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**Design of a Wristwatch PDA**

By

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**To**

**My dear parents**

**who always support me psychologically and financially.**

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## LIST OF ABBREVIATIONS

<b>CAID</b>	Computer-Aided Industrial Design
<b>CPU</b>	Central Processor Unit
<b>CRT</b>	Cathode Ray Tube
<b>GPS</b>	Global Positioning System
<b>GUI</b>	Graphical User Interface
<b>HPC</b>	Hand-Held PC
<b>ISO</b>	The International Organization for Standardization
<b>MDCT</b>	Modified Discrete Cosine Transform
<b>MODEM</b>	Modulator-Demodulator
<b>MPEG</b>	Moving Picture Expert Group
<b>LAN</b>	Local-Area Networking
<b>LCD</b>	Liquid Crystal Display
<b>PDA</b>	Personal Digital Assistant
<b>RAM</b>	Random Access Memory
<b>ROM</b>	Read-Only Memory
<b>SGI</b>	Silicon graphics Inc.
<b>URL</b>	Uniform Resource Locator



## PREFACE

This thesis concerns the design of a Wrist Device for assisting a person in one's daily tasks. Wouldn't it be nice if we could fit all the communication and data management tools we ever needed on our wrist? I personally like the idea. It is not because I am a watch collector that I chose to design a wrist style PDA.<sup>1</sup> I think to put a PDA on your wrist is not only a very cool idea, but also the best way of carrying a really personal device with you. Since we are already used to putting a watch on our wrist to tell time, why don't we take advantage of this and expand its ability. You wouldn't need to worry about losing your personal device such as a pager, a cellular phone, or even your laptop computer. Moreover, what if we could talk to this device and have it respond to us or execute our command? What if it could understand our commands and recognize our voice? Having a device, which does that, would be like having a secretary with you. I find that these questions really interest me.

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<sup>1</sup> PDA stands for Personal Digital Assistant

## CHAPTER ONE

### INTRODUCTION

This wrist PDA, or as I call it PDQ,<sup>2</sup> will do most of the tasks that we can do today with our laptops and cellular phones. In the following sections you will see how the design goals are established, how the design criteria relate to the design goals, and how the idea was developed. How long will it be until we see the real product come to the market? It will be soon. With the rapid growth in computer technology, although the Dick Tracy-style TV communicator watches are not quite here yet, they are no longer a dream.

#### Study of PDA

What is a PDA?

It is not too hard to understand why people want to be more organized in this highly knowledge-explosive society. Every person has the same twenty-four hours in a day and seven days in a week. We cannot save more time if we cannot be more organized. The PDA was created for those who want to be more organized.

Basically, a PDA is a handheld device that combines computing, telephone/fax, and networking features. A typical PDA can function as a cellular phone; fax sender, and personal organizer. Unlike portable computers<sup>3</sup> and personal organizers,<sup>4</sup> most

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<sup>2</sup> P means personal, D means digital, and Q means cue. See Chapter 2.

<sup>3</sup> A portable computer is a computer small enough to carry. Portable computers include notebook and sub-notebook computers, hand-held computers, palmtops, and PDAs.

current PDAs are pen-based, using a stylus rather than a keyboard for input. This means that they also incorporate handwriting recognition features. The user uses the stylus to write directly on the touch screen. Sometimes the user can also use a fingertip to operate one, but the touch screen is primarily designed for writing with the stylus. Some PDAs can also react to voice input by using voice recognition technologies.

How many kinds of PDAs are there on the current market?

Today the PDA market can be roughly divided into three categories: the personal organizers, the palm-size computing devices and the hand-held PCs. Business or personal organizers normally have between 64k and 512k of memory, enough to hold several hundred addresses. They can range in price from \$20 to \$150. Some computers classified as personal organizers are like a PDA, only less powerful. For example, the Sharp EL-6850<sup>5</sup> is a powerful personal organizer, which has multiple address directories (telephone/e-mail/ URL<sup>6</sup>), schedule function, notes, etc. The difference is that a PDA is more like a handheld computer rather an organizer or an address book. For some high-end users, some personal organizers have the ability to backup the data onto a personal computer.

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<sup>4</sup> A Personal Organizer also can be called a Business Organizer, which is usually a relatively inexpensive, keyboard-based computer that stores addresses, dates, phone numbers, and memos. Most include a calculator function as well.

<sup>5</sup> The related product link (URL): [http://sharp-world.com/organizer/product\\_news/el\\_6850.html](http://sharp-world.com/organizer/product_news/el_6850.html)

<sup>6</sup> URL is the abbreviation of Uniform Resource Locator, the global address of documents and other resources on the World Wide Web.

PDAs can have many powerful functions including a touch screen, handwriting recognition, voice recorder, modem<sup>7</sup> for connecting to the Internet, and more. They usually have a high-resolution grayscale screen with 4-16MB of RAM and 4-8MB of ROM.<sup>8</sup> ROM is where data is stored, and RAM<sup>9</sup> is memory for the system to use to run programs. PDAs range in price from \$199 to \$500 and are for a serious user. One popular model on the market is the Palm Pilot series.<sup>10</sup>

Palmtops or hand-held personal computers (HPCs) are "mini-notebooks," small computers shaped like a notebook with a high-resolution screen, sometimes with color, and a small keyboard for typing. The screen is usually a touch screen so that data can be entered with the stylus pen or the keyboard. It is important to look at whether or not a computer is a palmtop or a business organizer, as they can look very similar. Good palmtops can have up to 16MB of RAM and 8MB of ROM, and sometimes include a modem for access to the Internet. Their screens are wider than the taller screen of a PDA. These can range in price from \$500 to \$1000. There are some manufactures in this category are Casio,<sup>11</sup> Hewlett-Packard,<sup>12</sup> NEC,<sup>13</sup> Psion,<sup>14</sup> and Sharp.<sup>15</sup> Table 1 is a comparison of the current PDAs' market.

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<sup>7</sup> MODEM is the acronym for modulator-demodulator. A modem is a device that enables a computer to transmit data over telephone lines.

<sup>8</sup>Read-Only Memory (ROM) is a type of memory that the computer can access but cannot change. ROM is non-volatile memory, which means that the information stored in ROM is permanent. The information is not lost when the user turns off the computer.

<sup>9</sup> Random Access Memory (RAM) is high-speed memory that holds a copy of the operating system, any currently executing application programs, and any information undergoing processing. Ram is volatile, which means that all information is lost when the user turns off the computer.

<sup>10</sup> The related product link (URL): <http://www.palm.com/products/>

<sup>11</sup> The related product link (URL): <http://www.casio-usa.com/personalpcs/>

<sup>12</sup> The related product link (URL): <http://www.hp.com/jornada/products/720/index.html>

<sup>13</sup> The related product link (URL): <http://www.neccomp.com/>

Table 1. Comparison of personal organizers, PDAs (pocket PCs), and hand-held PCs

FUNCTIONS	Personal Organizer	PDA or Pocket PC	Hand-Held PC
<b>Keyboard</b>	Yes	No	Yes
<b>Back-Light</b>	No	Yes	Yes
<b>Screen Size</b>	Looks like a standard calculator LCD display	160X160 DPI	320X240 DPI
<b>Color Screen</b>	No	Yes	Yes
<b>Touch Screen</b>	Very few models have this feature	Yes	Yes
<b>Memory (RAM)</b>	64K~512K	2MB~8MB	4MB~16MB
<b>Operation System</b>	Proprietary OS	Palm OS	Windows CE, Win95/98
<b>Infrared Port</b>	No	Yes	Yes
<b>GUI (Graphical User Interface)</b>	No	Yes	Yes
<b>Docking Station to sync with users' PC and Mac computers</b>	No	Yes	Yes
<b>Handwriting Recognition</b>	No	Yes	No
<b>Voice Recognition</b>	No	No	Yes
<b>Sound Recording</b>	No	No	Yes
<b>Music Playback in MP3<sup>16</sup> file format</b>	No	No	Yes

