

intelligent intersection in the field of energy efficiency and traffic safety



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Motivation

The main infrastructural parts of urban intersections are road marks, traffic lights and lighting. Signaling – with the exception of metal signs – is always realized as intelligent systems. In case of lighting systems a trend for including intelligence into the luminaries for remote control and diagnosis applications can also be recognized. The different intelligent systems can be divided in safety-related and non-safety-related networks. Signaling (i.e., traffic lights and traffic light controller) is considered as safety-related because a failure can compromise traffic safety. Electronic displays (e.g., LED-based variable message signs) and intelligent lighting systems are non-safety-related systems. [1].

Goals

Project INGE aims to increase the energy efficiency of infrastructure at intersections by more than 20% without compromising traffic safety. It is intended to reach this goal by implementing additional intelligence into the safety-related system. In addition, all the heterogeneous systems (traffic light, optical displays and lighting) installed at intersections are integrated mechanically into a traffic light and with the help of open communication interfaces into a higher order management-system. The main result of project INGE is a holistic concept for managing the infrastructure at an intersection by integration and adaption of intelligent communication modules, communication between different units and components of a signaling system, and open communication interfaces. Selected results of the evaluation of a test installation regarding energy efficiency, traffic safety and user acceptance can be seen in Fig. 1, comparing old vs. new lighting systems (green = much better).

System Design

System design was based on open standards for a secure and reliable design, see Figure 2. All systems are merged into a management platform for control and maintenance, with particular emphasis on modularity and open interfaces. Thus, by integrating and adapting intelligent communication modules and sensors, communication between the units in a traffic signal system and the use of open interfaces, a holistic concept for an intersection infrastructure can be created.

The validation takes place with regard to the following objectives:

- energy efficiency
- traffic safety
- user acceptance

The validation, which takes place in a prototypical test installation, provides valuable data for spreading the holistic idea and raising awareness among relevant stakeholders.

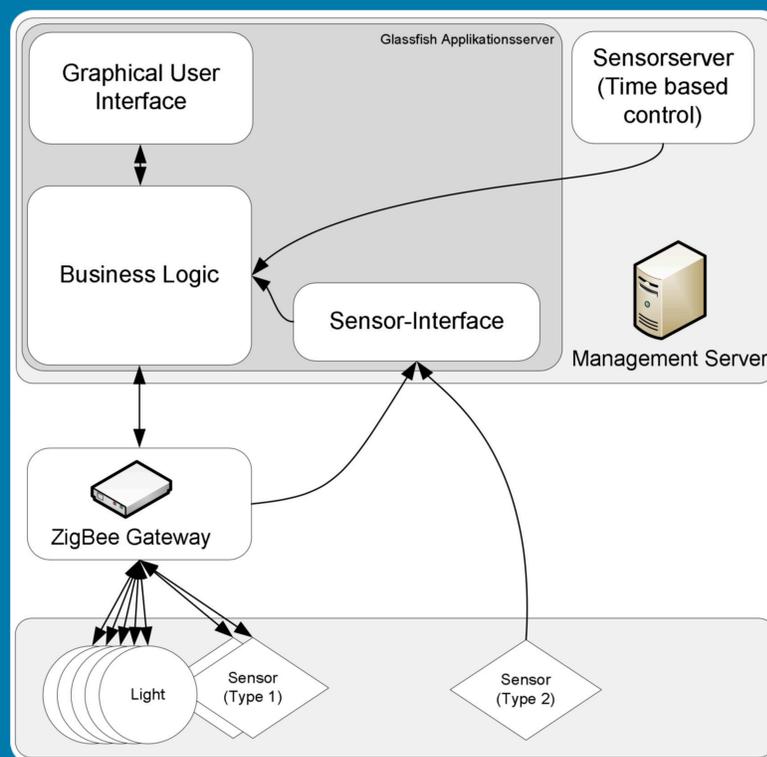
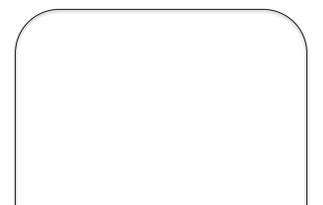
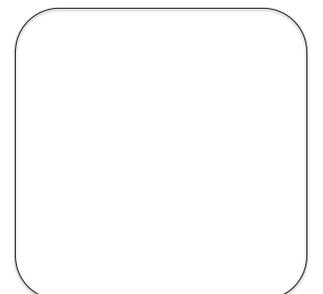
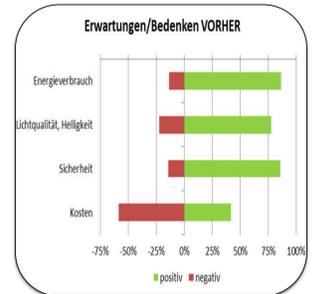
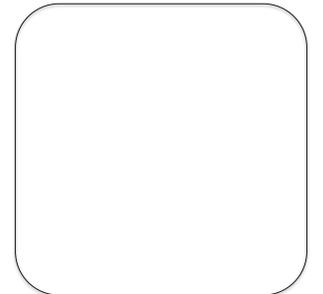
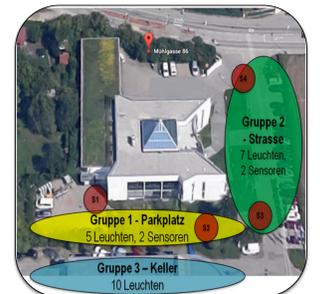
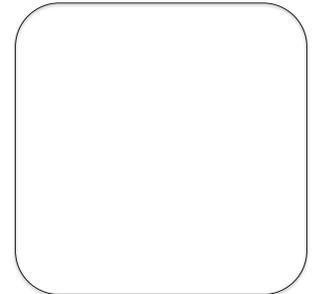


Figure 2: Systemdesign

References

- [1] T. Novak, K. Pollhammer. Intelligent Streetlight Management in a Smart City. In Proceedings of 2014 IEEE 19th Conference on Emerging Technology and Factory Automation (ETFA), pp. 1-8, 2014.
- [2] H. Zeilinger, T. Novak, W. Wimmer. Energieevaluierung einer adaptiven LED Straßenbeleuchtung. Im Tagungsband der 9. Internationalen Energiewirtschaftstagung an der TU Wien, 2015.



Figure 1: Excerpt of the high user acceptance in the testing phase

Projectpartners:



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TECHNIK FÜR MENSCHEN

Wissenschaftliche Exzellenz entwickeln und umfassende Kompetenz vermitteln.