Executive Summary

For those who are 65 years of age, and older, the ability to live independently is greatly coveted. PentaGran has designed a system to compensate for the factors that contribute to loss of independence, such as cognitive decline and security concerns. The system, called Secure Health Environment (SHE), is intended for the use of people 60 years of age and older, so long as the user does not require chronic care.

In order to accommodate the needs of seniors, PentaGran has adopted the concept of participatory design, in addition to other methods of obtaining user feedback. For example, through numerous information-gathering interviews, the system has evolved into a base station and its interface, the wrist unit, the data pack, and the pill dispenser. Through increasingly focused interaction with target users we will continue to develop SHE toward our goal of a system which helps seniors maintain an independent lifestyle.

Contents

The Basic Idea

One of the most important goals of many older individuals is to maintain an independent lifestyle. Unfortunately, many senior citizens choose to move into retirement homes because they feel that they have lost the ability to live independently without being a burden to their relatives. We have devised a system that will allow them to maintain their independence despite a decline in motor and cognitive abilities. PentaGran's Secure Health Environment (SHE) is a distributed wireless digital system that monitors and assists independent-living seniors in their day-to-day activities. In particular, the system seeks to assist memory—it reminds, and it coordinates with those who provide security and health-care services.

The proposed system is one that is sufficiently integrated into industrial culture. As

a result, third-party durable goods manufacturers may be induced to include computer control capabilities in their products, for pharmacists to communicate the minutiae of their prescriptions by modem, and for health and security authorities to enhance their present systems to receive automatically generated distress calls.

The intended system will use a base station, which can be hidden somewhere inside the user's residence, to coordinate a set of modules. These modules, such as the data pack, wrist unit, and pill dispenser, will relay information to the base unit. From the data collected,

the base unit will send a response, if necessary, to the appropriate module, depending on the user's location. Inside their home, an electronic pet will provide a cognitive link for the system, thus allowing them via verbal communication, to interact with the base station. Outside of the home, the data pack and wrist unit will act as the interface.

The system will be, from the user's perspective, passive. It monitors their activities and their location without intrusion. Only when necessary—when the user has forgotten something important or is critically unresponsive—will the system's presence be noticeable. At that point, it will send a message to the user or the appropriate people, as the situation dictates.

The Target User

SHE's typical user is a member of either of the two age sub-groups known as Young-old and Old-old, i.e. from recent retirees to those who are on the verge of entering a comprehensive-care nursing home or residence. In the former age group, PentaGran seeks to assist users in day-to-day tasks; in the latter group, the hope is to extend the person's independence and delay their entry into a long term care facility. PentaGran's goal is to relieve users, and the people closest to them, of the stress that accompanies declining cognitive abilities and their impact on performing vital routine tasks. The prerequisite for benefiting from SHE is simple; we make no particular assumption about any infirmities, illnesses, or handicaps that

the person may have, except as these may be monitored or (to a limited extent) treated by the options available in our system. Of course, such a system does have limitations; SHE cannot compensate for the needs of someone who is classified as requiring chronic care.

The system is intended to be intuitive, and in its minimum configuration virtually, seamlessly invisible. As such we make no assumptions about level of familiarity or expertise with computers, and our design intends to accommodate those who may be uncomfortable with technology. Its passive nature requires no special knowledge or memorization of commands.

User Contact Ideas & Insights

We conducted a total of eight 1-hour interviews with seniors, covering a broad range of issues; a sample of typical questions is provided in the appendices. This was accomplished in two phases, with the results of the first phase helping to shape the questions we used in the second phase. Our interviewees revealed a prominent feeling of pride amongst seniors. All stressed their capabilities—what they were able to do versus any physical or mental impairments. Moreover, none were amenable to any idea or device that would (even to themselves) highlight their physical deterioration. For example, most would not consider wearing headphones, such as a Sony Walkman, because their perception was they would only do so if they "needed" it.

In addition, there was a uniform negative response to the word "computer"—all interviewees said it was either "over their heads" or saw no use for it for themselves. "Why would I bother" was said by each of the interviewees.

One challenge that must be dealt with when designing a system is that, due to cognitive changes related to aging, such as a decline in the ability to recall information, the interface must be kept simple, guiding users through a sequence of selections. For example, some seniors who had played bridge regularly had stopped because they could not keep the rules "in their heads" anymore. To this end, anything that would act as a memory prosthesis, without being in any way obvious, was greeted positively, with the stipulation that it should provide them with a "nudge", to trigger the information already in their heads. This is consistent with research on aging which reveals that the ability to recognize, rather than recall, suffers very little decay as we become older.

