N. Endo, S. Momoki, M. Zecca, K. Itoh, A. Takanishi. Design and evaluation of the new head for the whole-body emotion expression humanoid robot KOBIAN. Gerontechnology 2008; 7(2):99. Personal robots and robot technology (RT)-based assistive devices are expected to play a major role in our elderly-dominated society, with an active participation to joint works and community life with humans, as partners and as friends. In particular, these robots are expected to be fundamental for helping and assisting elderly and disabled people during their activities of daily living (ADLs). To achieve this result, personal robots should be capable of human-like emotion expressions; in addition, human-like bipedal walking is the best solution for the robots which should be active in the human living environment. Although several bipedal robots and emotional expression robots have been developed in the recent years, until now there was no robot which integrated all these functions. Therefore we developed a new bipedal walking robot, named KOBIAN, which is also capable to express human-like emotions. In this paper, we present the design and the preliminary evaluation of the new emotional expression head. **Design** The body design of the whole body emotion expression humanoid robot KOBIAN[1] is based on WABIAN-2[2] for its body, and the head design on WE-4[3]. For the head, in particular, the basic requirements included (i) light weight, otherwise it would be impossible for the robot to walk due to the limitations in the motors, and (ii) downsizing, to balance the overall size of the body. The resulting head (*Figure 1*) has 7 DOF (eyes: 3; upper eyelids: 1; eyebrows: 1; jaw: 1; lip: 1) and weights less than 3.5 kg. **Evaluation** We conducted a questionnaire to investigate what kind of impression people get following the facial expressions of KOBIAN's head. 127 young subjects (age: 23.2±2.8) and 17 elderly subjects (age: 68.0±12.8 yrs) participated to the evaluation after giving the informed consent. Each subject was showed the pictures of KOBIAN's and WE-4s emotional faces. Each emotional picture was showed side by side with the picture of the neutral expression as a reference. The subjects were asked to choose the emotion that they thought the picture of the robot was expressing among a predetermined list ('anger', 'happiness', 'surprise', 'disgust', 'sadness', 'fear', 'perplexity', and 'other'). Figure 2 presents this preliminary evaluation. **Results and discussion** Overall, the recognition ratio of KOBIAN's face is lower than WE-4, as expected because of the extreme reduction of DOFs, except for 'disgust', for which KOBIAN's face was more expressive. For elderly people (*Figure 2b*) the recognition ratio is also generally lower than for younger people (*Figure 2a*). This might suggest that for elderly people a more empathized emotional expression is needed. Although the recognition ratio is generally lower, this evaluation proved the effectiveness of emotion expression even with a reduced number of DOFs.

Figure 1 KOBIAN

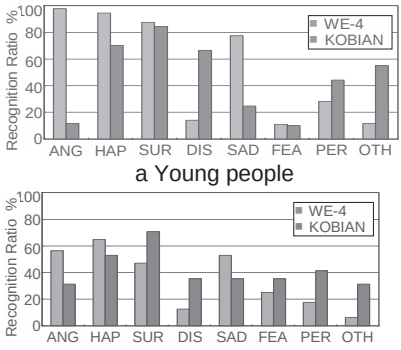

Figure 2 Results of the facial expression recognition

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