Design of a Shared Parking System with special attention to security aspects

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Overview

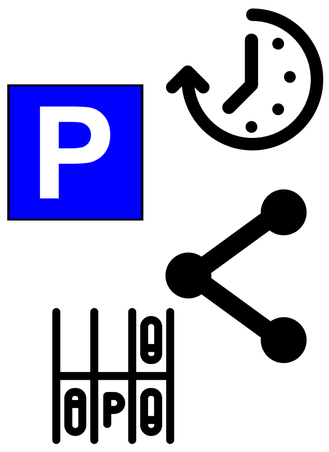
At the beginning the thesis introduces the parking problem in big cities and presents related work in the field of intelligent parking systems. The main part of the work focuses on the design of a Shared Parking System. This design will also be implemented as an Android App. While the implementation follows the main suggestions regarding security aspects that the work provides, there are also different alternative solutions presented and their respective advantages and disadvantages evaluated. The thesis is finished by various proposals for further work in this area.

Parking Problem

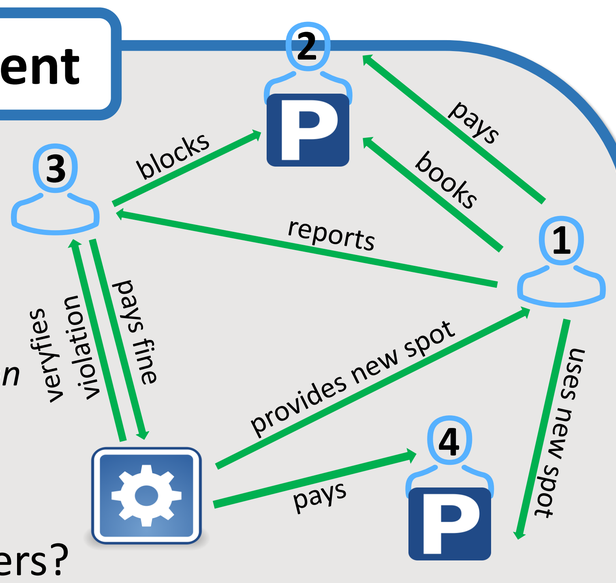
As big cities are growing more and more, the parking situation in those cities is becoming more precarious than ever. Parking demand already exceeds the limited amount of parking spaces available, and thus people searching for a place to park generate a significant part of those cities´ traffic. This leads to frustration with drivers, more traffic jams, unnecessary use of petrol and further air pollution. The creation of new parking spaces is often either difficult or very expansive, which means existing parking spots have to be used more efficiently. Intelligent parking systems are trying to solve that problem. This thesis is focused on Shared Parking, a special kind of intelligent parking system, which opens the possibility of sharing a parking place between different people. This work features the design and implementation of such a system with special attention given to security aspects.

Scam Prevention

The design proposes two fundamental systems to prevent cheating. With a **Rating System** users can rate their contractual partners or report any violations with a **Report System**. Those basic systems make sure to eliminate scammers quickly.



Scam Punishment



An Example of Punishment and Compensation: User 3 blocks parking space booked by User 1. System takes action after verifying the report.

How to detect scammers?

- Users report scammers when spotting them.
- Report gets verified by other, independent users, who in return earn a bonus.

How to punish scammers?

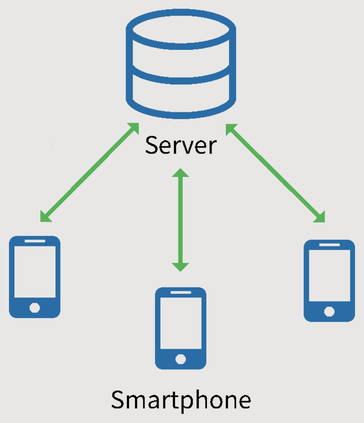
- People outside the system get punished like before.
- Users within the system get fined by deducting from their balance.

How to compensate the injured party?

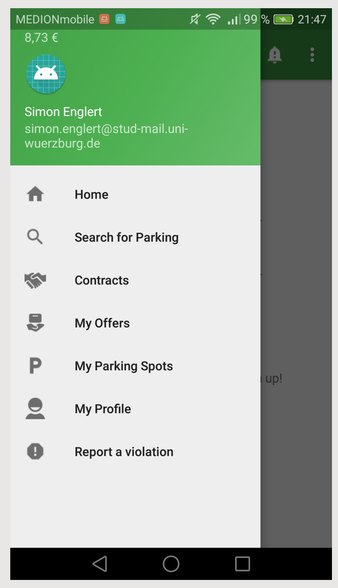
- If possible provide new parking spot.
- Lost revenue gets compensated.
- Money spent by the operator due to compensation gets drawn in from the scammer.

Implementation

The Shared Parking System will be implemented after the Server-Client-Model. One conceptual design choice was to make using the app as easy as possible. Neither the operator nor the user do need any special hardware besides the servers (operator) and a smartphone (user). Users should be able to book a spot or create an offer within minutes.



The server is used as a central database and provides an interface via REST API for the smartphones, who act as clients.



Screenshot of the Prototype showing the main menu (main use cases) and screen for the parking spot search.

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Secure Software Systems