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Headlamp with digital assistant

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ABSTRACT

This disclosure describes a headlamp device with a digital assistant application. The headlamp captures images from the user's context and provides a visual overlay on real-world objects with contextually useful information. The visual overlay includes, e.g., text labels, object outlines, part schematics, etc. The headlamp is a wearable device that enables users to obtain assistance via multiple media, e.g., audio and projected video.

KEYWORDS

- Interactive assistant
- Digital assistant
- Virtual personal assistant
- Headlamp
- Projection
- Virtual reality
- Augmented reality
- Wearable computing

BACKGROUND

Currently, digital voice assistants (also called virtual personal assistants, interactive assistants, etc.) are provided on various devices such as smartphone and other mobile devices, tablets, speakers, etc. The voice assistants accept voice/text input and provide information and responses using digital displays or speakers. An enhanced user experience can be provided by a digital assistant that can accept a combination of visual and audio inputs, and provide responses that utilize a combination of audio and shareable visual images.

DESCRIPTION

This disclosure describes a headlamp digital assistant with a capability to project images onto real-world objects and surfaces. The digital assistant includes a camera to enable easy acquisition of the visual context of a user in a convenient hands-free manner.

The headlamp with a digital assistant includes components such as a lamp, headband, battery pack, camera(s) (e.g., dual cameras for depth perception), motion sensors (e.g., accelerometer, gyroscope, magnetometer, etc.), location sensor(s), microphone(s) for user commands, speakers or headphones, infrared sensors for focusing camera and light projection, a lens system to focus light, transparent LCD or OLED display configured to project images via the lamp, a video projector, etc. The headlamp is also configured with wireless internet connectivity, local storage to cache files, and a CPU. In some configurations, a companion device such as a smartphone or other mobile device is used for the computational processing and display rendering, and corresponding hardware is omitted from the headlamp.

Fig. 1 illustrates an example of using a headlamp digital assistant. The headlamp digital assistant is enabled upon specific user permission, and is provided upon user request or configuration. The headlamp digital assistant determines and uses user data, such as user content, only when permitted by the user.
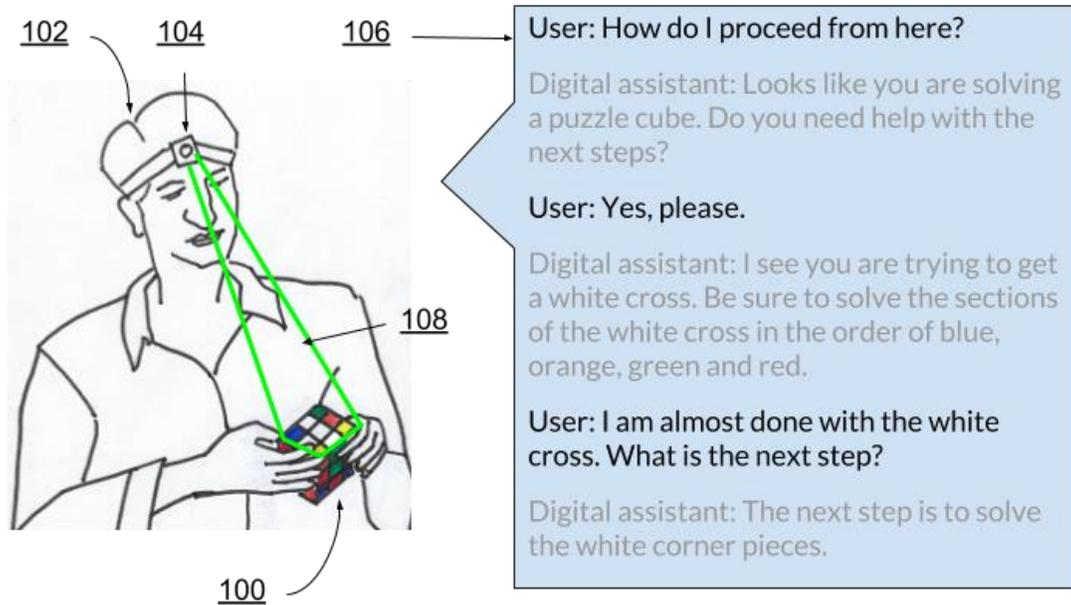
Fig. 1: Headlamp with focus on an object held by a user

As illustrated, in Fig. 1, the user (102) is engaged in solving a puzzle cube (100) while wearing the headlamp digital assistant (104). The user points the light from the headlamp assistant (108) on to the puzzle cube. The headlamp assistant includes a camera that determines the visual context of the user. The user engages in interaction with the headlamp assistant, e.g., via voice (106).

As seen in Fig. 1, the user requests guidance for the next steps in solving the puzzle cube. The headlamp assistant determines the next step (e.g., with on-board computation, or by obtaining the answer from another device, e.g., a server) and responds with the answer that is provided to the user via speakers or headphones in the headlamp. Further, visual elements of the response from the headlamp assistant are projected and overlaid on the puzzle cube. Such visual elements include, e.g., text labels, outlines of the object, schematics of parts of the object, photos of similar objects, views inside the object using simulated X-ray vision, etc.

