its stand. The stand also features a display that allows the sender to view the current locations of all of their previously mailed cells. As a result of this detail, the individual may uphold a mental tie to that object regardless of proximity.

INITIAL RESEARCH

Our research began by reviewing papers and essays regarding existing forms of artificial companionship with the intention of understanding both the successes and failures of previous product development and research. This also assisted in understanding the role as well as the meaning of companionship among a range of people. This knowledge informed our next step, which was to prune the areas of focus.

We utilized affinity diagramming to establish a more specific focus to guide us during our research [2]. The specific-to-general nature of the technique revealed pertinent categories that lent themselves to further research. Several of these categories were chosen as foci for the next phase of the research. These categories included lifestyle choices, periods of happiness, and domestic animals.

Having set a more clear concentration, plans were made to conduct a contextual inquiry. This method was chosen because of the qualitative, yet vivid nature of the data acquired. This allowed us to see certain details and nuances that could not be observed if the participant was outside of their natural environment [2].

We first chose to speak with Judy, 67, who lives with her mother and is identified in her neighborhood for her love of animals. She has one dog, eighteen cats, and is known to care for any animal in need. She also has a candidness about her, which made her an ideal participant for the inquiry. We employed a form of partnership during our inquiry that closely resembled the Master/Apprentice relationship model [2]. The balance of power between Master and Apprentice is the most appropriate for Contextual Inquiry because it allows for the wisdom of the Master to shine through without being overpowered by the interviewer. This worked particularly well in this case because of Judy's willingness to share her interests and views. The inquiry was recorded so that it could be fully transcribed. The transcript served as a textual representation

of the experience, which we could refer to during the interpretation of the data.

INTERPRETATION

One of the primary things that we noticed in our inquiry with Judy was her inclination to talk about her college years. “I started in ’69, and I graduated in ’81. [laughs] I loved college. I would have stayed longer if I could.” It became apparent that the main reason that she enjoyed college so much was because it was the time when she discovered her love of music. Her skill was strengthened by a piano teacher for whom she had great respect. “He was a poet... he just taught so much about the art. I just worshiped him... You knew [his skill] when he played for you. He just approached it so seriously.” Judy has maintained her musical skill to this day, and now owns a 7’ grand piano. She confessed that she had to mortgage her house to buy the instrument. “You said it was about companionship, right? Well, I love my piano. I love everything about it. I consider this room a music room rather than a living room.”

While we were modeling this data using Contextual Design models [2], we sought to find the reason for Judy’s profound liking of her piano. Through the use of a cultural model [2], we concluded that the piano served as a means for her to manifest her creativity. The act of playing the piano demonstrates her talent in a concrete way. “I had begun to learn when I was eight or nine. I didn’t like it. I wanted to impress my friends.” Her love to play was, in some ways, fueled by her desire to take an intangible part of herself and be able to share it with others. Since the piano facilitated her in this act, she regarded the piano itself as her companion.

Upon meeting Judy, we assumed that she was a highly sociable person because of her outgoing personality. We were quite surprised when she said, “I detest the phone to ring. I treasure my solitude... I like my own company.” She expressed that she simply did not like being interrupted. It was evident that Judy could easily be immersed in the activities of her choosing, and that she values this “flow”. Mihaly Csikszentmihalyi describes flow as “being completely involved in an activity for its own sake... Your whole being is involved, and you’re using your skills to the utmost.” [4] This realization led us to the conclusion that our solution had to be non-intrusive in nature, and if at all possible, help end users achieve flow.

We also sought to understand the emotional connection that Judy had with her many animals. Her initial explanation was brief in nature. “Well, I never had children... but they are one of God’s creatures.” Later in the conversation she casually stated that she was “more of an animal person than a human person.” Judy’s account of her rituals surrounding the death of her animals was particularly intriguing. “I wrap them in layers and layers of material, because [pause] you’re going to think I’m nuts. Well, if there was ever a world disaster, something that wiped out civilization I

would hope that someday someone would dig up my cats and they would be very nicely fossilized.”

We wanted to further examine her effort to preserve the bodies of her cats. We began drawing out a concept map in an effort to comprehend this ritual. Our understanding was that perhaps the idea of preserving physical aspects of her life somehow put her at ease. She liked the idea of a piece of her life surviving a “world disaster”. Through this act, Judy would be sharing an aspect of her life long after it ended.

We were able to see, through Judy’s regard for her piano, that companionship can exist without adding anthropomorphic characteristics. The meaning of the piano sparked emotion within her. This meaning was achieved through personal experience with the artifact, rather than engineered behaviors. We also were able to understand through the burial of her animals, the importance of concrete artifacts, which can contribute to the legacy of the owner. Finally, we needed for the interaction style of the solution to be non-intrusive, so that it would not interrupt flow.

