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Smart headgear for display of transcribed or translated speech

ABSTRACT

Natural language translation and transcription technologies can now enable x real-time conversation between speakers of mutually unintelligible languages. Such technologies also assist hearing-impaired speakers by providing real-time transcription. Currently, the transcribed or translated speech is typically displayed on a screen that is away from the speaker, e.g., on a hand-held device. Such type of display is not conducive to maintaining the eye-to-eye contact necessary for natural conversation. The techniques of this disclosure describe smart headgear that integrates a display capable of streaming transcribed or translated speech to a listener. The smart headgear integrates or interoperates with natural language processing hardware, microphones, and other necessary hardware and software such that, with the speaker's permission, the display streams a transcription or translation of the speaker's speech. In this manner, the interlocutors can maintain eye-to-eye contact during a conversation.

KEYWORDS

smart cap; smart headgear; smart hat; headband; wearable computing; transcription; augmented reality; accessibility; user interface

BACKGROUND

There are many situations where users benefit from viewing real-time transcription or translation of speech, e.g., when a person is communicating with another person that speaks a different language. In another example, if one individual in a conversation is hearing impaired, the individual benefits from real-time transcription of speech of others in the conversation. With recent advances in natural language processing, real-time transcription or translation of speech

is possible. However, the problem remains as to how to display the resulting translation in a usable manner.

A number of standard display options currently exist. For example, the transcribed or translated speech can be displayed on a projection screen, on a tablet device, or on smart glasses. There are deficiencies with all of these options. For example, when the transcription or translation is displayed on a screen that is remote from the speaker's face, the person reading it is deprived of any other linguistic or paralinguistic cues, such as the speaker's lip movements or facial expressions. Also, the dialog conditions can become unnatural when a participant does not establish or maintain eye contact with the person that is speaking.

DESCRIPTION

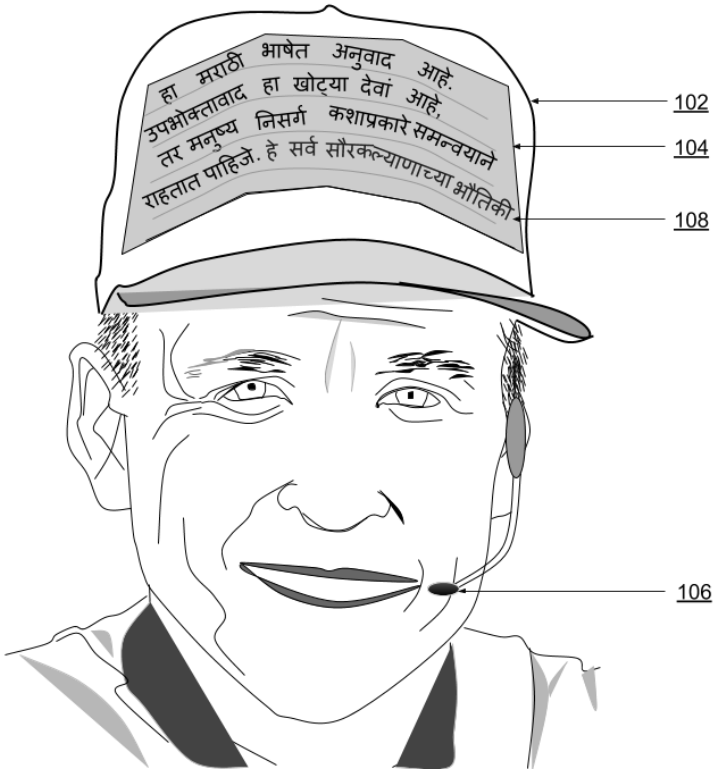

Fig. 1: Smart headgear

As illustrated in Fig. 1, a smart cap, hat, headband, or other headgear (102) is equipped with a display (104) and is interoperable with a microphone (106). The display is visible to another person, e.g., an interlocutor, that faces the wearer of the smart cap. With explicit consent from the smart cap wearer, the microphone captures their speech during conversation with the interlocutor and streams or displays transcribed or translated speech (108) on the display. In this manner, a person that is in conversation with a speaker wearing the smart cap can easily read transcribed or translated text without having to refer to a separate screen that is in a position that does not enable maintaining eye contact. Indeed, due to the proximity of the display to the speaker's eyes, the interlocutors can easily maintain eye-to-eye contact.

The smart headgear, as described herein, can include built-in speech recognition and language translation capabilities, or can interoperate with other device that perform such functions. An embedded microphone captures the speech of person wearing the cap, with prior consent and permission of that person. In implementations, such a microphone may be an ear bud, a dangling close-talking microphone, or other type of microphones.

Alternatively, instead of or in addition to the headgear, transcribed or translated text may be displayed on a shirt in a region near the speaker's face, or on the speaker's hand or body, if the speaker provides permission for such features. The display of such transcribed or translated text can be enabled by a wearable projector that resides on either the speaker or listener's person.

In this manner, the techniques described herein enable listeners to retain eye contact with a speaker that wears a smart cap (or other smart headgear) while reading the transcription or translation that appears above the speaker's eyes. Aside from retaining naturalness of conversation through enabling eye-to-eye contact, the techniques also enable the wearable

mounting of more sophisticated natural language processing hardware. Such hardware, which may be relatively heavy, cannot be currently mounted on eyeglass frames. The techniques also find use in augmented reality applications.

Further to the descriptions above, a user may be provided with controls allowing the user to make an election as to both if and when systems, programs or features described herein may enable collection of user information (e.g., information about a user's social network, social actions or activities, profession, a user's preferences, or a user's current location), and if the user is sent content or communications from a server. In addition, certain data may be treated in one or more ways before it is stored or used, so that personally identifiable information is removed. For example, a user's identity may be treated so that no personally identifiable information can be determined for the user, or a user's geographic location may be generalized where location information is obtained (such as to a city, ZIP code, or state level), so that a particular location of a user cannot be determined. Thus, the user may have control over what information is collected about the user, how that information is used, and what information is provided to the user.

CONCLUSION

Natural language translation and transcription technologies can now enable x real-time conversation between speakers of mutually unintelligible languages. Such technologies also assist hearing-impaired speakers by providing real-time transcription. Currently, the transcribed or translated speech is typically displayed on a screen that is away from the speaker, e.g., on a hand-held device. Such type of display is not conducive to maintaining the eye-to-eye contact necessary for natural conversation. The techniques of this disclosure describe smart headgear that integrates a display capable of streaming transcribed or translated speech to a listener. The

smart headgear integrates or interoperates with natural language processing hardware, microphones, and other necessary hardware and software such that, with the speaker's permission, the display streams a transcription or translation of the speaker's speech. In this manner, the interlocutors can maintain eye-to-eye contact during a conversation.