Fig. 2 illustrates an enlarged view of the puzzle cube (210) with information overlay from the digital assistant, e.g., a suggestion to perform counter-clockwise movement of the right piece of the puzzle cube is indicated by the projected arrow and outline of the area (212) and the projected text "Ri" (214). As the user rotates the puzzle cube, the digital assistant provides guidance with subsequent steps. The visual overlay can also be viewed by other proximate users.
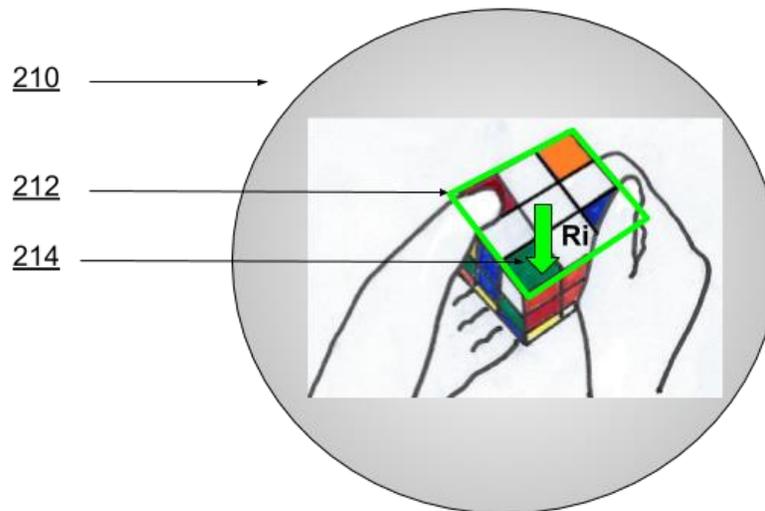
Fig. 2: Information overlay on an object

The headlamp digital assistant can be utilized in combination with artificial reality technology (AR) applications to project video output by utilizing a transparent display. The lamp shines through the transparent display and projects images onto external surfaces and/or objects. The portable headlamp enables users, who may be stationary or moving, to instruct the headlamp digital assistant to adjust the displayed image to match the objects being viewed. The headlamp assistant enhances the user experience of virtual reality (VR) and artificial reality (AR) technologies by enabling the sharing of audio and visual elements with proximate users.

The headlamp digital assistant can enhance user experience in a variety of ways. For example, based on a voice command, the headlamp assistant camera can be utilized to capture a

photo of any object or scene that the user points the headlamp light at. Live images captured by the headlamp assistant and overlay information can be shared with other users using software applications, e.g., a video conferencing or image sharing applications.

The headlamp assistant can be utilized to create a catalog by pointing the headlamp at objects and scenes, and requesting that the images be collected for subsequent viewing. Headlamp assistants can be utilized for collaborative research and in other use cases that benefit from integration of visual images and textual information. Some examples of use of a headlamp digital assistant are listed below:

- *Point and click camera*
    1. User points the light at an object and requests the headlamp to take a photo
    2. The headlamp assistant uses the camera to take a photo
- *Video conferencing*
    1. The user starts a video conferencing application and adds friends to share the experience
    2. With user permission, objects that the user points at with the light are captured by the camera and shared with other members in the video conference, who can see the captured video and projected overlay information.
- *Shared photos/videos*
    1. The user points the light at an object and requests the headlamp assistant to identify the object. In response, the headlamp assistant projects information on the object.
    2. The user requests the headlamp assistant to share the image with a friend, and the headlamp assistant shares a captured image of the object with the projected

overlay information, e.g., that may include metadata about the object, with the friend.

- *Cataloging and counting*

  1. The user points the lights at an object and requests for the object to be added to a list. The headlamp assistant adds a photo and metadata for the object to the list.

  2. The user repeats the process with other objects, and can view the list.

- *Shared viewing*

  1. Multiple users, each with their own headlamp assistant point to the same objects.

  2. The different headlamp assistants provide different overlays, e.g., scientific information, historic information, live economic data, etc. suitable for the object that are all projected simultaneously

- *Animation*

  1. The user points the headlamp at an object, e.g., a plant, and requests to see how the plant will look like in 3 months

  2. The headlamp assistant renders an animated projection of the growth of the plant

The headlamp digital assistant can also be used in other suitable contexts, e.g., to view historical information (e.g., when viewing a monument), photos or maps of places, to measure distances between objects, count objects, etc. The headlamp assistant can be used for industrial applications to project technical designs and architectural plans onto physical objects. The headlamp assistant can also be used for entertainment and educational purposes (for example, in museums).

<u>CONCLUSION</u>

This disclosure describes a headlamp device with a digital assistant application. The headlamp captures images from the user's context and provides a visual overlay on real-world objects with contextually useful information. The visual overlay includes, e.g., text labels, object outlines, part schematics, etc. The headlamp is a wearable device that enables users to obtain assistance via multiple media, e.g., audio and projected video.