

## MASTER'S THESIS

### Signal strength-based location estimation in two different mobile networks

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Signal Strength-based Location Estimation in  
Two Different Mobile Networks

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# Abstract

Mobile devices had emerged during the last decade and had become basic necessities for our daily life. Wireless communications between mobile devices and infrastructure became popular research topics. Various radio networks were designed to work with low-powered devices. Practical deployment of these low-cost high-speed radio networks enabled proliferation of location estimation systems.

Today, common mobile devices feature multiple wireless technologies. And thus, improving coverage of location estimation systems and enhancing the position resolution. In this project, we feature two location estimation systems which operate on two distinctive radio networks that cover outdoor and indoor environment of a metropolitan area.

The outdoor positioning system utilizes Self-Organizing Map to visualize the Global System of Mobile network signal power on a world map. And hence, by combining signal power from different cells, location of the mobile station can be estimated. On the other hand, the indoor positioning features Wireless LAN positioning using Personal Digital Assistants. Four different algorithms were implemented and a fusion between them was introduced to improve the estimation accuracy. Both location estimation systems aimed to facilitate location-aware computing with good coverage and multiple resolutions.

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