<sup>14</sup> The related product link (URL): <http://www.pSION.com/>

<sup>15</sup> The related product link (URL): <http://sharp-world.com/sc/excite/hc7000/index.html>

<sup>16</sup> MP3 is the file extension for MPEG (Moving Picture Experts Group), audio layer 3. Layer 3 is one of three coding schemes (layer 1, layer 2 and layer 3) for the compression of audio signals. Layer 3 uses perceptual audio coding and psychoacoustics' compression to remove all superfluous information (more specifically, the redundant and irrelevant parts of a sound signal. The stuff the human ear doesn't

Table 1. Continued

<b>Video Playback in QuickTime<sup>17</sup> file format</b>	No	No	Yes
<b>Built-in Modem</b>	No	Yes	Yes
<b>Fax</b>	No	Yes	Yes
<b>E-mail</b>	No	Yes (download only)	Yes (two way)
<b>Internet Access</b>	No	Yes	Yes
<b>Password-Protected</b>	No	Yes	Yes
<b>Calculator</b>	Yes	Yes	Yes
<b>Game</b>	No	Yes	Yes
<b>Battery Type and Life</b>	Watch batteries (lithium cell), Up to several months	Standard batteries can be replaced quickly without any data loss. Batteries usually last up to 8 weeks.	Ni-Cd batteries, Battery life last a few hours
<b>Weight</b>	A few ounces	A few ounces	Usually within two pounds
<b>Price Range</b>	20 ~150 USD	199~500 USD	400~800 USD

hear anyway). It also adds a MDCT (Modified Discrete Cosine Transform) that implements a filter bank, increasing the frequency resolution 18 times higher than that of layer 2.

The result is that layer 3 shrinks the original sound data from a CD by a factor of 12 without sacrificing sound quality. The compression ratio of layer 1 is 1:4, of layer 2 is 1:8, and of layer 3 is 1:12.

<sup>17</sup> In 1991, Apple introduced QuickTime, a multi-platform standard for video, sound, and other multimedia applications. In February 1998, the ISO standards body gave QuickTime a boost by deciding to use it as the basis for the new MPEG-4 standard it is defining.

## Primary advantages and disadvantages of each category

### ***Business/Personal Organizer***

Advantages: The devices in this category are normally less expensive than other computers. They are very light in weight and small in size.

Disadvantages: The devices in this category are usually equipped with tiny keyboards. This makes data entry tedious. Many keyboards are not laid out in the standard format like the normal keyboards we commonly use. People with large hands may have difficulty using the keyboards. Most have a small, low-resolution screen, making them look like a standard LCD display. The memory capacity is very small, and not expandable. Most of them use proprietary operating systems. The unit may be broken easily or may be lost easily. Data may be lost with replacement of batteries, which are usually hard-to-find watch batteries.

### ***PDA***

Advantages: The devices in this category usually have a high resolution, back-light display. Some have modems for surfing the Internet. A built-in microphone and speaker are often included. Most have a large memory capacity and usually run a non-proprietary operating system, which allows for plenty of add-on software, utilities, accessories, calculators, and games. A touch screen is the standard in this category. Some have a color screen. Most have handwriting recognition for fast and natural data entry. Most take standard batteries, which can be replaced quickly

without any data loss. Most PDAs can be password-protected. Most PDAs can sync with users' computer programs (both PC and MAC) using a docking system (cradle). The user can also download programs onto the unit this way. Most have an infrared port for wireless communication between a computer and other organizers. Most have serial ports, which allow for memory expansion. They only weigh a few ounces.

Disadvantages: The expensive touch screen can break or dent and impair the PDA. Tiny stylus pens are hard to hold. Glare on the screen often makes it impossible to read. Also, the screen must be carefully cleaned frequently.

### ***Hand-Held PC***

Advantages: These "mini laptops" often have a large, color display, which can reach a high resolution. Many of the newer ones have a larger keyboard for faster and easier data entry. Large memory capacity makes it act as a notebook. Many have modems for surfing the web. Users can sync the programs to their desktop. For instance, the users can use Windows CE's Pocket Microsoft office to edit office documents on their hand-held PCs, and then sync with their PCs and update the information. Most screens offer touch screen for dual input methods.

Disadvantages: Even the largest keyboards are often too small when compared to regular keyboards. Some can be very expensive. They can be relatively heavier than the pocket size PDA. Moreover, the color screen consumes the battery fast.



## What can a PDA do for us?

People use PDAs for many different reasons, and there is no one device that works perfectly for all users. When comparing PDAs, some functions commonly found include:

**Mobil communicator:** To be connected wherever you go is the advantage that would be useful to users. Most PDAs have the ability of receiving and sending fax or e-mail. Some models such as the Palm VII<sup>18</sup> can receive wireless e-mail. E-mail seems to be a growing part of our daily tasks.

**Note Pad:** The advantage of a PDA is the ability to duplicate, mail/fax and search notes, which genuine note pads are not quite so good for.

**Address Book:** Since contact information is stored in a PDA, there is no need for the user to carry an address book. The PDA can hold hundreds of names, phone numbers, and addresses. To do a search is a breeze if the users just execute the search command.

**Date Book:** A date book is a common feature for a PDA. The users can arrange their schedules without actually carrying paper systems such as a Day Timer, Filofax, or Time Manager.

**List and Memo Pad:** This is also a good feature for scheduling tasks and jotting down notes.

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<sup>18</sup> The related product link (URL): <http://www.palm.com/products/viiseries.html>

**Expense:** This feature will help users control their spending by recording their expense in a PDA.

**Information Resource:** Some models have a large memory capacity for storing large files and databases. One example would be searching for content in an encyclopedia program. Some models can access the Internet via a modem. Thus they can search and get the information from the Internet. Some examples are to get news, stock quotes, weather forecasts; movie schedules, and even get driving directions.

**Synchronize data with the desktop:** This is a powerful feature for data sharing. Synchronizing data means downloading or uploading data with the user's personal computer. This not only entails exchanging files, but backing up the important information in the user's personal computer.

## Trends in PDA Design

Years ago, the mobile cellular phone was a big and heavy rectangular box, and was initially designed for cars. Today the cellular phone is getting smaller than its ancestor, and has more functions to meet the needs of different kinds of customers. Most cellular phones act as an important part of our daily life. It is very obvious that the cellular phone has become the gadget of modern life. Following to the evolution of the cellular phone, the design of the new generation PDA may act in a similar way.

The following are perceived trends of PDA design:

**Lightweight, compact in size:** It is a benefit for the user if the PDA is a lightweight device and is also compact in size.

**Hands free design /Wristwatch style PDA:** If technology permits, the PDA can be worn on one's wrists. The user can reach the PDA naturally by lifting his/her arm and use it as we use our wristwatch without worrying about losing it.

**Global connection:** To be in touch no matter where we go is a great feature for the frequent traveler. The user can send or retrieve messages globally.

**Wireless connection:** The PDA would be able to connect to the Internet wirelessly. It will be as common as it is in today's cellular phone.

**Speech-activated functions:** The PDA in the future may have speech-activated functions. It will be smart enough to recognize the user's voice and provide advanced security. In other words, only the user who owns the PDA can use it.

**Entertainment center:** Since audio and video is getting more and more popular on the internet, the ability to play audio and video on one's PDA will be very important. Because some PDAs can connect to the Internet via either modem or wireless connection, downloading audio or video is relatively easier than before. Thus the PDA can also be a media player.

**Personal accessory:** The PDA will be like a personal symbol, which is a part of your fashion. For example, some people have several watches, which are different in shape or color. The user can choose a different look for different occasions.

**Message recorder:** The user can record messages or any sound. For example, record a message while driving home.

**Image capturer:** With this feature the user can capture an image or use the built-in camera to make a videophone call.

## **CHAPTER TWO**

### **DESIGN DEVELOPMENT**

With regard to current technology, such a product would be feasible and may not be far away. After studying the research materials that had been collected, the design goals were then established. These goals would have to reflect the customers' needs and expectations. Next, the criteria would be selected to meet the design goals. After that, the concepts would be developed through sketches and diagrams, and evaluated based on the design criteria.

