ROBOT LITERACY AN APPROACH FOR SHARING SOCIETY WITH INTELLIGENT ROBOTS

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ABSTRACT

A novel concept of media education called “robot literacy” is proposed. Here, robot literacy refers to the means of forming an appropriate relationship with intelligent robots. It can be considered a kind of media literacy. People who were born after the Internet age can be considered “digital natives” who have new morals and values and behave differently than previous generations in Internet societies. This can cause various problems among different generations. Thus, the necessity of media literacy education is increasing. Internet technologies, as well as robotics technologies are growing rapidly, and people who are born after the “home robot age,” whom the author calls “robot natives,” will be expected to have a certain degree of “robot literacy.” In this paper, the concept of robot literacy is defined and an approach to robot literacy education is discussed.

Keywords: Media Literacy, Humanoid Robots, Home Appliance Robots

INTRODUCTION

Practical home appliance robots, such as nursing care robots and living assistance robots, are becoming increasingly common, and we expect daily living with home robots to soon become the norm. Our lives will almost certainly change significantly with the

growing occurrence of home robots, but the question is: How, exactly? Stories of “life with robots” have always been told from the developers' point of view and are therefore based on the developers' assumptions. However, the time has come to discuss changes to our lives from the viewpoint of potential users in order to get ready for the unprecedented situation of living with home robots.

Looking back on history, a dissociation of values between generations was often accelerated by the appearance of new media. These media were then used in different ways by different generations. Namely, the first generation would understand the mechanism through the process of evolution and the next would accept mature technology as a black-box system. This is what causes the difference in their behaviors. It can thus be assumed that different understandings of a medium are a cause of the dissociation of values between generations.

Most of the practical home robots, such as Sony AIBO and iRobot Roomba, can be distinguished as machines at a single glance, and their functions and purposes can be estimated easily from their forms, meaning we can use them in the ways originally intended by the designers. Attempts have been made to foster natural communication with humans (Taniguchi, 2010), though these attempts have not yet been successful. Hence, we do not believe that a robot is a human being. In this study, we consider a humanoid robot of exquisite design that cannot be easily distinguished as a robot and that can communicate with us like a human. Does a person who is living with such a robot since early life consider it a machine? In this paper, the concept of robot literacy, i.e. a means to living effectively with realistic robots, is proposed. We then discuss our approach to robot literacy education.

ROBOT LITERACY

What is Robot Literacy?

People who have been using digital communication technologies such as cellular phones and the Internet since their childhood are called digital natives (John, 2008; Michael, 2011). They were born after the end of the 20th century and are just now joining adult society. In contrast, people born before the end of the 20th century are known as digital immigrants. While digital immigrants consider media such as the Internet to be extensions of older media such as the telephone, television, and newspapers, digital natives consider them novel tools because they did not experience the evolutionary process.

Digital natives use the Internet as naturally as using water and air. They are living in new societies formed by new technological media, and they have a new sense of values for these societies. They easily form connections with others on the Internet and create new businesses and organizations. It has been reported that they think information has always existed on the Internet and that it is free; that they do not distinguish their relationships on the Internet from their relationships in real life; and that they are not greatly interested in the age or title of others. These characteristics very often lead to misunderstandings with digital immigrants.

Figure 1 Relationship between New Technologies and Users' Conceptual Models

Similarly, the appearance of a “robot native” is forecasted if robots in the home become a daily reality. Figure 1 shows the relationship between the timeline and the conceptual models of technologies. A new concept model is always created on the basis of old conceptual models, and thus we cannot understand the mechanism of a new technology without learning. If we skip this process, we can only understand it as a black-box system.

Unlike information media on the Internet, robots have a physical structure and a physical interface. If they are not used correctly, they can cause serious damage to the operator. This highlights the importance of active, effective support for robot users.

Previous studies

● **Information literacy study**

Information literacy education aims to provide the skills necessary to operate information equipment and the etiquette necessary to behave in network societies. As a guideline for Internet users, a “netiquette” (net-etiquette) guideline was released in the early days of Internet history (Hambridge, 1995). The following is a citation of the opening:

“In the past, the population of people using the Internet had “grown up” with the Internet, were technically minded, and understood the nature of the transport and the protocols. Today, the community of Internet users includes people who are new to the environment. These “Newbies” are unfamiliar with the culture and don't need to know about transport and protocols. In order to bring these new users into the Internet culture quickly, this Guide offers a minimum set of behaviors which organizations and individuals may take and adapt for their own use.”