During our interpretation session, we found ourselves at somewhat of a standstill. We were fascinated by our contextual findings, yet we struggled in finding a manner in which we could apply them. We wanted to hone in on an elemental form or companionship; instead of resolving to create something of this nature we began brainstorming basic forms of *real* companionship. A discussion concerning food began because of its strong ties to family and social events. Food is a physical object, yet it also has the ability to be recreated through a recipe. We also understood that the dinner table is place where many memories are made. The notion of the simple exchange of food between loved ones intrigued us following our interpretation of the inquiry. Further data modeling did not offer meaningful material, so an interview was arranged in order to understand its value.

FOLLOW-UP RESEARCH

We scheduled an interview with Derek, 21, who was chosen because of his childhood experiences of cooking in his family. His grandfather, who is now deceased, was an excellent cook and prepared dinners for his entire family every Sunday evening. Since the event of his death, Derek and his father have tried to recreate the dishes that his grandfather cooked but have been unsuccessful. “Neither my father or I can really duplicate it...” he stated. The odd thing about his explanation is that he did not seem bothered by their failed attempts. “I would rather keep trying to make what my grandfather did than look for any other recipe.”

Derek cherished the idea that his grandfathers cooking could not be reproduced, as if that fact made the memories all the more precious. “I think there was just something that happened when he was cooking that was independent to him...” He joked that possibly some of his grandfather’s skin cells had gotten in the spaghetti sauce, and perhaps that

was what made it taste so good. Although the comment was made in jest, this statement sparked discussion among the group. We had assumed that we would be hearing about recipes that had been passed down, immortalizing the dish. In fact, we were hearing the opposite. Derek's grandfather's food had, in many ways, died with him. Derek and his father attempt to make these dishes again, but it is never quite the same. "It's kind of like how macaroni and cheese taste different at everybody's house, even though it all came out of the same box." It became apparent that he did not desire a replica. He quite simply wanted to enjoy the genuine flavors of his grandfather's cooking once again. The beauty of the food was in its uniqueness.

We utilized cultural models in an attempt to understand what was standing in the way of Derek truly reliving his memory. The perishable nature of food was the very thing that kept the experience from staying alive. The food did maintain the physical aspects that we had examined from the inquiry, but the short life span prohibited us from using food in a direct manner. From the interview we were able to understand the notion that something which cannot be recreated is precious in nature. Once we had combined this with the knowledge with the material from our contextual inquiry, we decided to investigate the personal objects. We wanted to understand what gave seemingly insignificant objects their value. To move forward, we needed to fully grasp what qualities gave meaning to physical objects.

PERSONAL ARTIFACTS

Informed by the findings of our contextual research, we sought to understand expert opinion of the meaning of personal objects. We noted that one of our participants' attachments to objects was directly correlated to their emotional involvement with the object itself. This notion was reinforced by Donald Norman's view that "Our attachment is not really to the thing, it is to the relationship, to the meanings and feelings the thing represents" [4]. This implies that a person's ability to cherish an object does not depend on how it looks or what it does, but rather depends on personal associations. These objects can affect a person's ability to achieve flow. "Household objects facilitate flow experiences in two different ways. On the one hand, by providing a similar symbolic context they affirm the identity of the owner" [7]. These objects have the power to silently convey profound characteristics of the owner of the object. "Each home contained a symbolic energy, a network of objects that referred to meanings that gave sense to the lives of those who dwelt there" [7].

DESIGN CRITERIA

Having completed a substantial amount of research, a framing exercise was then used to determine our design criteria. We combined the original constraints of the project with constraints that we had gathered from our research to develop the rules that would guide our concept development:

- The device must cost under \$500, although this price may ultimately be much too high
- The interaction with the device must be non-intrusive.
- The design solution should be such that it applies to different cultures, and will be appropriate for all age groups.
- The device will be a physical product that contains a relatively unseen digital component.
- The solution will bring forth existing meaning to personal objects.
- The device will encourage communication with other people (friends and strangers).
- The device will carry information to a larger system, and the user will anticipate the arrival of the product
- The product communicates the emotional qualities of a souvenir or a keepsake.
- The product facilitates and enhances the sharing of the user interests and emotions.

CONCEPT DEVELOPMENT

We began ideating by rapidly sketching our ideas, allowing for our research to inform our potential solution. As the sketching took place, each group member openly discussed the proposed solutions. The concept of sharing and exchanging was at the forefront of our initial designs. We were certain that we wanted to include some type of sharing in the final design; we also knew that the product was to be physical rather than purely digital. This meant that the product had to be transported or shipped. We chose for the product to be received and sent by way of mail, not only for logistical reasons, but also because of the anticipation involved in the receiving of mail.