#### **Concept Generation**

##### PDQ

The wristwatch style PDA, which I call PDQ, is projected to come about within the next two or three years. There are two meanings of the term "PDQ." One is "Personal Digital Cue." The PDQ can remind you about your schedule and give you a hint when you have a question. The user can use voice recognition to interact with the PDQ. Wearing a PDQ would be like having the service of a secretary with you all the time.

The other meaning is the familiar "pretty damn quick." It would provide the user with the ultimate interactive experience. The response would be in real time when the user makes a request. By wearing this device on our wrist, we won't need

to worry about losing it. Moreover, wearing it would be as comfortable as wearing a watch because we are already familiar with putting a watch on our wrist to tell time.

### How does the PDQ work?

In the future, network computers will be able to be used anywhere. The size of the future network computers will be smaller than their predecessors and the cost will drop to a reasonable amount. The network computer, or net PC, as it is called, will be a slimmed-down version of today's PC.<sup>19</sup> It has no hard drive and relies on a network, which is either a LAN<sup>20</sup> or the Internet, to provide it with applications and storage capacity. By this means, the network computer provides a new standard for the world of computing. Today's computing is based on the client-server model which we use everyday with the desktop PC. The server runs the corporate database, and the client, which is your desktop PC, stores and runs its own applications. In a networked computer system, with applications such as a word processor and spreadsheet, your work document will reside on an application server and will be downloaded to you when you need it. This is similar to other networks such as radio and television networks. The client machines display, play back, or edit information but don't store it locally. According to the concept of computer networking, it is very possible to reduce the size and the cost of our box-like computers. The PDQ is

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<sup>19</sup> Phil Hood, "New media and the future of interactive devices." Design Management Journal, Summer, 1997.

<sup>20</sup> Local-Area Network

designed based on this computer-networking concept (see Figure 1).

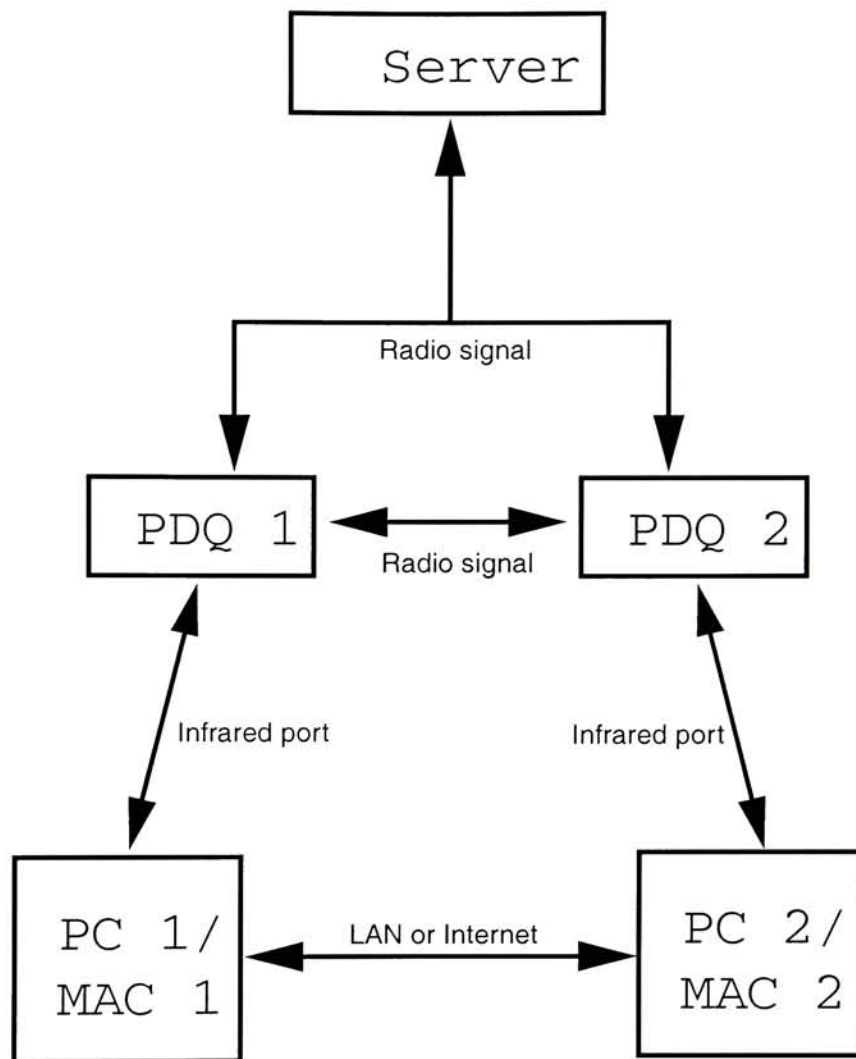


Fig. 1. Computer-networking concept

Different PDQs would access the same server (Figure 2). The user would upload or download data to and from the server by using his/her own account. Also, different PDQs would communicate with each other and exchange information such as business card information. This kind of communication would be done wirelessly. In

addition, PDQs would communicate with the user's personal computer via an infrared port to retrieve and backup data.

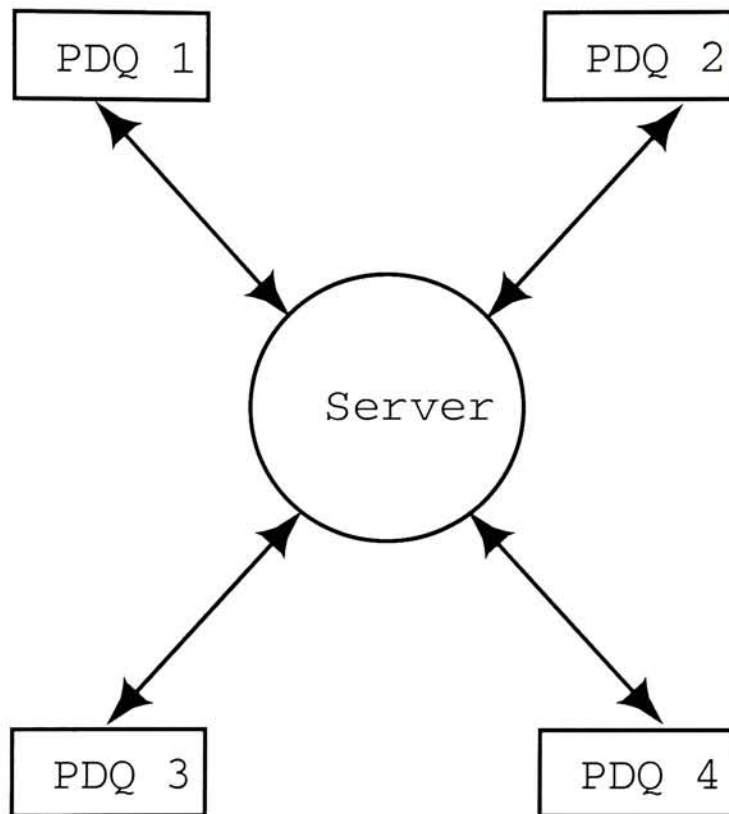


Fig. 2. Different users would upload or download data to and from the server by using their own account.

### **Design Goals**

The goals for this project is to design a lightweight, stylistically distinguished, multi-function wristwatch style PDA (PDQ). This PDQ would communicate with the user and other devices as previously described.



## Design Criteria

To accomplish these goals, the design concepts would be developed and evaluated by the criteria listed below:

**Aesthetics:** The design should be stylish and objectively aesthetically pleasing.

**Size:** The size should not be too large. According to the current watch design. The dimensions should within the range of 44mm x 14mm x 50mm.

**User interface:** The interface should be easily understood and followed. An inexperienced user would be able to use the system easily.

## Concept Development

### Sketches

There were several ideas in this conceptual design development. These ideas derived from three directions. Each concept will be examined and evaluated by the criteria. Then the final concept will be selected among them. Concept A includes idea sketches based on the current watch designs (See Fig. 3~6). Concept B includes sketches showing the sports version (See Fig. 7~11). Concept C includes sketches of the PDQ as a wearable device. It will look like a skeleton glove and the material would be flexible to provide ultimate wearing comfort for the user (See Fig.12~13).

