HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY

GRADUATION THESIS

ARNav - Augmented Reality Indoor Navigation Mobile Application

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ABSTRACT

When an individual visits a large building, such as a shopping mall or a supermarket, for the first time, they may experience confusion in addition to excitement. While it may be considered a minor journey through a modern indoor space, individuals often become tired when attempting to navigate to a specific location within the building without knowing how to get there. While most buildings nowadays provide maps on their front doors, few individuals seriously remember them. Even when using the maps, it can be challenging to follow the imagined path. This is where my indoor navigation app comes in. Unlike Google Maps, it was specifically designed for indoor use and provides a solution to this issue.

While some may initially view my app as simply a photo of a map on a smartphone screen, it offers much more than a traditional 2D map. By incorporating Augmented Reality technology, the app is transformed into a ”blue bird,” providing dynamic 3D artifacts on users' smartphone cameras to guide them through indoor spaces with ease.

Some may ask, ”Why should I use your AR navigation app when there are already similar options available?” But the question is, have you ever tried using them? I have, and let me tell you, it was a nightmare for my smartphone. Most of them required me to wander around the shopping mall holding my phone, while the app gathered data by using the camera. After collecting the data, when I finally got to try the guiding feature, the app was incredibly laggy and drained the battery life quickly, not to mention the lack of accuracy. This experience is what led me to create my own navigation app, designed to be easily applied to various buildings, with high performance while utilizing AR technology and minimal energy consumption, at least less than existing apps.

I came to the realization that the underlying issue with those apps was the way the system was designed. Their aim was to construct virtual environments using 3D platforms and execute computations on them, which required large amounts of computing resources that a small smartphone could barely provide. To tackle this, I adopted a different approach: I transformed the real world into data structures that a computer can easily interpret. After all the intricate processes, I only utilized the 3D platform in the final task. To be more specific, this project addresses two primary problems. The first is the Path Finding task, where I created standard graphs from the blueprints of the buildings and ran the routing algorithm on them to determine the route. Once we have the path, the second task is to convert it into

3D objects to display on the smartphone camera - the AR task.

In summary, this project not only enhanced my personal experience and that of other users, but it also created a promising business opportunity. Due to the ease with which buildings can be integrated into the app, I can potentially collaborate with building owners to add their locations. These could be shopping malls, universities, or parking lots, among others. As the app doesn't require 3D models or complex calculations, the cost would undoubtedly be reasonable.

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