Project Proposal for Swim Tech Goggles

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Abstract. The purpose of this project is to create a prototype for a head-up, hands-free, voice-activated swim goggles that will update swimmers on their mileage, speed, and other stats during their workout. Essentially, the idea is that swimmers will be able to preset their goggles to update them on their mileage by projecting stats onto the lens. This device will eliminate the need to keep track of laps and time while simultaneously focusing on the workout itself. Some of the areas that are to be considered in the scope of this project are resources, budget, schedule, and goals. Since the goggles will require more advanced technology, it will be expensive to create. Several prototypes must be built and tested to ensure usability before allocating resources and funds. There are also several interfaces that must be considered and tested with these individual prototypes. The goal of this project is to learn about the head-up user interface options, and the challenges and benefits they present in comparison to more perpetuated interface designs.

Keywords: head-up, hands-free, voice-activated, head-mounted, goggles, lens, swimming, mileage, speed

1 Problem Definition

In order to successfully build a product that is user friendly, functional, and enticing, it is important to simplify the process of successfully using and navigating through the device. For this project, the focus will be specifically on how the user turns the goggles on, sets the increment of time in which the stats are displayed, saves personal records, accesses personal records, and also how the user views the statistics displayed. Potentially, every user command could be voice activated. However, the accessibility of the device options must be consistent with the users' goals. If the users' goal is to interact with the device quietly, then a better option would be to add buttons on the side of the goggles through which the user may proceed with the device features. On the other hand, there are many different ways to present the statistics to the user visually. Therefore, another step is to determine the most appealing way to project the information onto the lens. It is also important to determine how much space a user has to personalize device features.

2 Research

The project's display lens is envisioned to be similar to the technology used to create Google Glass. Google Glass is a wearable head-up display lens with a touchpad, camera, and a Liquid Crystal on Silicon (LCoS), LED display. The LCoS uses liquid crystal on top of a silicon plate to reflective images. Google Glass also makes use of field-sequential color which uses the background colors of the viewing area to determine the most appropriate display colors. See Figure 1 in the Appendix for an example of field-sequential color in Google Glass. This type of display aligns closely with the expected imaging for the project.

Another important potential interface design is voice-activation. Current vocal command devices can recognize 50 different commands and store over a minute's worth of voiced messages. Such voice-activated technologies can be seen in Apple's Siri and with Google Glass. While the current project vision does not foresee needing a voiced response system as much as a voiced recognition system, it is possible to equip the device with the technology if user demand is high.

2 Prototypes and Challenges

As was mentioned earlier, there are several different options for developing the way the users will interact with the goggles. Similar to Google Glass, users may interact with the device through vocal commands such as "Power on", "Power Off", "Set interval time", "Set display time", "Save time", "See P.R.", and more. While most of the commands are self-explanatory, the "Set interval time" command corresponds to how often the stats will display on the lens, while the "Set display time" corresponds to how long the stats will appear on the screen before it disappears. By allowing users to personalize the display interval and time, a standard does not have to be researched and designated by the designers. This type of technology can be very user friendly and desirable to tech savvy individuals. However, this type of voice-activated interaction will require more time and money to develop.

A second option is to add these commands as buttons on the side of the goggles. This will certainly cheapen the cost of production, but may present challenges to users if instructions are not clearly defined. Buttons may also cheapen the look of the device. However, installing a touchpad as a way to navigate through commands, may be a much more simplified, yet expensive system. In addition, a waterproof touchpad may create challenges of its own, such as reduced sensitivity.

The other most important design feature of the goggles is the lens display. Since the device is expected to be used most regularly in the pool, it is important to choose colors that will not clash with the surroundings. However, using a field sequential color system can eliminate this potential problem. At the same time, the placement of the stat display on the lens itself is also a huge design feature to discuss. It is possible that updates displayed in the center of the field of view may be appropriate for some

swimmers over others. Therefore, several prototypes should be developed in which displays differ by location.

The main objective of the display on the lens is that users will not have to stop to check their mileage or time. If the display significantly distracts the user from their workout, then it defeats the purpose. While the display location obviously affects this sort of distraction, it is also important to consider the manner in which the display appears on the screen. Simply projecting the stats on to the lens without any prior warning may be potentially aggravating to users. One way of easing the user into preparing to see the display is to gradually fade in the stats to the lens. Neutral colors may also be less alarming than brighter ones. Another option is to gradually lower the display with a scrolling motion.

While the projection of statistics on an interval system is one reliable option, another prototype that may be considered is a real-time display system, in which the mileage, speed, or both could be constantly displayed in respective corners of the goggle lens. This could also be incorporated as display option in the other prototype.

One example of this real-time display is Figure 2 in the Appendix. However, the project is open to discussing whether all stats should be displayed in one section of device or divided amongst the corners.

While the main objective has focused on displaying workout stats, another option is to include and camera and video recording system. This would certainly increase the cost and time of production, but it may expand marketability by appealing to more recreational swimmers.

3 Results

Ultimately, the goal of this project is to determine if and how voice-activated technology may improve the quality of technological interaction. At the same time, the goal is to learn if voice activated technology is preferential to more traditional hands-on interfaces.

In addition, the purpose is also to learn about certain restrictions wearable, head-up devices may present, and how to best implement design for near-eye technology. This type of design is important to research as wearable technology continues to be an up and coming field in technology

Another goal is to gain a sense of practical interface design. By testing prototypes with different display shapes, colors, and locations, one can determine how to maximize limited space, select color schemes, and choose patterns appropriate to the functionality of the product.

Appendix

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Figure 1. Google Glass Lens Display

Figure 2. Google Glass Stats Display

Acknowledgements / Honor Code

"On my honor, as a student, I have neither given, received, nor observed any unauthorized assistance on this assignment."

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