Another key issue regarding design: for vision, hearing, and, to some extent, mobility, the decline in performance or ability was imperceptible in nature. It was only by way of contrast with activities that they used to do "years ago" that they came to realize they couldn't see or hear as well.

During the interviews, we presented several of our brainstorming ideas to the interviewees: electronic pet, pill dispenser, fanny pack, and watch ID/monitor. The following is an overview of their responses:

The pet: received a lukewarm response. Most could not envision what it would look like

or how it would function. Some commented that it was an "interesting idea" but not one that they would use. One interviewee stated flatly she thought "it was crap" because she is not so senile that she'd be caught talking to inanimate objects. However, more research must be performed to resolve the difference of opinion. An occupational therapist, specializing in working with seniors, stated that she believes that some of the people that she works with would like it since many of them like having pets but they can no longer take care of them. For those who do not like the idea of a talking pet, a replica of an antique radio can be substituted.

The pill dispenser: received an overall positive response. No specifics were discussed in the first phase but, with the second phase, we gathered data on how the interviewees currently keep track of their medications. This information will be incorporated into our designs and fed back to them for further comments.

The fanny pack: was rejected by all interviewees. Keeping in mind that over 85% of our target users are women, reasons ranged from issues of looks ("it would make my tummy look bigger than it already is") to discomfort due to hiatus hernias, or body shape. However, interviewees did suggest an alternative; clip a 4" x 3" x 1" unit ("two packs of cards") onto the waist-band (weighing no more than 8 oz.). As a result, we will be incorporating this suggestion into our designs.

The watch ID/monitor: was greeted with interest. The features mentioned by the interviewer were: the remote door opening, reminder sound, pulse monitor, and "trouble" button. One interviewee (who had broken two hips and used a walker) suggested the latter function. When shown the interviewer's Timex Indiglo watch as an example, all felt it looked too high-tech, but would consider wearing it if it "looked like fashionable jewelry". We will be incorporating this suggestion into our design.

In all, four interviewees came up with suggestions or refinements to our existing ideas and have agreed to critique our next iteration of designs. Further input from interviewees showed that all agreed that the priority was keeping the mind active and then facilitating movement. Therefore, when designing our devices, we cannot assume that the senior can i) figure out what to do, ii) get out of a chair, or iii) move as fast as we can. Consequently, devices that act as "fast feet" (i.e., picking up the telephone for them, or answering the door) was both suggested and greeted favourably.

All interviewees expressed a pragmatism regarding eventual confinement and relocation due to declining functionality. The solution, as they saw it, was to move to their destined long-term care facility before necessary in order to familiarize themselves with the surroundings and the routine while they were still mobile and cognitively alert. They called it insurance. Of those interviewed in the retirement residence, many expressed regret at having to leave their homes, relocate away from friends, give up their cars, etc. Most did it on the advice of concerned relatives. This is precisely the situation our products are designed to mitigate. We believe this could be an important selling point for introducing our passive-assistive technology to their homes.

Brainstorming Ideas & Insights

The brainstorming process began with writing every idea related to "elderly" onto a mind map. We were then able to step back and sort some of the ideas into

conceptually similar groups. The second round of brainstorming produced three preliminary ideas: a health monitor (blood, pulse, activity); a recreation/mentoring device; and, an electronic pet to keep the senior company and stimulate mental activity. The map and an outline of the ideas produced by the second round of brainstorming are provided as appendices

The group decided to combine the first and third idea into an integrated group of products. The diagram below illustrates the specifics of each component in the overall system, using the base station as the hub. It is this idea that we presented to our users during interviews. The result: the Secure Home Environment, a health and safety monitoring system.

Diagram of the Secure Home Environment resulting from PentaGran's third round of brainstorming.

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Proposed Functioality

The core of SHE is comprised of a static base station, the system's "central nervous system", a set of wireless sensor, and a wrist unit. They are supported by a family of optional, modular products provide the system's 'senses' and 'effectors'. The system is designed to be proactive and non-intrusive, integrating itself into the senior's daily routine.

The **base station** is the main "brain" of the system; it contains a modem, data storage, a dedicated computer, and a low-power transmitter/receiver. Its modem is connected to the resident's telephone line, providing communications between the user and the appropriate people for various transmissions. For example, in emergency situations, it sends notices to police, ambulance, fire, or security monitoring services; health-related data would be exchanged with the user's family doctor, pharmacist, or nursing monitoring services. Moreover, caregivers, doctors, and pharmacists would be able to dial in for an authorized real-time 'situation report' in cases where closer monitoring of the user is necessary.

