HCIP:Human Computer Interaction in Practice
Editorial

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Abstract— **HCI (Human-Computer Interaction) technology has been put to practical use in a variety of fields. This technology is designed to respond to various human movement patterns and to enable humans to work at their most efficient. Three-Dimensional (3D) analysis of human behavior in HCI not only allows us to see the characteristics of each behavior from various angles, but also to display the patterns in a virtual environment, which can be used for appropriate behavior support systems. In this special track, three practical studies in human-computer interaction were introduced, including an assessment of drug picking activity using RGB-D camera, the development of a Virtual Reality (VR) simulator for speed sprayers, and a flexible 3D pointing device with haptic feedback. These studies involved the development of systems with multiple sensors and discussed the measurement data obtained from the systems.**

Keywords-Human Computer Interaction; virtual reality; haptic feedback; 3D human pose.

I. INTRODUCTION

Human-Computer Interaction (HCI) technologies involve sensing and computer vision technologies as well as other technologies that enable interactive operation with the computer. The research area of HCI can be classified into three developmental stages: the era of legacy systems (1959-1989), the era of the Internet (1989-2009), and the era of pervasive systems (2009 to present) [1]. HCI recognizes the importance of applications that specifically improve human capabilities. The HCI of the future may evolve into Human-Engaged Computing (HEC), which represents the synergistic interaction of advanced human capabilities and advanced technological capabilities [2].

From the HEC perspective, HCI will maximize the synergistic interaction between humans and computers. The development of HCI is closely related to the development of computer systems. The most obvious example is the set of technologies employed in Virtual Reality (VR). Modern VR allows for accurate and detailed representation of body movements, making the user feel as if they are in a real space. For example, the Oculus Quest 2, a consumer-oriented Head-Mounted Display (HMD) VR device developed by Facebook, has a Six Degree of Freedom (6DoF) angular and linear tracking system that can measure head posture and hand gestures [3]. The Rokoko [4], an affordable and intuitive full-body motion capture tool, enables users to create a motion capture stage without the constraints of their location. The data obtained from Rokoko can be used to drive the high-fidelity digital human of the user in immersive training in the workplace [5].

Introducing HEC into the workplace can help reduce work errors and increase work efficiency. However, a complex system can have the opposite effect. Therefore, remote observation by camera sensing is more desirable than having the operator wear the device while performing the actual work. Utilizing an affordable RGB-D camera sensor such as Azure Kinect [6] would enable the observation of most user actions remotely.

This special track invites the researchers working in these fields to introduce and discuss their research cases that can be applied to real life. Some of the most relevant topics relevant to the objectives of this special track include interactive user interfaces, pose estimation, hand tracking, 3D VR simulation etc.

The rest of this editorial is organized as follows: the following Section II summarizes the submissions accepted for presentation and publication in the special track. Section III concludes and presents future perspectives and challenges for this topic.

II. SUBMISSIONS

The first paper entitled “Toward the Development of a VR Simulator for Speed Sprayers” by Tanaka and Prima [7] proposed a speed spray simulator that allows users to experience driving and operating a car in a virtual environment. The simulator used an HMD-type VR device and a car controller used in games. The head pose, hand gestures, and gas pedal and brake operations of the driver measured by the simulator were collected to visualize the characteristics of the driver's behavior while driving. To make

the simulator more realistic, data from the operators driving the actual speed sprayer was also collected so that the same behavioral data could be reproduced in the virtual environment.

The next paper entitled “Assessment of Drug Picking Activity Using RGB-D Camera” by Ono and Prima [8] proposed a framework to determine the medication picking behavior using Azure Kinect. Compared to barcode medication management [9] and automated dispensing systems, the proposed framework is easy to use and does not require capital investment or high cost to install LEDs or AR markers on the dispensing shelf. Experimental results show that the proposed framework can accurately determine the picking process by hand tracking.

The last paper entitled “Development of a Flexible 3D Pointing Device with Haptic Feedback” by Yoshikawa et al. [10] developed and evaluated a stylus-type 3D pointing device with a flexible mechanism and vibration actuators for intuitive input. The device is expected to enable more accurate input by providing a tactile input depth sensation. The experiments showed that haptics had a significant effect on 3D pointing, enabling more accurate input manipulation. However, the flexible mechanism did not have a significant effect on adjusting the input to match the depth.

III. Conclusion & Future Perspectives

The special track, "HCIP: Human Computer Interaction in Practice," provided a forum to discuss research themes related to human-computer interaction to enable humans to work most efficiently with various movement patterns, as well as issues and solutions related to each theme. The first two papers dealt with 3D behavior analysis using camera sensing and attempted to use the acquired this information to evaluate the performance of actual workplaces. The last paper discusses the development and application of a device equipped with active and passive haptics and examines the effects of the haptics. We hope to see more contributions of applied research on this topic in the future. Devices such as virtual reality and high-performance 3D measurement systems are becoming more and more advanced, and research using these devices is highly expected.

At the upcoming HCIP, we are looking for case studies using motion capture and will discuss a wide range of topics related to the analysis and application of human behavior using digital humans.

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