



[Volume XL-4/W4](#)

Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XL-4/W4, 1-6, 2013
www.int-arch-photogramm-remote-sens-spatial-inf-sci.net/XL-4-W4/1/2013/
doi: 10.5194/isprsarchives-XL-4-W4-1-2013
© Author(s) 2013. This work is distributed
under the Creative Commons Attribution 3.0 License.

Dynamic WiFi-Based Indoor Positioning in 3D Virtual World

S. Chan¹, G. Sohn¹, L. Wang¹, and W. Lee²

¹GeoICT Lab, York University, Toronto, Canada

²KICT, SOC Research Institute, Goyang-Si, Republic of Korea

Keywords: 3D Modeling, Indoor Positioning, Tracking, System Design, Visualization, GIS

Abstract. A web-based system based on the 3DTown project was proposed using Google Earth plug-in that brings information from indoor positioning devices and real-time sensors into an integrated 3D indoor and outdoor virtual world to visualize the dynamics of urban life within the 3D context of a city. We addressed limitation of the 3DTown project with particular emphasis on video surveillance camera used for indoor tracking purposes. The proposed solution was to utilize wireless local area network (WLAN) WiFi as a replacement technology for localizing objects of interest due to the wide spread availability and large coverage area of WiFi in indoor building spaces. Indoor positioning was performed using WiFi without modifying existing building infrastructure or introducing additional access points (AP)s. A hybrid probabilistic approach was used for indoor positioning based on previously recorded WiFi fingerprint database in the Petrie Science and Engineering building at York University. In addition, we have developed a 3D building modeling module that allows for efficient reconstruction of outdoor building models to be integrated with indoor building models; a sensor module for receiving, distributing, and visualizing real-time sensor data; and a web-based visualization module for users to explore the dynamic urban life in a virtual world. In order to solve the problems in the implementation of the proposed system, we introduce approaches for integration of indoor building models with indoor positioning data, as well as real-time sensor information and visualization on the web-based system. In this paper we report the preliminary results of our prototype system, demonstrating the system's capability for implementing a dynamic 3D indoor and outdoor virtual world that is composed of discrete modules connected through pre-determined communication protocols.

[Conference Paper](#) (PDF, 908 KB)

Citation: Chan, S., Sohn, G., Wang, L., and Lee, W.: Dynamic WiFi-Based Indoor Positioning in 3D Virtual World, Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XL-4/W4, 1-6, doi: 10.5194/isprsarchives-XL-4-W4-1-2013, 2013.

[Bibtex](#) [EndNote](#) [Reference Manager](#) [XML](#)