Wireless environment sensors can be distributed throughout the home to detect heat, pressure, open doors and windows, outside temperature, light, smoke, or whatever is appropriate to the user's condition and monitoring interests. These sensors would be about the size of a large postage stamp, could be programmed to transmit at a given threshold condition, and could include a small digital transmitter in order to send alerts to and receive threshold programming from the base station. Each sensor has its own unique digital ID, which it transmits to initiate a specific alert.

The base station monitors low-power transmissions from these wireless sensors.

For example, magnetic switches monitor whether doors and windows are open or closed. If they are opened in the absence of the user, the base station sends an alert by phone to security services. If a door or window is accidentally left open by the user the user is reminded to close them. Heat sensors detect whether stove elements, space heaters, coffee machines, etc. have been left on, and remind the user if left on. Pressure sensors detect the user's movements in and out of bed. If activities occur outside of the user's established routine, beyond a threshold of related events, the base station sends an alert to the primary caregiver.

The primary user interface between our memory prosthesis system and the user is an electronically animated pet. It can be in the shape of a bird, cat, dog, or, if none of these appeal to the user, an old-fashioned antique desktop radio. We felt that having a representation of a traditional "companion" would be cognitively easier for the senior to relate to when making queries about appointments or medications, much as pet owners talk to their pets now. This was borne out by discussions with an occupational therapist for the elderly (see Summary of Interview in the appendices). By having the main interface to the system be voice activated/voice feedback we minimize the user's awareness of "technology" in the home and eliminate the need to learn operational commands. The power and sophistication of this system lies in the AI's syntactic parser that recognizes meaning from what the user says. This is a large part of the reason we have no real limitations on the education, intellectual level, or sophistication of our target user—at this stage of development our users just have to speak conversational English. Other languages can be developed in future.

Another basic option is the **wrist unit**. Base functionality includes an ID chip, a pulse monitor, and a pressure sensitive "trouble" button.

Wireless door locks unlock automatically when the user approaches within a meter of the door wearing the data pack (the door can also, of course, be opened manually). This precludes losing or fumbling for keys, and allows easy entry to the home when returning with hands full. Conversely, the doors can remain locked at all other times. This reduces risk from unsavoury criminal elements.

Alternatives for this device range from a LCD watch, which could silently explain an alarm with a keyword (e.g. by displaying 'oven'), to a slightly longer and elaborate device with one-touch function buttons, which could initiate a 'situation report', or activate voice input and a piezo-electric 'mouse' for controlling a cursor, should it appear in the visor. The wrist unit could also allow basic medical sensors that could, for example, monitor the user's heart for irregularities.

An optional **data pack** extends the system's affordances beyond the home. Our original design called for a fanny pack that would be worn around the user's waist. However, based on target user's feedback, we opted for this design, which is more portable, sized to fit in a fanny pack or purse, with a sealed, rubberized, soft-bodied package, containing a small PCS phone/modem, global positioning satellite (GPS) receiver, data processing, data storage, vibrating pager, and battery boxes. It is intended for the pack to be carried outside the home to provide extended monitoring, trip guidance, and communications. Two noteworthy features are the GPS receiver, that, if necessary, can suggest a route to and from home, and the

vibrating pager, which silently alerts the user to an impending decision or incoming phone call.

Other devices, which interact with the aforementioned units, are available. These units are either strategically located in the home or are portable, allowing increased functionality by adding modules as desired. For our initial project, however, we will focus on the base unit and its interface, the data pack, and the wrist unit. To fully describe the diverse capabilities of the system, we have also included a description of possible add-on modules.

Inside the home

Inside the home, the base station monitors sensors and interacts with other units, providing feedback based on their collective status. The electronic pet acts as the interface, responding to verbal queries and informing the user of any anomalies.

The Pill Dispenser: A common theme among all seniors is a growing reliance on doctors and medications. However, overmedication and missed pills are endemic in the senior population—thus a computerized pill dispenser would likely be a key option. There are a number of implementations being considered. First, the pill bottles obtained at a pharmacy would have a unique laser bar code sticker on the cap. The pharmacist could either have the user's medication portfolio on the pharmacy's database, or could (with authorization) call into the user's base station to obtain the pertinent details from the user's current medical profile, as required. The pharmacist uploads information about the prescription dosage and contra-indications to the base station at the user's home and, possibly, voice recordings of their recommendations. When the bottle is inserted at the top of the user's pill dispenser, the bar code is scanned, and the appropriately coded prescription data is read from the base station, and stored in the dispenser's memory associated with a particular storage bin in the dispenser.

