A Video See-Through Face Mounted Display for View Sharing

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1. Introduction

If the feeling of the presence can be transferred to a different place from rather than the place where we actually exist, our life style will change drastically. By extending robot-human telexistence [1] technology to human-human situations, we are developing an environment where a skilled person, who actually exists at a different place, can work with high efficacy on the ground instead of non-skilled person. In order to realize such a telexistence environment in human interactions, we are developing remote communication technologies exploiting sense-motion sharing. In this project, we have developed a view sharing system to share first person perspectives between remote two people [2]. The system consists of a head mounted display and cameras, which make possible a video see though (VST-HMD). The user wearing the HMD can see his own view and the partner's view, and also send his own view to the partner. Our aim is to share experience and to transmit the skills from one to another by sharing vision and motions [3]. We developed a new view sharing system to improve effectiveness and expand its applications.

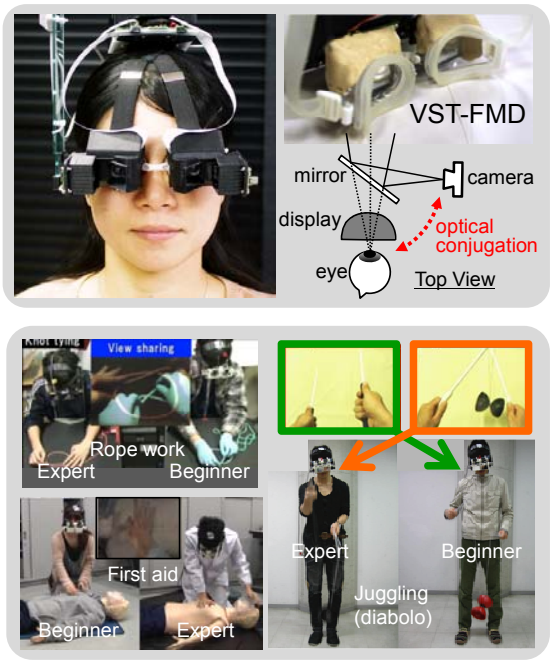
2. View sharing system

Our view sharing system is composed of two cameras (PointGrey FireFly MV), two displays (Daeyang FX603), two mirrors, two lamps and a motion sensor (NEC/Tokin MDP-A3U9S). The layout of the devices for vision is precisely designed to be able to share the first person perspectives. The cameras are placed at the optically same place at the eyes. Therefore the cameras capture what subjects would see if they do not wear the system. The captured images are once sent to PC and are showed in the display. They can see binocularly. By adjusting blending parameters, the views are blended differently.

The new system has three advantages. One is light weight. Weight of the system (about1.5kg) is drastically lighter than established one (about 32kg). The second is stand-alone system. In this system, the user can wear all components. There are only two components; the video see though face mounted display (VST-FMD) and a vest including the battery, circuits, and laptop PC. Battery life is approximately three hours. Moreover, we mainly use wireless networking so that the area of user's actions is not limited by wires. In addition, there is a battery to operate without external power supply. Therefore, it is possible to extend user's behavior range. The third is simplicity in wearing the system. The display is bonded to goggles. The edges of the goggles are covered with soft rubber so that the eyes and goggles maintain close contact. There is no need to adjust the distance between the two displays to a user's interocular distance. Therefore, a user can wear the system easily, and expand his/her range with a View Sharing System. These features can make more efficient of skill training and expand sphere of activity.

3. Demonstration

By wearing our view sharing system, the users can experience to learn skills such as how to play theremin, do a basic trick of Diabolo (rotating a spool with two sticks tied by a string), paper folding, balloon twisting, the way of first aid and so on. The users can learn those skills while watching the skilled person's view from the person's perspective and imitating the person's motions as if the displayed motion is their own. The users do not have to pay attention to how to do it but just follow the skilled person's motion. The users can intuitively learn the skills.



View sharing system (top) and skill training (bottom)

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