As with newbies in the Internet society, home robot users do not need or want to understand the physical and electrical mechanisms of the robots they use. Creating a guideline for such users in order to make them more literate is one of the key objectives of the robot literacy study.

● **Media literacy study**

The purposes of media literacy education is the acquisition of information media knowledge, the encouragement of curiosity related to information media, and the instruction of critical thinking and understanding intentions (Suzuki, 2001). Such knowledge and abilities are also important when thinking about symbiosis with robots, and we expect that the methodologies used here can be extended to the study of robot literacy.

● **Information moral**

Ochi (2004) discussed the transition of Internet users' morals from the viewpoint of their responsibility. He pointed out that morals decrease in accordance with an increase of the number of users. He also argued that we cannot expect high morals from the Internet users because they are so many. He concluded that a moral guideline is therefore required.

APPROACH

The netiquette guideline was defined in order to deal with several problems that have been occurring on the Internet. Unfortunately, we cannot use precisely the same methodology because we do not yet have super-real humanoid robots. We, therefore, take a different approach and identify the problems likely to occur by living with home robots by analyzing data from field work and experiments.

Figure 2 The Advance of Technology and Changes of Tasks

Figure 2 shows changes of tasks in accordance with the advance of technology. Quantitative changes of tasks by a streamlining procedure are shown in Fig. 3 (A). Generally, a rationalization of the procedure is achieved by automating and black-boxing a part of the procedure. At this time, some helpful know-how that accompanied the now-removed tasks is also lost. The qualitative changes of tasks caused by engineering innovation are shown in Fig. 3 (B). In this case, effective know-how for performing tasks has not yet been well constructed, which should cause some confusion and problems during operations. Thus, when proposing a new technology, the developer should consider potential problems of this sort and suggest solutions. Robot literacy focuses on this second case. We will estimate which know-how are likely to disappear by introducing a home robot through experimentation.

CONCLUSION

In this paper, we discussed the concept of robot literacy. We gave a brief overview of the background of the study and then outlined the scope of robot literacy study and its future directions. The robot literacy study aims to construct a methodology of robot literacy education by utilizing methods of media literacy education. We expect our work to contribute to the following three fields: (1) Robot industry. Designers of humanoid robots have to consider potential ethic and moral problems and be ready to explain them to the users and suggest solutions. Educational materials based on the robot literacy study will

help the designers with this. (2) Education engineering. Many robot-aided education systems have been studied, but most did not consider robot native students, and the side effects of the systems on the students were not confirmed. By introducing robot literacy education, robot native students will be able to understand the mechanism of robots and use the robot-aided education system as easily as robot immigration students. (3) Intelligent home appliance. The newest technology media seems aimed at “invisible devices” such as cloud computing and ubiquitous computing. By exposure to robot literacy education, users can obtain the ability to construct mental models of such highly packaged environments. As seen from the above, the study of robot literacy can contribute to a wide variety of areas including our daily life.

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REFERENCES

- Carroll, C. (2011). *Robots are being created that can think, act, and relate to humans. Are we ready?*, NATIONAL GEOGRAPHIC, Retrieved September 30, 2013, from <http://ngm.nationalgeographic.com/2011/08/robots/carroll-text>.
- Hambridge, S. (1995). *Netiquette guidelines*. Retrieved September 30, 2013, from <http://www.ietf.org/rfc/rfc1855.txt>.
- John, G. (2008). *Born Digital: Understanding the First Generation of Digital Natives*. U.S.A.: Basic Books.
- Michael, T. (2011). *Deconstructing Digital Natives: Young People, Technology, and the New Literacies*. U.K.: Routledge.
- Ochi, M. (2004). *Information Ethics*. Japan: Nakanishiya Shuppan Co., Ltd.
- Suzuki, M. (2001). *The Present and the Future of Media Literacy*. Japan: Sekaishissha Co., Ltd.
- Taniguchi, T. (2010). *Constructive Approach towards Symbol Emergence System*. Japan: NTT Publishing Inc.