Intelligent Robot POMI

Youngwoo Yoon  
ETRI  
youngwoo@etri.re.kr

Woo-han Yun  
ETRI  
yochin@etri.re.kr

Hosub Yoon  
ETRI  
yoonhs@etri.re.kr

Jaehong Kim  
ETRI  
jhkim504@etri.re.kr

Abstract — Intelligent robot POMI is designed for home entertainment and intelligent services. The robot has vision and audio recognition functions, so he recognizes users’ faces and voices, recognizes voice commands, localizes a direction of sound, and follows a human body.

Keywords — Service robot, cognitive system, recognition

1. Introduction

The robots are playing important roles in the industrial area, but service robots interact with humans is still far from coming out in the market. We made the intelligent robot POMI to shows feasibility of service robots. This paper presents the external design of the robot and cognitive capabilities.

Fig. 1. Snapshot of robot POMI.

2. External features

POMI is a middle-sized robot which is 80 cm in height. As input capabilities, he has two cameras, four microphones, one touch screen, and laser scanner. Two cameras work by turns. One is a cam which has wide angle of view and the other one is a general USB webcam. Four microphones are placed on his neck sparsely.

Face, LEDs, and soft arm is for expression of his feeling. Eyebrows, eyelids, pupils, and lips on the face move separately. The soft arm makes gesture expression. The motors moving the arms are inside the robot and external part of the arm consists of wires and springs. Therefore, there is less possibilities to be harmed by robot arms.

A beam projector and a photo printer are embedded in the robot. He can take a picture of people with his camera and print out instantly. He also plays video clips and movies by using the beam projector and speakers.

3. Cognition Software

3.1 Vision

POMI has three vision based cognition modules. Face recognition and gesture recognition works with the webcam. Human tracking module uses the wide angle cam because the webcam with narrow angle of view fails to track human moving fast horizontally.

Face recognition module detects human faces and compare with the registered faces. The robot recognizes user’s face and reacts differently according to the users. POMI is a mobile robot. Users can make the robot moves with the remote controller like a joystick. In addition to that, with Human following module [1], POMI follows a target person by tracking face, head-shoulder, and body region [2]. Gesture recognition module recognizes four gestures of calling, waving, stopping, and raising.

3.2 Audio

Speech and speaker recognition [3], sound source localization module runs on POMI. The robot recognizes short audio commands and provides corresponding services like checking weather or incoming messages. Speaker recognition is useful in this kind of services. When a registered user tries to check messages, the robot recognizes the speaker and automatically shows his/her message not the other’s one. Also, the robot estimates direction of sound source from the sound information of four microphones. By using speech and speaker recognition modules, the robot only turns to the user when a specific user speak a certain command.

References