Concept A

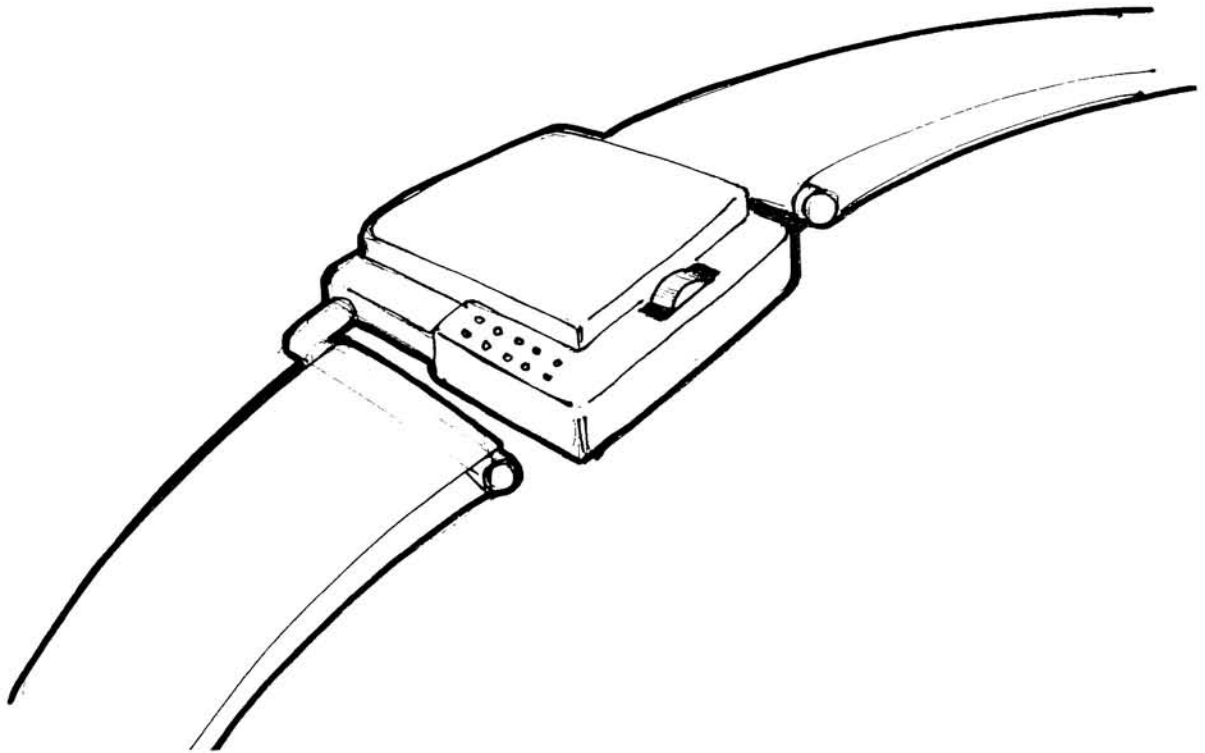


Fig. 3. Perspective view of the PDQ based on current watch design

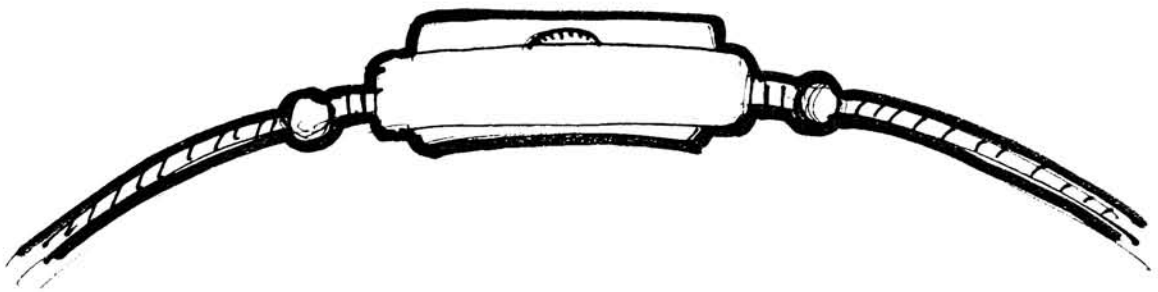


Fig. 4. Side view of the PDQ based on current watch design

Concept A

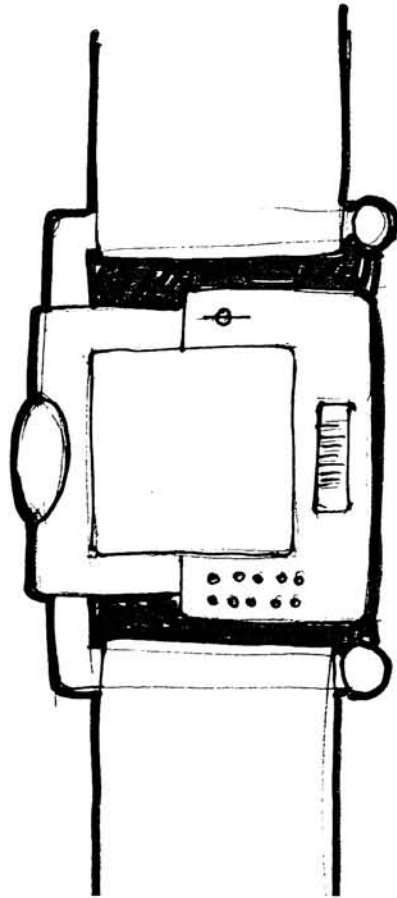


Fig. 5. Top View of the PDQ based on current watch design

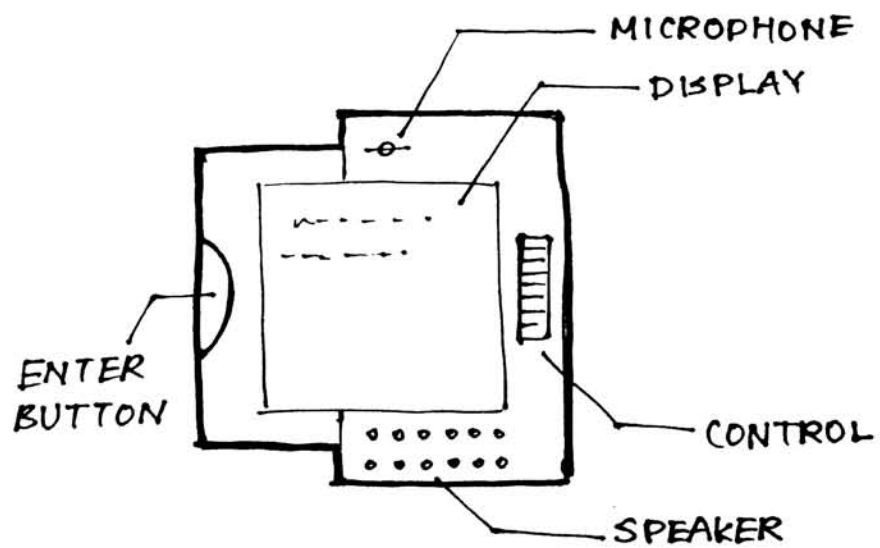


Fig. 6. Layout of the PDQ based on current watch design

## Concept B



Fig. 7. The sports version PDQ

can be worn on neck.

