Technical development of a wearable device to assist facial identity recognition for people with memory cognitive impairment

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Introduction

It is embarrassing not instantly calling the name of the familiar people we encounter. Therefore, this study develops a wearable device that provides memory support to help such persons to engage activities of daily life with confidence and dignity. The wearer can use the device to recognize the face and identity as whom the wearer is facing, and immediately to inform the wearer of the profile of the person by recorded speech, exempting the wearer from the awkward situation.

Purpose

We anticipate that this device with AI technology can be applied to the memory aid of people with mild dementia, avoiding their confusion and dilemma caused by facial identity impairment and reducing their psychological setbacks and social isolation.

Methods

A cap (Fig. 1) is integrated by earphones, digital camera and data processor as the wearable device with AI technology. At the beginning, face and identity tag database is created for each participant by performing about 20 face feature trainings. The device uses the Mobile Net pre-training model and SVM classification in the cloud server to perform the participant's identification. As the facial identity is verified, the voice response will be activated to provide the profile of the participant to the wearer.

Results

We have used computer-aided engineering (Fig. 2) to complete the prototype design of this device (Fig. 3) and have demonstrated the feasibility of implementing AI technology in the laboratory. We created a face and identity tag database for 10 participants, then used the device to perform identification of the participant and activated the prompt voice response to this identity (Fig. 4). The results of the experiment showed 10 participants' facial identities and the recognition rate reached over 90% according to our experiments in the laboratory (Fig. 5).
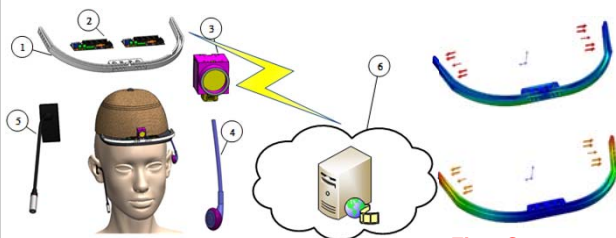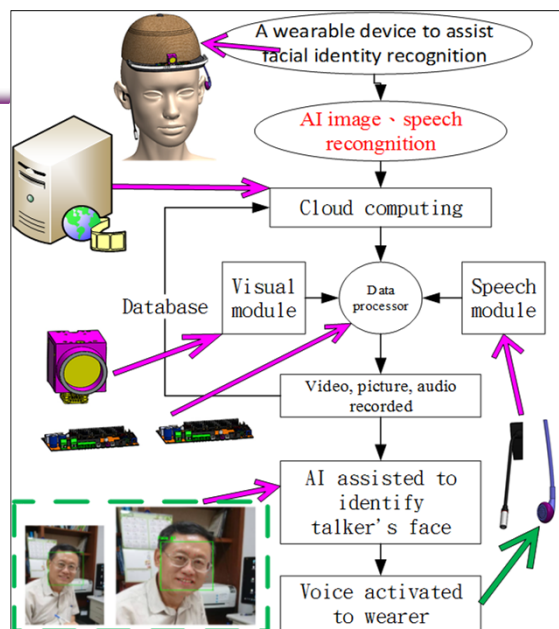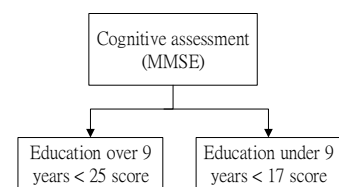

Fig.4 System configuration

Fig.1 The device

Fig.2 Structure analysis

Fig.3 Device prototype

Fig.5 Testing

Fig.6 Flowchart

Conclusions & Comments

We have developed the design and completed the prototype of the wearable device by integrating the techniques of computer-aided engineering, artificial intelligence and smart manufacturing. In the near future, we will use the MMSE scale to perform user cognitive screening and the SF-12 scale to evaluate quality of life for pre- and post-test of wearing the device (Fig. 6). It is anticipated that this wearable device can assist the memory of people with cognitive impairment.
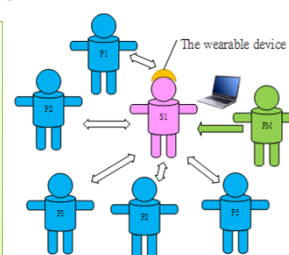
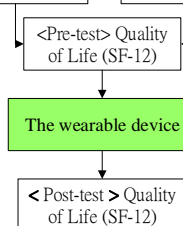**Key word: Wearable device, Memory cognitive impairment, Artificial intelligence**

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