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Remote Control and Conversation System between Human and Android Robot via Internet

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Abstract: In this paper, we propose remote control and conversation system between human and android via internet. Android is a robot resembles human being not only its appearance but also behaviors. The android EveR-3 which was developed by authors can express facial expressions and lip synchronizations. Also it can talk with a human, because it has voice recognition/synthesis engine and conversation database. To control the android in remote place, we develop an online chatting program with webcam and connect it to the program of the android. At this time, the Android's side becomes a server and user side is a client. Then, user can order the operation commands to the android using this system or talk with it by voice and text messages. In this paper, we will show some examples to verify the effectiveness of our system.

Keywords: Remote control, Remote conversation, android robot

I. INTRODUCTION

Remote control in robotics, have been developed in the field of dangerous environments such as nuclear power plant, deep sea, and space. In recent years, as intelligent service robots in our home or life have been developed, the application of remote control is wider. The home service robots, such as pet robot, home guard robot, education robot, are produced as commercial goods. In this paper, we proposed remote control and conversation system for applying to a personal service robot. Proposed system is verified by applying to the android robot developed by authors.

II. ANDROID ROBOT

Android robot resembles human being not only the appearance but also its behaviors. We have developed android robot for researching the emotional interaction between human and robot.

Our first android, EveR[1]-1 is capable of motion from her torso up because her lower body is a dummy. She has 35 D.O.F (degree of freedom) with 15 D.O.F in head [1]. She can do facial expressions of four emotions. EveR-1 is applied to guidance service of an exhibition, oral narration of fairy tales. EveR-2 is bipedal type [2]. So she can sing a song in standing. EveR-2 has the lower body with 12 D.O.F. She has the function of EveR-1 and is added the function of whole body coordination and dialogue engine. Her gesture, facial expression, lip synchronization, and vision recognition are upgraded. EveR-3 is the latest version of our android [3]. She can move the ground because she has wheel based lower body. So she could be debuted as a robot actress in Korean musical performance, "EveR comes to Earth" at Feb. 18, 2009. Also the design of facial muscles in head (23 D.O.F) is based on anatomical structure of human face. So the expression ability of emotions is more abundant. Fig. 1 shows some examples of facial expressions of EveR-3.

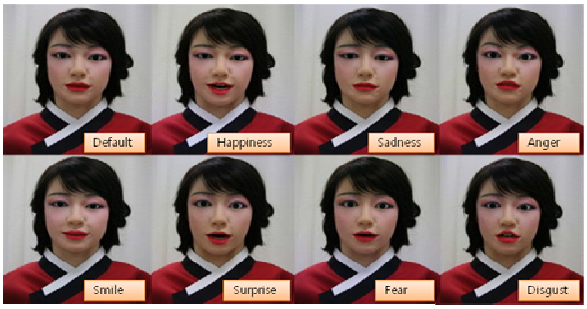

Fig.1. Facial Expressions of EveR-3

III. REMOTE CONTROL SYSTEM

1. Remote control and conversation

To control and have a conversation with robot in remote site via internet, we use one of internet messaging software which has the function of video conferencing; Skype (www.skype.com) is used in this experiment. Fig. 2 shows the proposed system that is composed of three parts; one is user (or client), the second is a server with webcam, the other is android robot, EveR-3. Internet messaging software must be

[1] The name EveR derives from the Biblical 'Eve', plus the letter 'R' for robot.

installed in user computer and the server. After a user and server are connected each other in online, the user can type or tell a message. Server interprets the message is a command or a conversation.

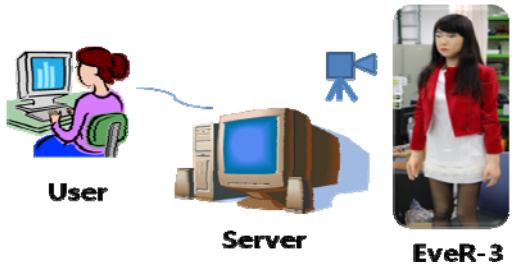

Fig.2. Components of remote system

The difference between a command and a conversation is whether input message (by typing or voice) is same with one of reserved scenario files or not. Scenario files will be explained in sec. III-2. For example, if 'right hand up.txt' is one of scenario files, also if an input message is 'right hand up', and then EveR-3 plays the scenario files. If the input message is not matched with reserved scenario files, then the robot responds the answer as the input message is a question. At this time, dialogue engine of EveR-3 is used.

Fig. 3 shows the internet messaging software used in this paper. We can see the robot and can type a message. Also we can say using microphone which is connected in PC. The internet messaging software transmits the message and voice to the server in remote site.

Fig.3. Remote control and conversation tool based on video conference using Skype

2. Scenario editing tool

EveR-3 has dialogue engine with conversation fairs that has 5,000 Q&A fairs which is used in ordinary life. So if one asks a question to the robot, it answers the question using dialogue engine.

Another working mode of EveR-3 is scenario mode. In scenario mode, a robot plays the scenario files. A scenario file has composed of voice, facial expression, and gesture with the start time of each. As times goes, the voice, facial expression, or gesture is played. User can create and edit the scenario files using the tool in Fig. 4.

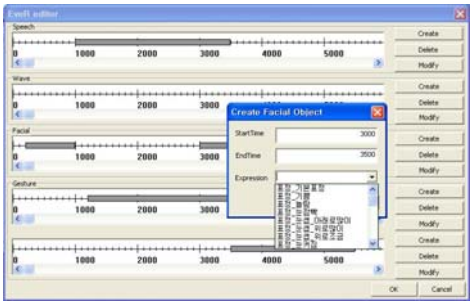

Fig.4. Scenario editing tool

VI. CONCLUSION

In this paper, we developed remote control and conversation system. Using video conference software, user can see the moving images of a robot in remote site, and can control or talk with the robot by text messages or voice commands. If user types or orders the commands through the software, then the robot can do some actions according to the command. If user talks about something, the robot responds. We think that the proposed system will be applied to remote medical examination, remote education, and so on.

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REFERENCES

[1] H.G.Lee, M.H. Baeg, D.W.Lee *et al.* "Development of an Android for Emotional Communication between Human and Machine," *Proc. of Int. Symp. on Advanced Robotics and Machine Intelligence*, pp.41-47, 2006.

[2] D.W.Lee, T.G..Lee, B.R.So *et al.* "Development of an Android for Emotional Expression and Human Interaction, *Proc. of World congress on International Federation of Automatic Control* (*IFAC 2008*), pp. 4336-4337, 2008.

[3] D.W.Lee, D.W.Che, D.Y Lee *et al.* "Development of an Android for a Performance," *Proc. of Int. Conf on Ubiquitous Robot and Ambient Intelligence* (*URAI 2010*), p. 664, 2010.