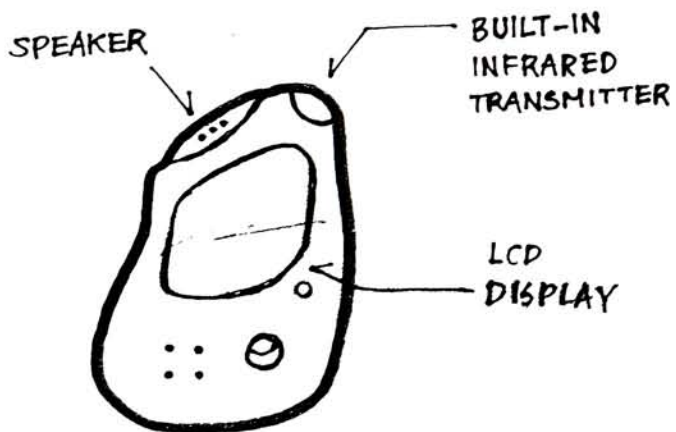


Fig. 8. Layout of the sports version PDQ

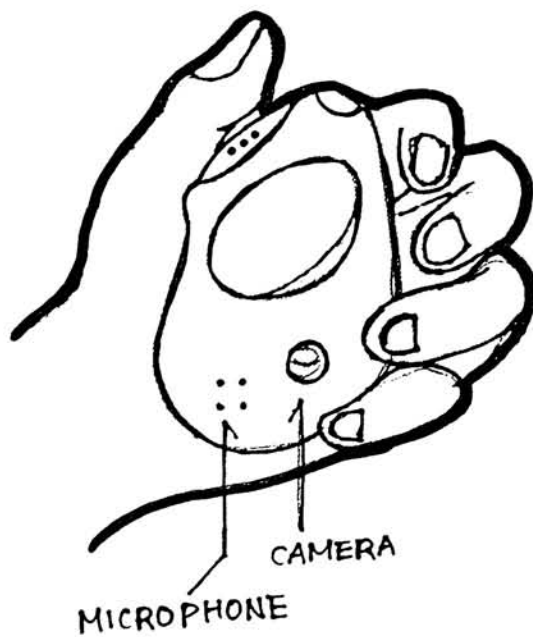


Fig. 9. The sports version PDQ is easy to be operated with one hand.

## Concept B

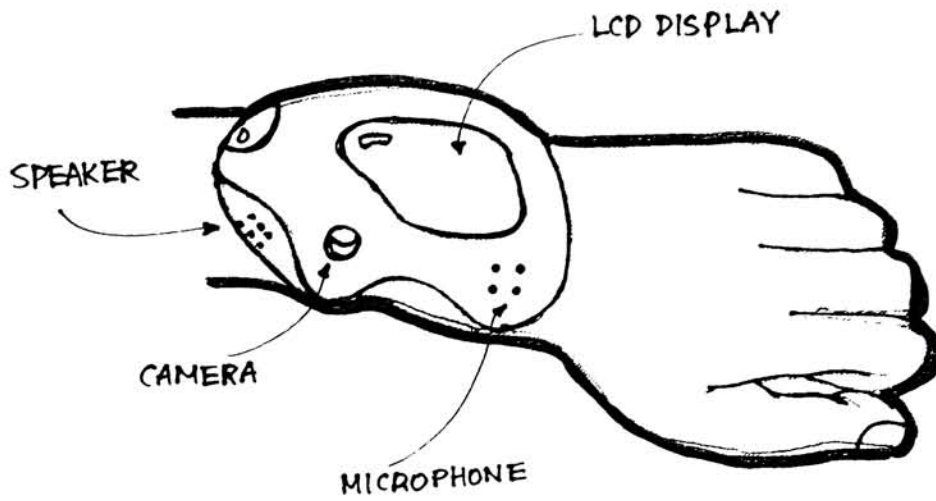


Fig. 10. The sports version PDQ can be worn on one's wrist.

