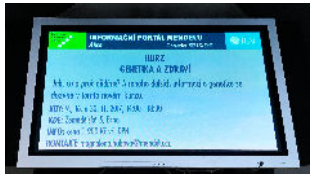
Adaptive study assistant based on location services

Faculty of Business and Economics, Mendel University in Brno

Author: Ivo Pisařovic Supervisor: David Procházka

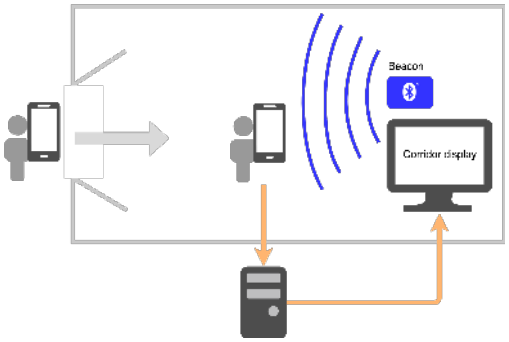
Problem



- Information panels are present at walls at universities, airports and other large buildings. The displayed content is however simply dumb.
- Thanks to my system, the content on such displays is adapted according to needs of users in the display vicinity.
- The focus of my work is the university environment. My goal is to help students to fulfil their duties by helping them with their common problems. However, the system can be used for other use cases as well, e.g. navigation on an airport or a hospital.

Solution

The basic principle of the system:
A user enters a room with a display. The user's mobile device receives a signal from a small Bluetooth beacon placed at the display. On the basis of this location information, the user's mobile device knows at which display the user is standing. The user's data is sent to the server. The server selects relevant content. And finally, the content of the display is relevant to the needs of the users in the display vicinity. The user's mobile device is used also for displaying additional content and performing actions and interactions with the displayed content.



On the right images, you can see two use cases. The left one shows a warning in case students of the last semester are present at the display. The users can use their mobile phones on which the opening hours of the study department are automatically shown in this case. The right example shows a display at the entrance of the building. It automatically shows the student's next lesson that solves another common problem -- students often look for their timetable on their mobile devices every day as they enter the school.

Contribution

- A complex model of the whole system was designed. It includes a user model, a user behaviour model, an environment model etc. These models are used as inputs for the content selection algorithm.
- An effective rule-based algorithm was designed. It is used on the server to select relevant contents based on inputs (user's field of study, current semester, his/her last location, whether the user is moving or steady, …).
- A special user interface was designed for corridor displays. It is optimized to maximize readability and usability of such an innovative solution.
- No previous work reserched this field (information panel content adaptation using low energy beacons combined with a well-designed user interface).

Summary

- The information panel's content is automatically and immediately updated according to present users near the display (their parameters and behaviour).
- The user interface is very natural. Looking for information on a mobile device puts a high cognitive load on the user. However, looking on a display with automatically displayed content is very natural and does not require any user explicit action.
- The system was designed to protect user data. Sensitive data is stored only locally. Data sent to the server is anonymized, aggregated and deleted after the user leaves the display area. Personal content is only on mobile devices.
- User and expert testing have been done with very good results, confirming a well-designed user interface. The system will be deployed at our university at the end of the year.