

PAHIMA - Pametna hišna malina

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1 Introduction

Modern houses are far from simple walls with windows and doors in which we spend our time. In order to achieve energy efficiency, security, and comfort, houses take advantage of a variety of IT controlled devices. Traditionally these devices were controlled by industrial micro controllers (PLC) with the devices as their periphery. Nowadays, there are available capable and cheap microcomputers that permit use of standard, open source development environments, which further reduces the price and improves the use. Furthermore, PLC based design did not put a lot of emphasis on security, which is easier to achieve through standard services and protocols run on computers.

2 Modular system

In the project we designed an architecture of the system (see Figure 1) around the TCP/IP protocol. This permits

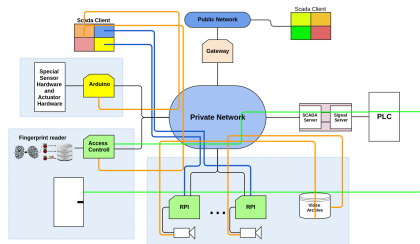


Figure 1: The architecture of PAHIMA.

us to introduce standard protocols and services. The system was designed in a modular way and in the rest of the article we describe each module briefly.

2.1 Fingerprints

An important aspect and addition to the security aspect of smart housing is biometric access control. A fingerprint reader can be used to open and close doors or restrict access to the system itself. The hardware consists of a fingerprint reader and a Raspberry Pi (RPI). The latter is responsible for storing fingerprints, comparing them, and publishing events. Open source software is available but is limited in terms of hardware support and scalability.

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2.2 Video Control

Video cameras represent another security feature. By default the camera records with a low resolution. When a movement is detected the camera switches to high resolution. Moreover, this way we can control the lighting, open or close doors or report the status to the alarm system. Video from all cameras is archived using another RPI.

2.3 Sensors and device control

One of the main features of the system is to manage IR controlled devices in a house such as air conditioning, TV, radio etc. All the IR commands from house appliances can be recorded by an IR receiver. The RPI can later broadcast all recorded IR commands to control the appliances from a single source. Besides the IR sensors, temperature and humidity sensors are deployed for better monitoring.

2.4 Graphical user interface

Information from all modules is gathered by the main server. The server also hosts an http server running SCADA system. Through it a user can control and monitor all devices/systems. Dynamic scripting and preprocessing of civil engineering blue prints permits semi-automatic SCADA configuration.

3 Conclusion

The designed system uses and benefits from fast advances in ICT. It is a major step from traditional PLC based systems. However, since it still keeps PLC as a building block, it retains its robustness and simultaneously introduces security and openness using standard services and protocols.

4 Acknowledgment

The project was partly funded by Europe Union, specifically from the Europe Union social fund. The project is carried out under the Operational Programme for Human Resources Development for the period of 2007-2013, 1st development priority „Spodbujanje podjetništva in prilagodljivosti ter prednostne usmeritve” 1.3. „Študentske sheme” and „Po kreativni poti do praktičnega znanja”



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