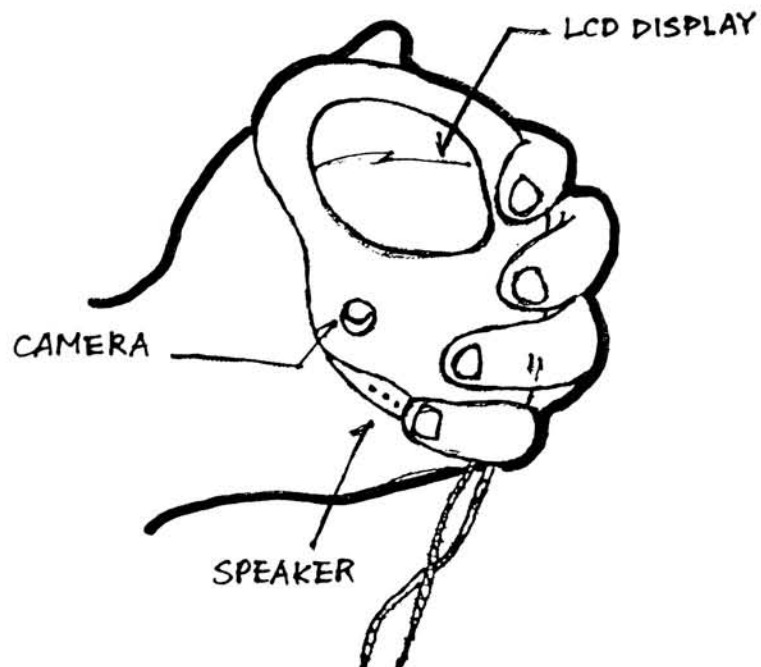


Fig. 11. A different layout of the sports version PDQ

Concept C

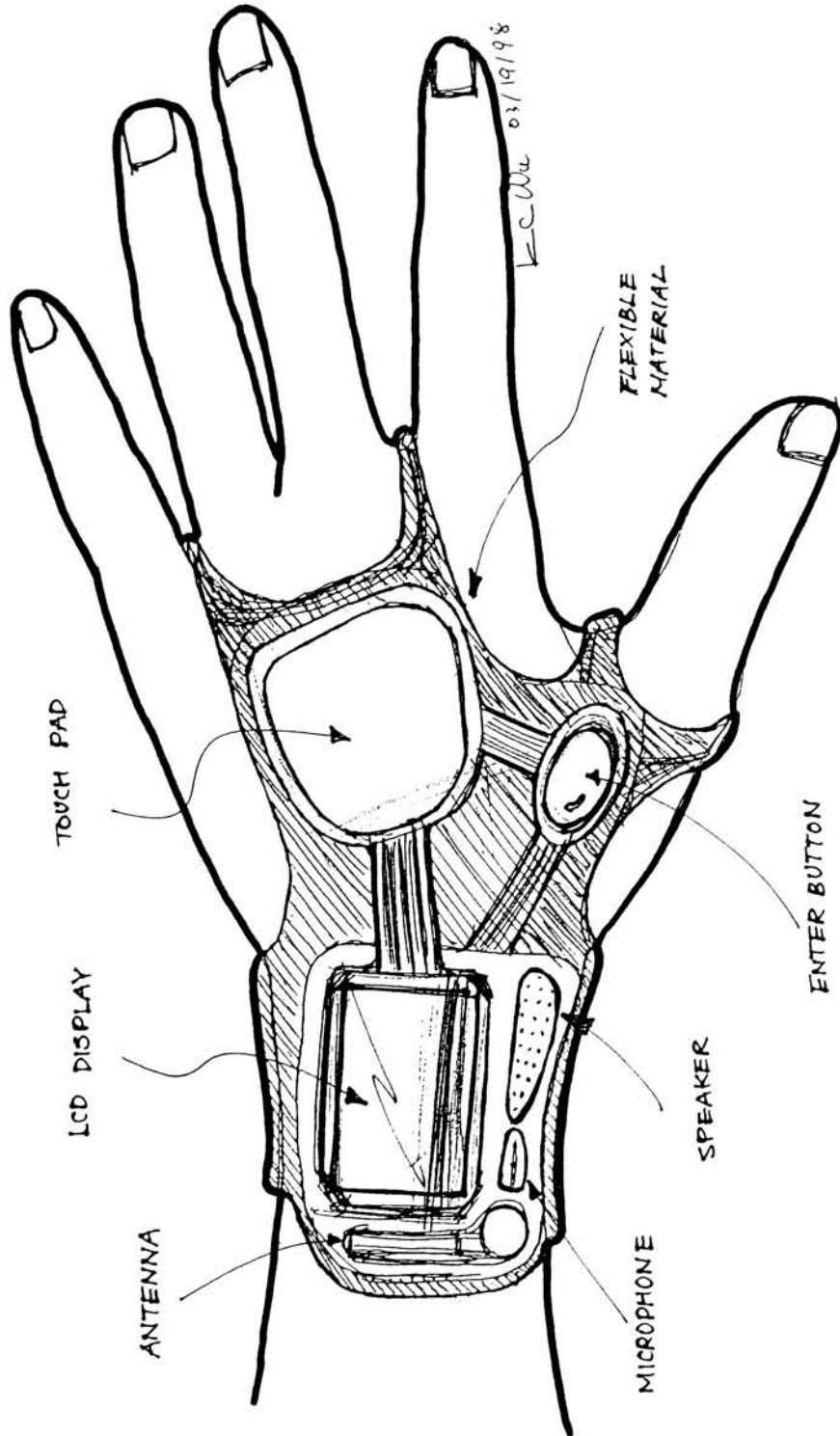


Fig. 12. Layout 1 of a wearable PDQ

Concept C

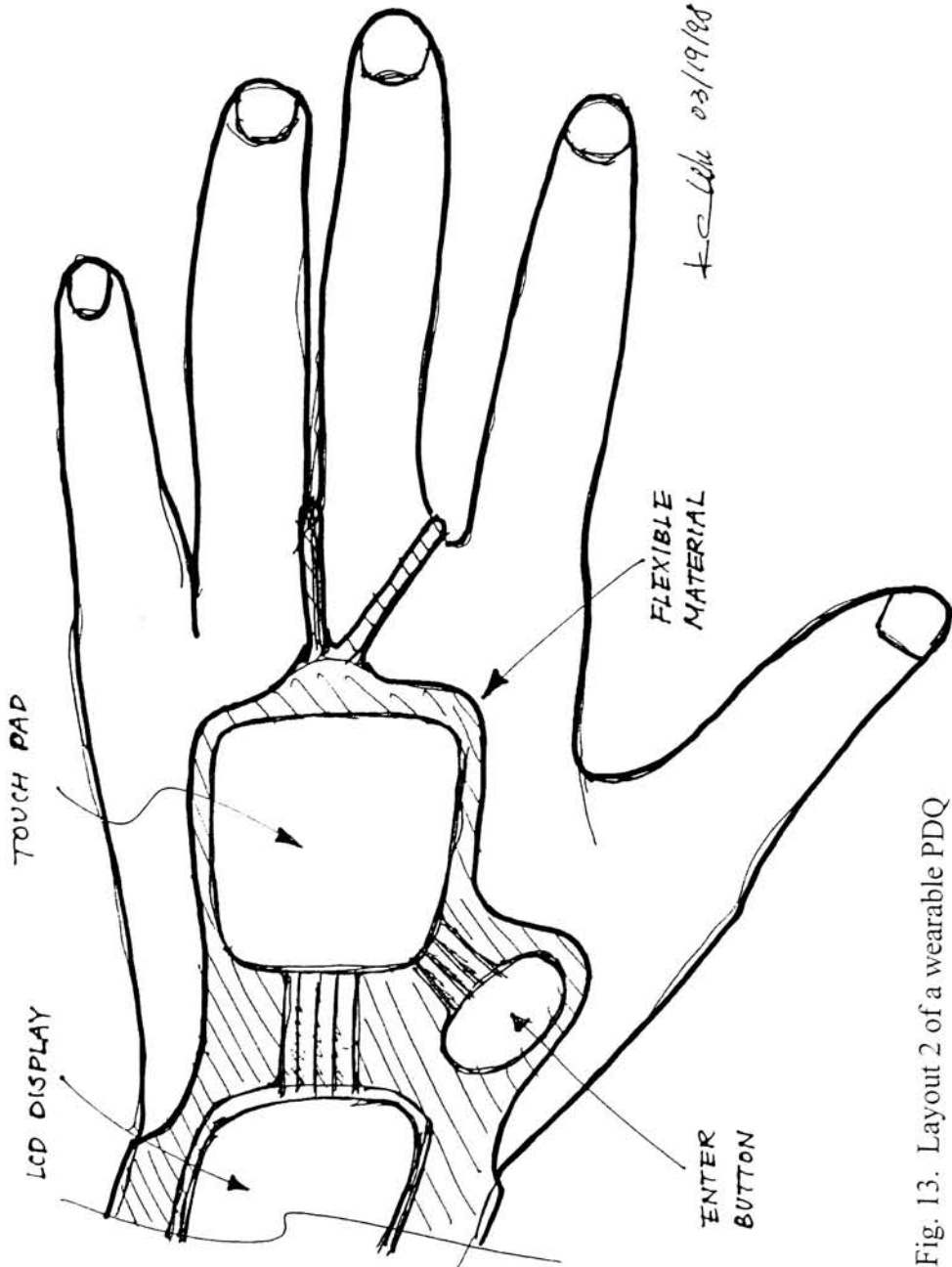


Fig. 13. Layout 2 of a wearable PDQ

## Scenarios

The purpose of scenario building is to promote creative thinking so that new ideas can be generated and recorded. The goal is to promote and encourage creativity by using fictional characters to describe fictional activities. The idea and process of scenario building is an actual design methodology, which is currently being used by a few cutting-edge industrial design firms.

The scenario on your disk is about a day of a typical businessperson. It starts with the morning schedule, then work, followed by a meeting and ends with a party activity. In order to give the best understanding for the reader, this scenario was created as an animated movie. Before making this movie, the scripts were written to describe the characters, their situations, and the actions or events the characters encounter. Finally, outcomes were shown according to how the characters resolved problems. Please refer to the CD included in the thesis on the inside back cover.



## Final Concept

This final concept conveys a hi-tech image to the user. It would look like a piece of jewelry. There would be four parts in a PDQ including:

1. Input system—microphone for voice recognition, infrared port for data transfer with personal computer, built-in antenna for wirelessly downloading and uploading data to server, touch pad and enter button for mode selection and command executing.
2. Output—LCD display, infrared port for data transfer, speaker and built-in antenna.
3. Power—built-in rechargeable battery.
4. CPU—for all the data processing.