When the bottle is then twisted, the cap is broken off, and the pills fall into that particular storage bin. If for any reason the necessary prescription data is missing, the base station calls the pharmacy database to confirm the prescription and obtain the appropriate dosage information.

The dispenser is semi-portable and will fit into luggage in the case where the user goes on a cruise or to visit friends and relatives. For prolonged trips, a link can be made to the user's pharmacy and base station through the communications hardware in the data pack; data storage in the data pack can thereafter retain prescription information. For more disruptive travel, such as a bus tour, the dispenser could produce small, sealed "med-packs" which are suitably labelled; the user is alerted according to information stored in the data pack when the next dosage in the current med-pack is to be taken.

We are currently in discussions with another group to license their product for incorporation into our system. If successful, the medical organization touchpad (MOS) would act as the interface and portable add-on to our dispenser.

Third-party appliances such as stoves and washing machines could be given wireless digital interfaces to monitor and control appliances. This would prevent the waste and dangers of forgotten cooking, or the musty frustrations of forgotten laundry. Simple voice commands replace a bewildering variety of manufacturer-specific control panels. Voice commands could be simply reduced to "275 degrees, 2 hours", or "delicates, warm". The user could be alerted when the program is nearing completion.

Outside the home

Outside the home, the data pack co-ordinates information, monitors health sensors, and controls feedback devices as outlined below.

The Visor: Sunglasses, employing infinity optics to project an apparently ten-foot distant television screen before the viewer, are already available in the market. There are several applications for this concept in PentaGran's system. First, this would allow an unobtrusive visual interface with the system, controllable by voice or a cursor of some sort (see 'wrist unit'). Second, navigational information can be displayed to guide the user to and from home, in the form of maps or arrows. Third, with the PCS unit in the data pack, the user would also have access, on the go, to information on bulletin boards or the Internet. Fourth, television can be viewed anywhere and in any posture, tuned in by the system. Finally, with appropriate advances in technology, video on demand could even be possible on a park bench.

Speaking and listening: The PCS phone and the voice-activated emphasis of the system require a microphone and speaker or earphone. Some alternatives under consideration are a lightweight headset which integrates an earphone with a small microphone; a wrist-mounted microphone/speaker/speakerphone; an integral hearing aid and earphone; a microphone broach. An appropriately spaced microphone/speaker arrangement on the touchpad (see 'LCD touchpad') could allow it to be held and used as a telephone handset.

LCD Touchpad: Offers PDA-like convenience that combines the features of several of the above options. It offers an alternative for those who would rather not wear the visor to use the system interface or watch TV, or would like to share their slide shows of trips and family with others. It would also allow for a more tactile touch-screen interface for such applications as a calculator. The touchpad could also be employed for voice/audio interface and telephone if it were to incorporate a small speaker and microphone. The touchpad should be appropriately sized to fit in a purse or large pocket, and should be able to display of high-resolution, bright colour images. It will store and retrieve the bulk of its data from the data pack; by itself the touchpad is useless, making it less attractive to thieves, especially so if it is encoded to only work with a particular data pack. As an added feature, to prevent loss, a warning could be sounded when the distance between it and the data pack exceeds a couple of meters.

Digital camera: No more fumbling for a camera—a very small and simple CCD device could be integrated into other system devices, and as such could fit on the edge of the touchpad, in the wrist unit, or in an arm of the visor. Users strictly point-and-shoot, and the picture is stored in the data pack, subject to slide-show playback.

Proposed Use Model

This section consists of a comic strip that cannot be viewed in this context.

The Design Team

Dorothy's background in psychology and human behaviour, coupled with her years of interacting with the elderly, will help in determining the needs of today's seniors, as well as conducting multiple user interviews. Her years in business will help ensure a practical focus to the project.

His background in Industrial Design makes Michael ideally suited to carry out product design and mock-ups. His extensive programming skills and previous exposure to Director qualifies him to design our interface prototype.

Jonathan brings a well-rounded skill set to this project, including experience in psychology, business writing, and ethnographic studies. His main focus will be on programming in Director and product testing.