During this ideation sketching, Judy's ritual of burying her cats came into discussion. We were intrigued by the fact that she "would wrap them carefully in layers and layers of material." We took Judy's act of creating an enclosure for the meaningful object and applied that to our design concept. We decided that our visual opportunity would lie in the design of a unique housing for objects of the user's choice. Typical forms of artificial companionship are robotic in nature; the most well known product of this kind is a mechanical dog by Sony called AIBO. Products like AIBO fail because many people cannot forget that the dog is not living, but rather "a bloody collection of nuts and bolts" [6]. We resolved to hone in on existing meaning rather than attempting to engineer it.

Our first visual inspiration for the form of the cell was an egg because the shell of egg protects the embryo. There is a sense that its contents must be nurtured once it has been removed from the shell. We understood that the people opening the pollen cells might not have full dexterity; we provided protrusions on the form that would provide leverage to open the cell. These leverage points were visually inspired by petals on a budding flower. The pollen

cell, however, does more than contain the object; the cell also has digital storage so that the user may record a voice message to accompany the object. The voice component is essential because an object's meaning is often rooted in the event it represents. This association may be conveyed verbally, heightening the recipient's understanding of the object. The form of the cell stand is intended to accentuate but not distract from the form of the cell. The shape is meant to look as if the cell is being cradled, gently supporting the object inside.

FINAL SOLUTION

The concept of Pollen relies upon the human inclination to cherish personal keepsakes. Everyday objects that hold meaning to the user may be fortified by the basic interaction with this product. The pollen cell serves as a housing for personal artifacts that accentuates the uniqueness of the object inside. This product offers an exchange beyond that of traditional communication devices by honing the symbolic power of the included objects. By using this product, participants may send and receive such items, resulting in a unique interaction that manifests feelings of friendship and belonging

Involvement with Pollen begins with the purchase of the stand. The stand comes with a single Pollen cell. Within the cell is a paper form that has been placed there by the company. The user may immediately place an object in the cell and send it to a loved one, or may choose to participate in the extended service offered by Pollen by filling out the form. The form serves to inform the company of the users' interests. This information is used to direct cells to people according to their interests. This way the user may send and receive cells from strangers, if they so choose. This option is important because it allows people of varying social environments to participate – including those who may not have close family ties. Once the completed form has been sent to the company, the company will be able to appropriately traffic the cells. The charge for the shipping of the cell is included in the price of the cell itself, and thus appears “postage-paid” to the end user. At the height of 5½ inches, the pollen cell has relatively small capacity. From a pragmatic viewpoint this will keep shipping costs low, allowing for the cells to cost less which will result in a higher number of exchanges. More importantly, however, the small size contributes to the emotional quality of the object being precious in nature. The received cells exist as keepsakes in their own right. Although the purpose of the cell is to contain an object, it also has stored audio that can be heard by placing the cell on the base. The audio component is intended to enhance the existing meaning of the artifact. The nature of the audio format can convey human emotion through voice. The pollen cells can be considered “knick-knacks” themselves, and are ideal displayed as such.

MANUFACTURING AND ASSEMBLY

The Pollen cells will be made of injection-molded polyurethane. While tooling is expensive, as larger quantities are made the cost of production will become lower per unit. This method also conveys the intended form more accurately than other processes. We calculated molding cycle time according to the principle that the thickness of wall section determines cooling time. Cost for injection molding is as follows [8]:

1. Molding cycle time is determined by the thickness of wall section (which determines cooling time); the thickness of Pollen wall: 0.05"
2. 80 parts/hrs x 7 hrs shift = 560 parts/day
3. 80 parts/hrs X 147 hrs/month (147 = 7 hours of run time/day for 21 working days/month) = 11,760 parts/month
4. Demand volume (number of parts/month): 50,000 parts/month
5. 80 parts per hour per cavity: 45 sec cycle time
6. 11,760 parts/month/cavity = 4.25 mold cavities (the presence of a decimal, .25, tells us that the factory will have to run overtime around nine hours per month)

Calculating material volume resin required:

7. Calculating resin needed for 1 parts (pollen is a two part system, thus, multiply by 2)
8. Surface Area of Pollen = $(4\pi r)^2 = 50.27\text{inch}^2 \times .005\text{''(wall)} = 2.51\text{inch}^3$
9. Volume of body = 2.51 inch
10. Volume of 4 cavities = 2.51 x 4 = 10.04; Add 15% for runners, thus 10.04 x 1.15 = 11.55 inch³
11. The cost to run a 75 ton machine runs about \$23/hour. To allocate the machine time to the product, we divide the hourly run cost into the number of parts/hour.
12. A 75 ton press producing Pollen, then, costs \$23.00/320 = \$0.07
13. The cost of resin (injection molding polypropylene) = \$.015 per part
14. $2.51''^3 \times \$0.015 = \0.038 or four cents for polypropylene resin per part

Resin (material)	\$0.04
75 Ton press (body)	\$0.07
Total	\$0.11
Body made of 2 parts	total cost = \$0.22 per Pollen

The technology featured in the cell is digital storage space, in the form of compact flash memory for the audio component. Flash memory is inexpensive both at a manufacturing and consumer level. For instance, a 32 MB flash drive is available for purchase by consumers on Amazon at the cost of \$9.99 [1]. Products typically sell for roughly four times their manufacturing cost [8]; therefore we may conclude that they cost about \$2.50 to manufacture. At most, only 1 MB of memory would be needed to store 30 seconds of high quality sound, costing \$0.50 maximum at the manufacturing level.

