Smart Glasses Just Got Smarter

Golden-i Gen 3.8 is a handsfree wireless computing and communications headset that operates by voice commands and head movements. It was demonstrated at Electronics Rocks Conference 2013

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We all have seen the media frenzy that surrounded Google's Glass, a wearable computer that integrated a lot of Android functionality, while making you look like an Android at the same time.

Golden-i is a mobile wireless wearable headset computer with 38cm (15-inch) near-eye virtual display, which enables the users to carry out general computer functions without using their hands. It allows the users to access six independent devices or networks simultaneously (including PCs, cellular phones and industrial and enterprise servers). The device supports more than 38 languages. It is operated by voice-user interface and head-tracking system.

Technology

The device has an embedded 14MP camera that can record and/or send full-colour images or streaming video in real time, in resolutions ranging from 240p to 1080p, at the rate of 2fps to 60fps. In addition, it is equipped with a head tracker, Wi-Fi, Bluetooth, ambient-light sensor, USB on-the-go and other peripherals. The design also includes a low-power, ultra-small form factor micro-display that integrates advanced voice and gesture recognition technology.

The latest version of Golden-i, the Gen 3.8 system, is built around TI's powerful OMAP4 processor and runs on Android 4.2 operating system. A Windows Embedded Compact 7 version of the product is also supported. An automated test suite is available for hardware design validation and manufacturing test.

Construction worker using Golden-i

Applications

Golden-i is a finished product and is being adopted in various fields, such as fire brigade, police department, construction, maintenance, repair and general professional applications. It is used in healthcare by doctors and nurses, and for emergency medical services. Product developers can also use Golden-i as a development platform.

Since this gadget is highly customisable, it can be used in a variety of applications, and robust solutions and support are provided to the clients by the firm.

Here is an example of how Golden-i Gen 3.8 is used in a fire brigade. The application used here is the Firefighter Pro, which helps improve time efficiency and safety. It allows firefighters to access vital information while dealing with an emergency situation. They could call up floor plans and GPS coordinates on their wearable computer, giving them real-time understanding of the layout, assisting navigation through unknown structures efficiently (using assisted-GPS inertial navigation) and hence enabling quick evacuation/rescue operations. It helps the firefighter see through smoke, mist, dust and thin materials using an optional IR camera.

The firefighters can monitor the vital signs of individuals and the crew (which is an application in healthcare field too). Live, on-site video streaming is also possible to and from the affected environment.

Development

The Golden-i is a global multinational endeavour that was developed with the goal of improving productivity, efficiency and safety in all professional and industrial sectors. It supports and guides the user at any moment without interruption.

The US-based Kopin Corporation's portfolio includes designing, building and deploying lightweight, power-efficient, ultra-small liquid crystal displays. They entered into a partnership with Bangalore-based Mistral Solutions to design the headset computing and communications system. Mistral also manufactures compact hardware electronics required by Golden-i.

The concept of handsfree, wireless, headset computer was first discussed in August 2006. The first actual Golden-i headset development started on July 1, 2007, and in January 2008, the

first handsfree computing wireless Golden-i headset was demonstrated streaming 480p video at 25fps over Bluetooth 2.0 EDR. It used a speech recognition user interface with approximately 85 per cent efficiency.

Kopin Corporation has over 200 issued patents covering various aspects of Golden-i. Apart from this, the company also has an additional 100+ patent disclosures open, and approximately 60 additional patents filed since 2007, which are being processed.

The team is currently working with the world's leading cellular service providers (such as Verizon Wireless) for bringing the Golden-i Gen 3.8 headsets in various global geographical markets this year.

Design challenges

"The major challenge while developing this product was fitting all the interfaces into a small form factor design," according to Selvaraj Kaliyappan, general manager - Delivery (PES), Mistral Solutions. The product should offer multiple technologies, such as cameras (infrared, SWIR, near-IR, visible light and terahertz), Wi-Fi, Bluetooth, 4G LTE cellular, 9-axis head tracking and numerous sensors while also ensuring sleek, lightweight and compact design. Space optimisation was achieved by using microBGA and package-on-package (PoP) technology. The Mistral team also addressed multiple routing and layout challenges.

The overall power consumption and heat dissipation in the system was also successfully reduced, thus ensuring longer duration for system operation.

Since Golden-i relies much on voice commands, implementation of a stable voice recognition and active noise cancellation in ambient environments with as much as 120dB of noise was yet another challenge. The algorithm integration was to be performed to the desired level to meet the specific market demographics and ambient environments that are typically encountered.

Best of its kind

Google Glass is a similar product that made huge headlines last year. But original Golden-i had reached the market ahead of Glass.

"Golden-i is not a single device, but a family of devices leveraging similar hardware and software," says Jeff Jacobsen, senior advisor to CEO, Kopin Corporation, "but significantly differing in headset size and peripherals, depending on the market being addressed."

The initial version of Golden-i 3.8 had been designed for use with hard hats and helmets, for industrial use and applications. Smaller, sleeker and more stylish models of Golden-i are expected to hit the market by 2015.

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