Ramona's avocation in art has her ideally suited to construct the 3D model of our

primary interface, while her skills in graphic design puts her in charge of our presentation packages. Additionally, her years in academia bring strong writing and editing skills to the project.

Alvin brings a strong graphic design skill to the group. His double major in Computer Science and Human Biology makes him an excellent all-around contributor. We will utilize his skills primarily in the product design and report presentation phases.

Irene is amply qualified as our Seniors consultant, having a degree in Gerontology and being a senior herself. In addition, she runs her own Eldercare business and is in constant contact with young-old and old-old seniors.

The PentaGran team brings together a strong and diverse set of skills. To take full advantage of this, each team member will be contributing to all phases of product development, including research, design, prototyping and writing. In addition, team cohesiveness allows for much collaborative effort between members across the different areas of responsibility.

Appendices

Phase I: List of Questions

- Explain purpose of our inquiry/project objectives.
- If you don't feel like answering any of these questions, please say so.
- There will be some general questions then some about physical ability.
- Is it ok if I tape the conversation? I will erase it after I transcribe the notes.
- Name for sign-off sheet.

1. How long have you been at this residence?

2. What events prompted you to come here?

3. Do you have family living in Toronto?

4. How often do you/they visit/speak/write?

5. What are the barriers to more frequent contact?

6. Have you ever worked with computers?

7. Have you ever worn headphones (like Sony walkman)?

8. Do you know how to type (touchtype)?

8a. Ever played video games?

9. What stuff about computers/technology don't you like?

10. Or difficult to work with?

11. What type of music do you enjoy most?

12. Do you do a lot of reading? kinds? tried books on tape?
    if not, what stops you?

13. What types of aches/pains :
    vision (bifocals) swelling
    hearing aid (problems?) taste/smell
    back grip
    allergies

13a. What kind of activities do you do? (walking/golf/knitting/cards)

14. Can you wear jewellery (wrist, necklace, fanny packs)?

15. Any feelings about zippers, buttons, velcro, plastic vs metal vs velvet.

16.Do you have difficulties:
- turning dials
- pushing buttons
- light switches
- phone calls
- keys

17. What things do you miss in your life?

18. If you could ask a fairy godmother to magically add something to your day-to-day life or activities to make things easier or more enjoyable, what would it be?

**19. Ask permission re giving feedback on our prototype and day-in-the-life.

Phase II: List of Questions

- Explain purpose of project.
- If you don't feel like answering any of these questions, please say so.
- Some general questions then some about physical ability.
- Is it ok if I tape the conversation? I will erase it after I transcribe the notes.

1. What did you do before you retired?

2. Do you have family living in Toronto?

   2b. How often do you/they visit/speak/write?

   2c. What are the barriers to more frequent contact?

3. What sort of things do you like to do?
   (walking/golfing/knitting/cards)

   3b. What type of music do you enjoy most?

   3c. Do you do a lot of reading? kinds? tried books on tape?
   If not, what stops you?

   3d. Do you have a driver's licence?
   Do you/did you drive a car?

   3e. Do you consider yourself "active"?

4. What stuff about computers/technology don't you like?
   Or difficult to work with?

   4b. Do you know how to type (touchtype)?

   4c. Have you ever worn headphones (like a Sony walkman)?

   4d. Do you prefer ATMs over tellers at the bank?
   Why or why not?

5. What is your daily routine at home?

5b. Have you ever had a pet?
What type?

5c. Would you like to have one now?
Why or why not?

6. Do you take any vitamins or other pills?

6b. What is the size/number of prescriptions/ frequency of refiles.

6c. What is your routine for remembering when to take them?

7. What types of aches/pains do you experience:
vision (bifocals?) swelling
hearing aid (low sounds?) taste/smell
back ache/spasms grip strength
allergies

8. Do you have difficulties:
- turning dials
- pushing buttons
- light switches
- phone calls
- keys

9. Would it bother you if our product had zippers, buttons, velcro, plastic vs metal vs velvet?

10. What activities do you wish you could do that you have not done for some time?

10b. Is there anything specific that has kept you from this activity?

We would like you to give us your reaction to some of the product ideas we were considering.

1. What if there was a way that something attached to your watch could unlock and open the door for you when you came home?

2. What if there was a device that would enable you to contact a relative or summon help just by calling out?

3. What if there was an electronic hand-held device that would keep track of when you had to take your medications?

4. What about a device that dispensed the pills as you needed them?

4b. With a small "med-pack" for times when you are out of the house?