Plastic component:	\$0.22
Flash memory (1 MB):	\$0.50
Manufacturing cost:	\$0.77
Retail cost:	$0.77 \times 4 = \$3.08$

At the affordable cost of roughly \$3.00, Pollen cells would be available for less money than greeting cards. The low cost would make the product available to more people, promoting a higher quantity of exchanges. Of course, the base would be needed in order to record and listen to messages stored within the cell. In order to make the cells more affordable, most of the technology exists within the base. The base features a microphone, digital audio recorder, batteries, and a USB port.

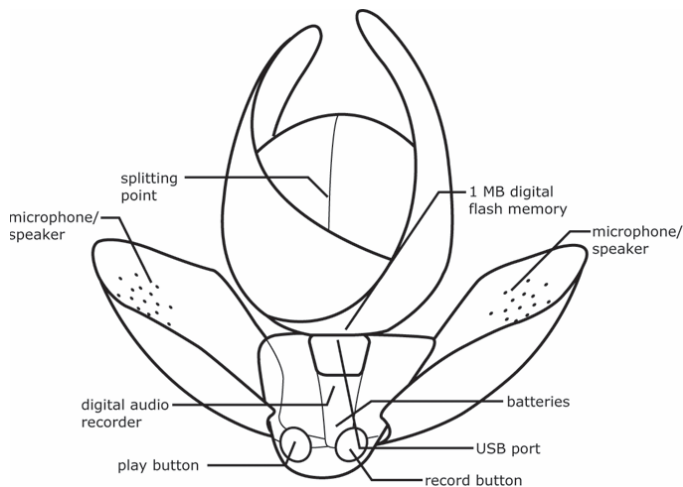


Figure 1. This figure illustrates where technological components are housed within the manufactured product.

AREAS FOR FURTHER STUDY

Like any existing design, our design can be improved. While we were pleased with the findings from our contextual research, we understand that Judy and Derek

may not be truly representative of the larger population; therefore, further inquiries would be needed. Particular areas of concern arise in the physical capabilities required to open the pollen cell, as well as to operate the stand, and the cognitive capabilities required to comprehend our user interface. User testing and additional Human Factors research would be required to produce a truly legitimate solution.

Although the final design is humanistic in nature, the motion of setting the cell on the stand would be an unnatural motion. The act of making sure that the cell has successfully connected to the USB port in the stand detracts from the user experience. Alternative technologies could be explored, such as a Bluetooth or a wifi connection, to find the best marriage of usability and cost effectiveness.

Finally, more discussion and investigation into the “service” side of Pollen is necessary, with a particular emphasis placed on privacy of individuals participating in the service.

CONCLUSION

Pollen provides artificial companionship through the exchange of meaningful objects. These objects carry emotional power through symbolism, and this emotional power is often related to specific human beings. Pollen exists to preserve, and to enhance, this power.

REFERENCES

1. Amazon.com. <http://www.amazon.com/exec/obidos/tg/detail/B0002UF2MY/qid=1102107560/sr=84/ref=pd_csp_4/00235425571072844?v=glance&n=507846>.
2. Beyer, Hugh, and Karan Holtzblatt. Contextual Design: Defining Customer Centered Systems. San Francisco, CA: Morgan Kaufmann, 1998.
3. Cooper, Alan. About Face: The Essentials of User Interface Design. New York, NY: John Wiley & Sons, Inc., 1995.
4. Csikszentmihalyi, Mihal. Flow: The Psychology of Optimal experience. New York, NY: Harper & Row, 1990
5. Norman, Donald A. Emotional Design. New York, NY: Basic Books, 2004
6. Personification Technologies: Developing Artificial Companions for Older People. Comp. David Benyon, Stewart Crinigan, and Oil Mival. Napier University. 12 Aug. 2004 <<http://www.acm.org>>.
7. The Idea of Design. Ed. Richard Buchanan, and Victor Margolin. Cambridge, MA: The MIT Press, 1996. 118-126.
8. Fee, Robert. Professor, Industrial Design; Savannah College of Art and Design. Personal Interview, 2004.