

# Mobile Augmented Reality Application Supporting Building Facades Visualization

Michał Bednarczyk and Tomasz Templin

University of Warmia and Mazury in Olsztyn, Faculty of Geoengineering,  
Institute of Geodesy and Civil Engineering

**Keywords:** *Mobile Application, Augmented Reality, Technical Documentation of the Building, Spatial Information System of the Building.*

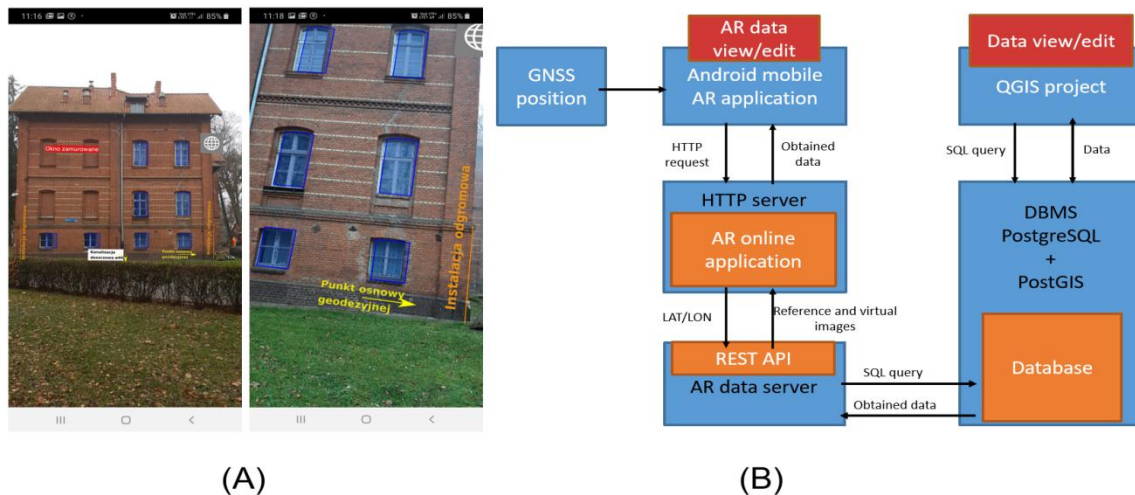
## 1 AR Application Concept

The use of mobile devices such as smartphones still increases over last years. Smartphone hardware capabilities are comparable with average personal computers. Thanks to the increasing computing power, their application is focused on more and more sophisticated and complex tasks. These includes among others augmented reality (AR) applications, which support precise GNSS localization and use signals from such devices like accelerometer or gyroscope. They are able to create interactive, immersive real-time visualisation of any kind.

The article presents a prototype Mobile Augmented Reality (MAR) Application for visualization of the building facades. It allows to support the original look of the building with the additional information from database. Software of this kind, can be used for overviewing, inspecting or work planning carried out on the facade of the building. As a part of the test, a prototype of the MAR application for Android has been prepared. Rest of the solution components have been presented in form of a concept, implementation of which is planned in near future. Basic technical assumptions are already developed, but details may change. The paper mentions also some important AR problems, especially positioning in urban environment and accurate registration of digital objects in the real world.

AR technology can be helpful in visualizing information about the state of the building facade during inspection. By mixing the real view of the object with the previously collected data, a direct comparison of the current and historical status can be obtained. A working prototype of the application, shown in fig. 1a, uses computer-vision based AR to recognize the facade of a specific building. After that, an image (drawing) is overlayed that can contain any previously collected information related to the building, such as: descriptions and markings of construction elements, defects and damages, installation descriptions and markings, interactive elements - to get additional information or perform an action in the application, historical facade photos and other useful information.

At present, described application prototype is able to recognize the facade and display AR content. This software works in client-server architecture. Client application runs on a mobile device and is responsible for mixing and displaying the final image. Building the virtual "world" and sharing data is done on the server side. Further work will be focused on expanding the system's functionality. All of proposed software should work under control, or be part of, more general system such as GIS or other spatial information processing system of this kind. Schema of the conception of proposed AR system for building facades is presented in fig. 1b.



**Figure 1.** (A) Additional, sample information about building facade presented in AR mobile application. (B) Components of proposed AR system for building facades.

## 2 Conclusions

It can be assumed that visualization of building facades using AR can support the process of collecting data in the field. Using AR technology, one can display data from previous inspections, BIM, a database, or e.g. archival photos, overlaying them on the actual image of the building in real time in the field. Thanks to this, one can easily make a comparison with the existing state, make a quick view, take notes and decide whether to update the data.

However, in order to ultimately achieve the goal, further work needs to be done to refine the proposed solution. This applies above all to the system architecture, which should be expanded with appropriate components to ensure efficient and effective work.

### ORCID

Michał Bednarczyk: <https://orcid.org/0000-0002-0450-5327>

Tomasz Templin: <https://orcid.org/0000-0003-2188-0097>

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