

Integration of Smart Glass Technology for Information Exchange at Construction Sites

S. Moon^a and J. Seo^b

^aDepartment of Civil and Environmental Engineering, Pusan National University, Korea

^bDepartment of Civil and Environmental Engineering, Hanyang University, Korea

E-mail: sngwmoon@pusan.ac.kr, jseo@hanyang.ac.kr

ABSTRACT

Google Glass is a next-generation technology for information management. This technology presents a great opportunity to advance information exchange at construction sites. When Google Glass is applied to construction management, the application can free construction supervisors from the burden of holding paper documents, such as drawings and manuals, or other devices, such as tablets. The Construction System Laboratory at Pusan National University is currently working on a smart glass application using Google Glass for construction management. The objective of this paper is to introduce the effectiveness of the Google Glass application in information exchange at construction sites. In this paper, a prototype system is presented to demonstrate the effectiveness of hands-off information management when a smart glass device is integrated into construction management.

Keywords: Smart glass application, Google Glass, Information exchange, Safety monitoring
Instructions; Authors; ISARC 2015

1 Introduction

Google Glass is a next-generation technology for information management, and it aims to connect the world together [1]. This smart glass device uses a prism to display information on a screen. Even if the prism-based screen is small, it offers a screen image in a resolution of 640 by 360. Even in the daylight, users can read information by slightly pointing to the darkened side.

Smart glass is becoming an emerging technology for improving construction management. Grayson [2] mentioned Google Glass is an inevitable technology, even in construction. The construction industry is paying close attention to this smart glass technology because the device provides a great opportunity to advance information exchange in construction management. When Google Glass is applied to

construction management, the application can free construction supervisors from the burden of holding paper documents, such as drawing and manuals, or IT devices, such as tablets.

This paper introduces the feasibility of the Google Glass application in information exchange at construction sites. In this paper, an example Google Glass application is presented to demonstrate the effectiveness of hands-off information management when a smart glass device is integrated into construction management.

2 Smart Glass Application for Data Exchange

Google Glass offers beneficial functions that can be utilized in construction management. The main functions of Google Glass include 1) photographing, 2) videotaping, 3) browsing, 4) talking, 5) synchronization, and 6) augmented reality. Photographing and videotaping can be used for recording the construction operation.

Table 1. Potential applications using Google Glass functions

No.	Google Glass function	Potential application
1	Photographing	Taking pictures for daily recording of construction progress in pictures
2	Videotaping	Recording of milestone activities
3	Synchronization	Saving and retrieving pictures and videos in a database
4	Browsing	Referencing construction documents (e.g., CAD drawings, specifications)
5	Talking	Communication between construction workers
6	Augmented reality	Display of graphical images with the aid of GPS data

The pictures and videos can be saved at the same time of recording in a database so the construction manager can retrieve for documentation. Browsing allows for referencing construction documents while hands free, and talking can improve communication. Based on GPS data, augmented reality can provide visual or numerical data by overlapping real images. These functions can integrate construction management better without the technological barrier.

3 Case Study

3.1 Example application

The Google Glass application can be developed for various purposes [3]. In this paper, the application is prototyped to facilitate data accessibility in monitoring safety during the construction of temporary structures. In this case study, Google Glass is integrated into a safety management system in which the construction manager can access the safety status using PCs, mobile phones, and Google glasses. The Google Glass application uses the function of browsing in Table 1. That is, the application can simply refer to the information on current safety conditions.

Google Glass uses a touch method to navigate menus (Figure 2). The menu can be displayed by swiping the glass frame forward and backward. The submenu can be selected by tapping the main menu. For example, in the main menu, the items include project information and safety control. In the submenu, the items include signal statuses for safety conditions.

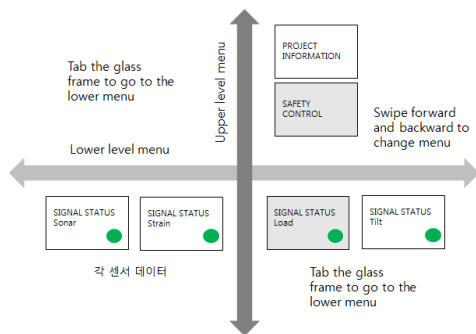


Figure 1. Sample menu structure in the Google Glass application

3.2 Data Exchange for Safety Monitoring

If the safety personnel are tied up with site activities, smart glasses are a good option. The smart glass application can free workers from the burden of holding documents or devices, such as mobile phones and tablets, for construction information. The safety manager can continue monitoring safety by relying on the information displayed on the prism monitor in the glass.

Figure 3 shows the integration of the Google Glass application into the overall safety monitoring system. The images of the prism monitor display the information required for safety management. Although the application shows the same information, the safety manager can easily access the information for quick reference.

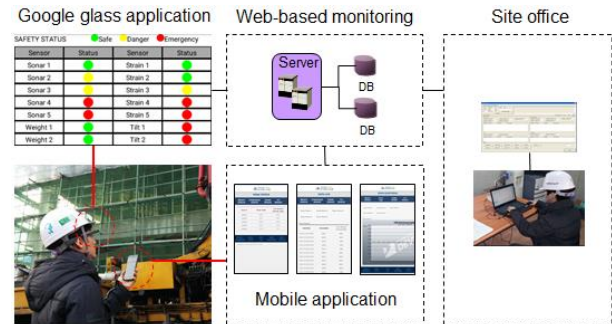


Figure 2. Integration of data exchange at the construction site

4 Conclusion

The prototyping of Google Glass has been limited to browsing functions currently. The prototype is being further extended to include other Google Glass functions. When the prototype is complete, a full-scale evaluation will be conducted regarding the benefits of the smart glass application. However, the limited version of the prototype shows Google Glass offers beneficiary functions that can be applied for construction management that have not been experienced in the construction industry.

5 Acknowledgement

This research was supported by a grant (00-AUDP A00) from the Architecture & Urban Development Research Program funded by the Ministry of Land, Infrastructure and Transport of the Korean Government.

References

- [1] Google Glass Books. *Google Glass: What is It and How Can It Change Our Lives*, Future Apps, San Bernardino, CA, 2014.
- [2] Grayson W. "Face the Future: 5 reasons construction companies need to buy Google Glass right now." *Equipment World*, On-line: <http://www.equipmentworld.com/5-reasons-construction-companies-need-to-buy-google-glass-right-now>, Accessed: 28/12/2014.
- [3] Scheel M. *Software Development for Google Glass*, Half Fast Publishing, San Antonio, TX, 2014.