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Designing Effective User Interface for Healthcare Applications

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Abstract

Nowadays, digital technologies are very important in daily life. Many digital products are required a user interface to communicate with them. Human-computer interaction (HCI) provides a connection between the users and these digital products. The aim of human-computer interaction is to create the interactions for easy and useful products. To support the requirements of users, the user interface of applications in the digital products is also important. Healthcare applications are playing a significant role in today information society. Mobile healthcare applications have been developed because of simple access to care a health life. This paper aims to develop effective user interface design for healthcare applications.
Keywords: human-computer interaction, user interface design, mobile applications.

1. Introduction

With the development of the information technology, health technologies have also been developed [1]. By using digital health tools, the ability to accurately diagnose and treat disease is improved for healthcare of patients. Many healthcare applications are used by both employees and patients in the medical fields. Therefore, the development of user interfaces for digital devices becomes essential in order to support the various requirements of the doctors and patients. Based on previous research and analysis, the development of the HCI design is important to support the user needs. The following statistic displays the number of available healthcare applications.

An intuitive, natural, efficient, robust, and customizable interface can greatly reduce the gap between a human's mental model and the way a computer, machine, or robot can accomplish a given task. Although studies about HCI date back to 1975, recent technological advances in consumer electronics have opened exciting new scenarios: gestures, hand and body poses, speech, and gaze are just a few natural interaction modes that can be used to design affordable *natural user interfaces* (NUIs)[20]. This paper reveals the more usable and natural interfaces for human-machine interaction can yield incalculable advantages and can deeply change everyday life**.**

2.1. The User

The digital products are produced and used by the humans which are the users of the products. For understanding humans as information processing system, how they communicate, characteristics of the human, problem solving, learning are concerned in designing user interface. According to the service of products, the user requirements could be varying. Therefore, different models and learning concepts are formed based on the different interactions.

2.2. The Computer

The user used the computers for interaction and they have the components to interact. The

computers also provide a platform to formulate the components for effective learning. According to the technology, the computer can be devices such as desktop computers, laptops, mobiles devices. Devices such as TV can also be denoted as the computer.

2.3. The Interaction

The interaction is the major component of HCI to interact between human and computer. Basically, human interact with other human by using speech, some body gestures and emotions to support their requirements. However, interaction between humans and machines are different from interaction between humans. In order to get a useful system, it is required to support user's requirements throughout the design process.

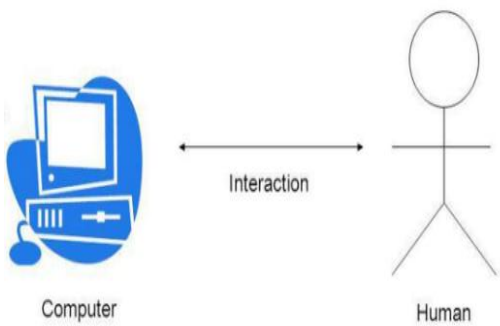

Figure 1. Three components of HCI [2].

3. Impacts of Human-Computer Interaction on daily life

- **Increased Automation**

The advances in technologies make manufacturing tasks can now be completely automated. Machines can work constantly without having a break producing more accurate outputs than manual labors. Increasing automation leads to improving productivity. Organization will no longer need a lot of people to work for them which leads to increasing amount of unemployed people. Unemployment leads to weaker economy since unemployed people will not be spending much money on things [3].

- **Quicker and Accurate Inputs**

High technology devices can read data automatically making thing much easier, quicker, more accurate and reducing complexity than manual inputs. Speed up and accurate inputs lead to quicker and correct outputs.

- **Specialized Interfaces**

Technologies like voice input, text-to-speech and thought input helps disable people to interact with the computer more efficiently and that affect to economy because even disable people would be useful person which in turns improve the productivity of the economy.

- **Improved Usability**

Later electronic devices make sure the input and output processes are as simple and easy for the user as possible. With these user-friendly devices, people do not require to have much training in order to control the functions of these devices like past generations. Examples of user-friendly devices are touch screen, voice recognition and motion-sensing controller.

- **Develop Living Standards**

Comparing to 60 and 70 years ago, HCI has changed the way cultures work and live [4]. Some examples would be: enabled people to communicate without having to be connected to something by a wire, nearly all manufacturing is using machinery, people tend to surf on Internet for information rather than reading hardback book and even young children nowadays are exposed to a lot of technology. This shows that our living standards are massively improved within few decades.

4. User Interface Design for Healthcare Applications

Today, medical staffs and patients use a variety of devices which are able to provide medical records. Since mobile health has been developed, how healthcare providers interact with their patients becomes important. Designing an effective healthcare application requires focusing on targeted users. Healthcare developers pay attention on the user interface design to improve the usability of healthcare services. The choice of color, icons and layout influence the user experience. Icon sets used in healthcare applications should be highly instinctive to easily understand what a particular icon means [5]. The application developers must avoid the icons which can confuse the users.

Most widely used medical icons are shown in Figure 2. Figure 3 shows the sample healthcare application.