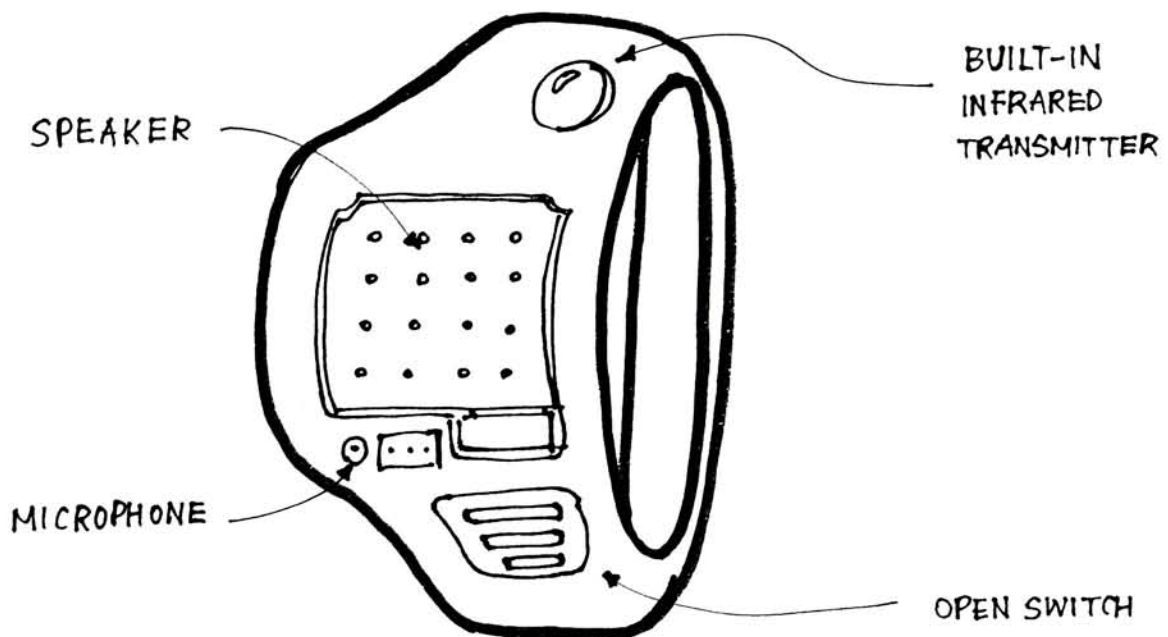


Fig. 14. Layout of final concept

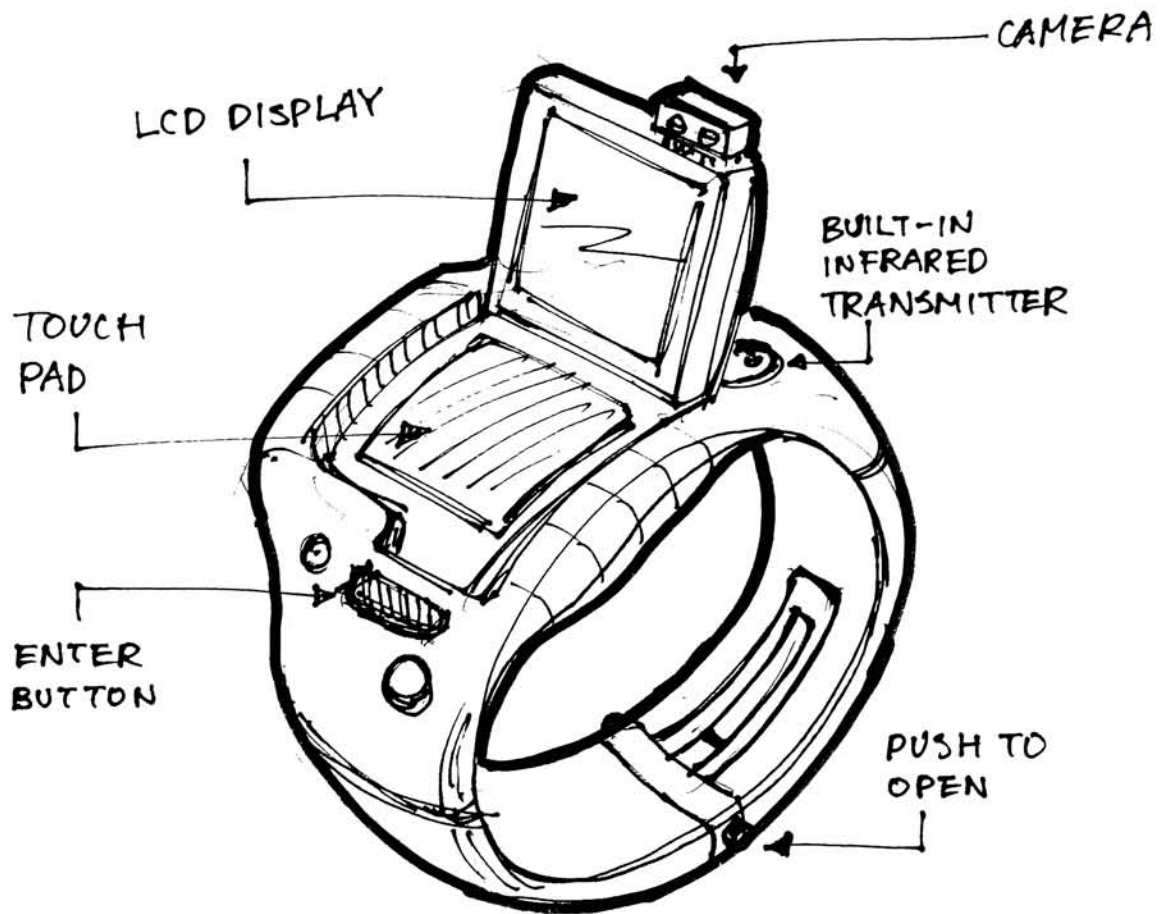


Fig. 15. Perspective view of final concept

## CHAPTER THREE

### DESIGN RESULT

#### Rendering

The virtual model shown in Fig. 16 was created in the program of SGI Alias/Wavefront V. 8.

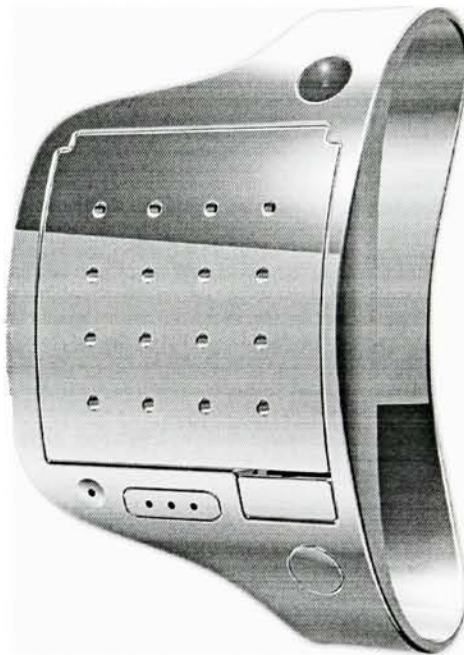


Fig. 16. Computer rendering of final concept

## Design features

**Reminder:** PDQ would remind the user to keep an appointment according to the schedule by showing or telling the user.

**Voice recorder:** PDQ would record the user's messages.

**Translator:** PDQ would be a multi-language translator.

**Advanced security:** PDQ would recognize the user and execute the user's command.

**Horologe:** PDQ would act as a traditional watch when the user makes the request.

**Sharing information:** Data would be transferred between PDQ and PDQ, PDQ and server, and PDQ and personal computer.

**Changeable operation interface:** Changeable transparent interface (voice) design would meet the needs of different customers.

**Communicator:** PDQ would be able to send or receive faxes and e-mail or make a videophone call.

**Education:** The user would be able to search a desired encyclopedia by downloading the necessary information from a server.

**Entertainment:** The user would listen to MP3 music or play games when waiting.

**Navigation:** User would get driving maps and directions from Internet.

**Electronic business card:** PDQ would exchange business card information with another user's PDQ.

## CHAPTER FOUR

### CONCLUSIONS

I received plenty of feedback after the thesis show, which was held from May 1st to May 13th in 1998. Most were very positive. It seems that people like this concept. People also liked the video demonstration combined with the two-dimensional presentation. I did not make a physical model; I only made a virtual model by using different computer programs, although some people still like to touch and feel an actual model. If I had enough time and extra money I might have made a prototype with colors and details.

I enjoyed doing this design and have found the whole research and design process for this project very interesting. I gained more new experience and learned how to integrate different media to make an impressive presentation. After this exhibition, I have a strong feeling that the use of Computer-Aided Industrial Design (CAID) will grow in significance in the field of Industrial Design. Using CAID will shorten the design process. The virtual world will certainly change the way we are.

It's been two years since the thesis show, and I am glad to see that some of the ideas I presented at that time are on the market now. For instance, the wristwatch style cellular phone manufactured by Samsung is now available<sup>21</sup>. This product uses voice-activated technology to allow users to dial with speech. Casio introduced its

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<sup>21</sup> For the product information please go to (URL): <http://www.samsung.com/products/index.html>

watch digital camera, which can capture 100 pictures<sup>22</sup> and store them in the watch.

Also, the Casio Company has developed the Global Positioning System (GPS) watch.

Although some of the functions and features mentioned on the CD are not here yet, I am very positive that they will occur someday soon.

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<sup>22</sup> Picture is in 16 grayscale of 120X120 dot format. For the product information please go to (URL): <http://www.casio.com>

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## APPENDIX

1



P . D . Q .

## introduction

With the progress in modern technology, a number of products tend to be designed as black boxes. Many products look the same, and the users are often confused when they are using them. Designers believe intelligent design will change the living environment in a positive way. However, some high technology products still can not help people, but only confuse the user. For example, the automatic water taps confuse the user all the time. The user often does not know how they work, or how to get the water to flow.

Can a product walk you through its use? How can we use a product or an object in a natural way? How can we sense the role that a product plays? How can we communicate with a product, especially a so-called "smart product?"

