Development of a workbench system for job training based on behaviors of worker

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Abstract

In Japan, factory tends to use IT (Information technology) because population of workers is decreasing. Worker assistance system gives workers comfortable environment. Previously, we have developed a workbench system to give workers useful information while making circuits. However, this system worked only on table. In this work, we develop a worker assistance system that can scan the movement of a worker and that works not only on table.
The 16th International Symposium on Advanced Technology (2017) p.210.

Previously, we have developed a workbench system to give workers useful information while making circuits [1]. This system was composed of a Web camera, a projector, and a PC. A worker performs his/her work according to the instructions displayed on a workbench from the projector. By detecting the change of colors on the surface of workbench, this system shows the next instruction for the worker. However, this system cannot utilize information on the height of worker's movement. Therefore, the field of application of this system was narrow. In this work, we detect three-dimensional coordinates of the worker's body and we extend the field of application of our system.

In this paper, we propose a worker assistance system that gives workers useful information while assembling machines. This system has two functions.

1. Giving the worker some instructions based on the three-dimensional coordinates of his/her body.
2. Showing the movement of a skilled worker to novices.

This system is composed of a projector, a display, a PC and a Kinect v2 provided by Microsoft. Fig.1 shows joints of human detected by Kinect v2. Light blue points show a head, a fingertip, and a thumb of the worker. The three-dimensional coordinates of these points are also available. When the difference between the desired position during his/her work and the position of his/her body becomes small, our system concludes that the worker has completed one of his/her tasks, and it shows the next instruction on the workbench using the projector.

Fig.2 shows an overlay of the movement of a skilled worker on the movement of a worker, which is shown on a display settled on a side of the workbench. This function uses PCL (Point Cloud Library) of Kinect v2, which shows white points that are determined by the distances to the body of the skilled worker using the infrared sensor. These white points are recorded in advance as an mp4 video.

Using the proposed functions, the worker would be able to perform efficient works.

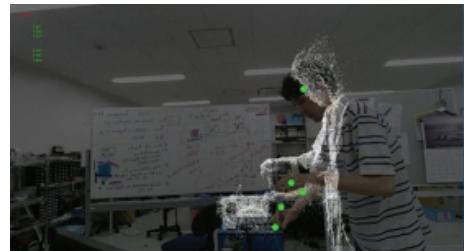**Fig. 1** Joints of a worker detected by Kinectv2.

Fig. 2 Overlay of the movement of skilled worker.

References:

[1] Hideyuki Abe, Takashi Kanamaru, "Development of informatized workbench by use of tangible user interface", The Japan Society of Mechanical Engineers, Annual Conference 2016 (S1210103)