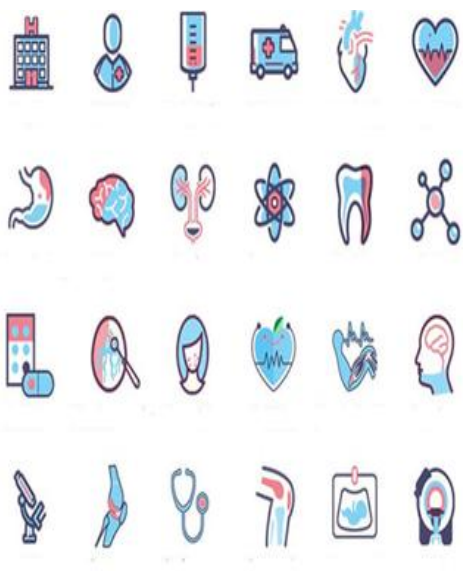

Figure 2. Medical icons [6].

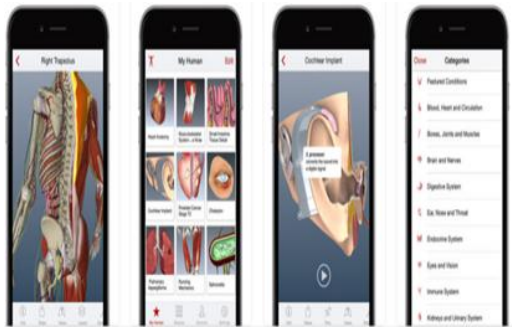

Figure 3. 3D healthcare application interface design [7].

4.1. Notification Interface Design

The notification interface design is also important in healthcare applications. For example, an application reminds users to take a pill as shown in Figure 4. This application describes the record of the pill consumption.

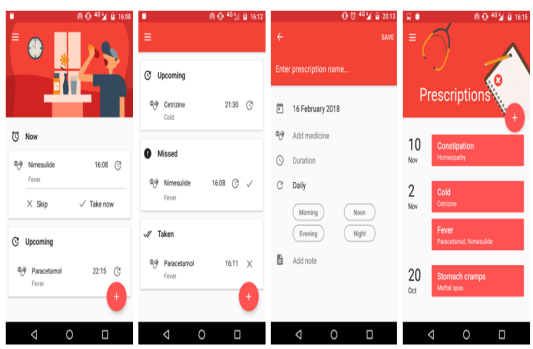

Figure 4. Pills taker reminder application interface design [8].

4.2. Diabetes Application Interface Design

Some healthcare applications help the patient to manage their medical routine. For example, diseases like diabetes and blood pressure. The diabetes application helps the patients to manage the blood sugar levels [9]. In order to alert, the notification color of sugar level and high blood pressure should be used warm

colors. As part of the development process, it is required to choose a suitable color and fonts [10].

4.3. Diet Application Interface

People suffer most of the health concerns due to improper diet and unhealthy eating styles. Wellness applications are also widely used to measure the number of steps walked, heart rate and daily calories intakes for diet plan. The diet application shown in Figure 5 instructs what to eat and in what quantity in preparing a diet chart.

Figure 5. Diet application interface design [11].

5. Impacts of Future Developments in Human Computer Interaction

As HCI continues to develop, there are many possible developments that could be implemented in the future. Some potential developments include: Artificial intelligence, 3D Holographic Projection Technology, Thought Input [12].

- **Artificial Intelligence**

The study of science and technology that focuses on the creation of intelligent machines that work and behave like humans. Robotics is a major part of AI. Currently, no robots or machines exhibit complete artificial intelligence [12]. Nearly all the basic tasks done by humans will totally be replaced by AI while human can spend more time doing more constructive things. With machines that have their own intelligence with the ability to think, analyze, and make decision like human, it could potentially overpower human race. Human mind and its capabilities might go to waste Increases the possibility that these AI machines could take unexpected actions beyond our control.

- **3D Holographic Projection**

Magnificent technology that records the light scattered from an object and presents it in high resolution 3D object that allows the user to interact with it without needing any special equipment [13]. In future, holographic displays will be replacing all present displays in all sizes, from small phone screen to large projector. Interactive visual 3D blueprints or designs could be made, or even become part of the overall design process. Without the need of any special device, people could face eye problems from 3D projection as their eyes are focusing directly on the screen.

- **Thought Input**

Thought Input is technology that allows users to input and control the interfaces according their thoughts. In coming years, you'll simply think the phone number and your phone will start dialing [14]. Things become much easier, faster and productive. Physical input devices are no longer needed. Very useful especially for disable people who cannot speak and can hardly move. Things will get worse if it is used for bad purpose.

6. Conclusion

With the development of digital technology, the operations of human-computer interface are more and more complex. New forms of HCI will

significantly change our lives. New interaction paradigms offer the chance to improve quality of life for people who can't take advantage of current interfaces. On the other hand, new issues will arise particularly related to privacy, security, and ethics thus potentially slowing the diffusion of new hardware and software products based on wearable devices. Although some researchers have already investigated relationships between interface design and legal and privacy issues, national legislations are heterogeneous and not yet ready to cope with present and future advances in HCI. This paper analysis the difference interface design related to healthcare devices. Then, this paper reveals the user interface is our primary means of interacting with machines such as computers, internet, robots, almost anything digital etc. If you've ever watched how quickly a child or elderly person can learn how to interact with a smartphone, that's largely due to the huge strides made in user interface design.

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