Communication between users and products seems very important. The solution here is to propose a smart product which would be able to provide personalized service by recognizing the users and responding to predetermined preferences. Thus, the P.D.CUE is the solution to facilitate the interaction between users and products.

P.D.CUE

Fig. 17. Introduction

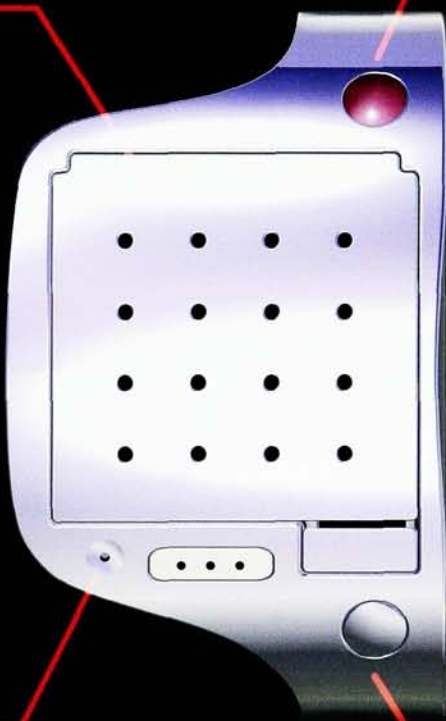


P . D . Q .

**about P.D.CUE**

SPEAKER

BUILT-IN  
INFRARED  
TRANSMITTER



MICROPHONE

OPEN  
SWITCH

P.D.CUE

Fig. 18. Layout 1



P . D . Q .

**about P.D.CUE**



P.D.CUE

Fig. 19. Layout 2

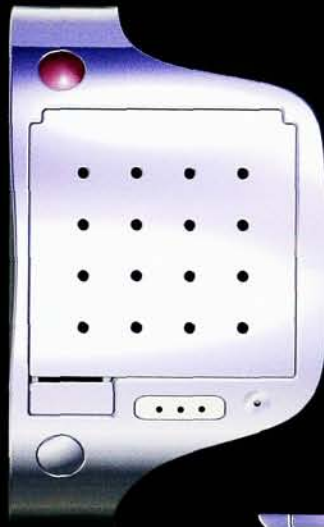
4



P.D.Q.

profile

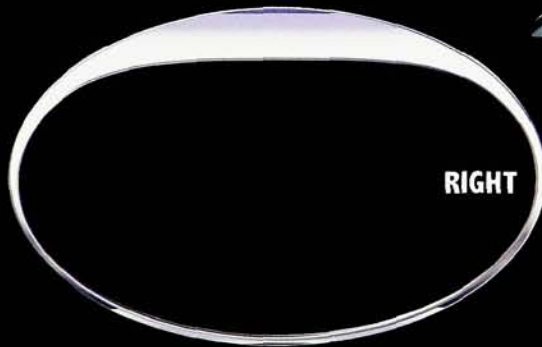
TOP



FRONT



RIGHT



P.D.CUE

Fig. 20. Three Views

5



P . D . Q .

network

Data can be transferred between public server & P.D.CUE, P.D.CUE & P.D.CUE, and P.D.CUE & personal computer.

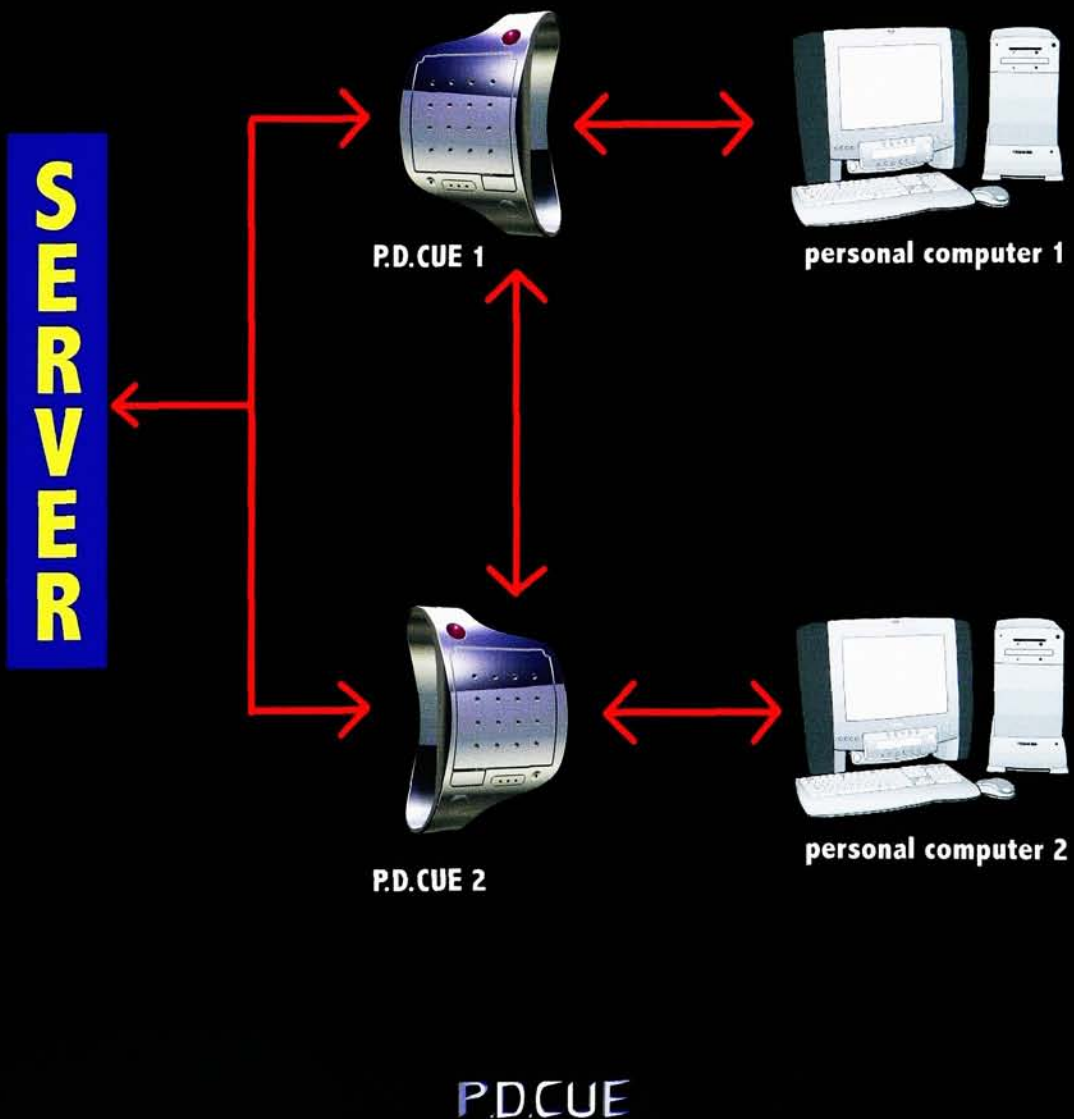


Fig. 21. Network



# P.D.Q.

## features

**REMINDER** *show or tell you the to-do list*

**VOICE RECORDER** *record your every important message*

**TRANSLATOR** *can speak different kinds of languages*

**EXECUTE YOUR COMMAND** *by means of the voice recognition technology*

**TIME TELLER** *a different way to read time (voice)*

**SHARING INFORMATION** *data can be transferred between P.D.C.U.E & P.D.C.U.E  
P.D.C.U.E & server and P.D.C.U.E & PC*

**CHANGEABLE OPERATION INTERFACE** *user friendly design  
changeable transparent interface (voice)*

**COMMUNICATION** *to make a video phone call*

**EDUCATION** *encyclopaedia can be call by downloading  
the necessary information from the server*

**ENTERTAINMENT** *to watch TV when waiting*

**NAVIGATION** *by means of GPS when traveling*

**KEEPING INFORMED** *to be able to surf in the internet and send/  
receive your email*

PDCUE

Fig. 22. Features