4c. Which room in your home would you prefer it in?

5. How would you feel about a fanny pack that contained all sorts of information, such as a locator, reminder, alerter?

Occupational Therapist's Feedback

We visited a geriatric centre and had a chance to talk to their resident occupational therapist to discuss existing devices to enable both the disabled and seniors.

The devices that we were shown from their "Ability Shop" were mostly to help make life easier for consumers. Some of the things we saw were: tub scrubbers with long handles for those who have trouble bending; folding canes with optional cane "straps" to the wrist as well as various grips like ice picks for more traction; a sock helper to help people who have trouble bending put their socks on; elastic shoelaces for those who do not have fine motor control; a button puller for arthritis patients; long-handled foot scrubbers, important for diabetes patients; door handle grips; light switch attachments so people in wheelchairs can reach--"Reach It"; magnifying sheets, glasses; etc.

The general trends, in the devices we saw, were that they were made of heavy plastic, making them easy to clean. Colours were important for such things like long-shoe-horns so that they were very visible and contrasted with the background for the visually impaired. Aesthetics was important and devices had to look "normal" or seem "invisible". Most devices incorporated principles of ergonomics, that is grips were moulded to the contours of the fingers. Most enabling devices had large-sized handles and large grips. Suction cups were placed on the bottom of objects to prevent them from sliding, such as on a cutting board. Devices were designed to make use of the larger joints and larger muscles groups of the arm, to get the most power out of the person.

As for computers and seniors, The occupational therapist said that most were not familiar with computers and to make them easier for patients to use, sometimes auditory cues had to be used such as "keyboard clicks". Touch screens were very popular as opposed to pushing of buttons. A general problem with seniors was illiteracy, most either did not know how to read or write, or spoke a different language than English.

Other things: A black background with white writing was most visible to the visually impaired. Courier font worked the best also. The use of bright colours was important as visual cues.

We also had the opportunity to briefly describe our design project ideas to the occupational therapist and the general consensus was that our ideas were very good. The watch device would have to look "normal" and not too bulky. She mentioned that most people did not wear fanny packs anymore and that items such as those would

have to depend largely on social trends. She suggested that we might want to incorporate some of our devices into a pin/brooch since female seniors like to wear them. Devices to hang around the neck were not advised, since most seniors already wear their glasses on a rope around their neck. We also mentioned the idea of an "electronic pet" and she seemed quite enthusiastic about it. She said that seniors liked pets, especially for companionship and an electronic pet would be a good idea for a senior because they would not have to feed it or take it for a walk. Whether or not a senior would like being in the company of a mechanical
pet would depend upon the senior. The pet would have to "talk" quite loudly because most seniors take their hearing aids off while at home. Also, they may have to turn it off when they have company because it may scare their guests.

Preliminary ideas during second phase of brainstorming:

electronic pets
sexual aid devices
coupon clipping/financial aid device/funeral planner, will
health monitor (invisible/small/hidden)

urine control, check for drugs?
bowel movements monitor (in the toilet, invisible)
cholesterol
heart conditions (wrist sensor?)
customized system (personal health history check)
diet (too difficult??)
recreation, for "young-old" category, like a mentoring system
stimulate the mind, memory
choosing knitting patterns, flowers
shape matching, regaining motor skills
could be tied with jobs/volunteer work (gardening)
build on their past work experiences
satisfaction
feeling useful
giving back to the community
satisfy needs of communication
addresses education and loneliness
e.g. literacy tutors, guidance counselors
interface must address loss of senses, loss of mobility
Electronic Pets, Bird??
could be combined with health/recreation devices and needs of a companion, movement, memory, sense of
responsibility, stimulates mind
could help with crossing the street/traffic light
voice recognition, turn off lights, open doors, unlock doors, appliances, arm grabber
video camera eyes
Bird:
act as a base station?
companion
voice interaction
shoulder mount
ask questions, read poetry, riddle of the day?
AI/training, sense of responsibility
video camera eyes
control of lights/doors?
modularity
cognitive focus
redundancy (telephone on different power source)
easier maintenance
Health limitations
arthritis
vision, need glasses
hearing, need hearing aids
mobility, need cane, scooter, walker, star lift
pace makers
dentures

Bird
vox recognition
cognitive focus
  smells, music, recreation
video camera
Fanny Pack
uses GPS
Toilet control
Sensors
Monitor blood pressure, light, gas, door lock

Jewellery/wrist
  GPS, police