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Radio duct energetic retrofitting of ventilation: An air-conditioning system for existing buildings via radio-based control

Regarding primary energy consumption, the building sector is the largest single sector. The energetic retrofit of constituent facilities offers a huge potential concerning current climate protection objectives. Energy-distributing and energy-producing units are often controlled in a non-optimized way. The energy footprint can be reduced with a demand-driven operation, but this requires a rigorous energetic monitoring. The needed communication infrastructure rarely exists in constituent building making a retrofit extremely arduous. Radio duct deals with the development of components which allow a Wi-Fi-based communication for actuators and sensors with the aim of monitoring, controlling and optimizing the energy consumption of non–residential building. By using available air ducts as a non-optimized waveguide to transmit TCP/IP packets, the transmission bypasses walls and the bundling effect serves to achieve higher transmission distances compared to open area transmission - while interference from external devices is blocked off. The preproduction models are based on the ESP8266 microcontroller, acting as independent IoT devices with the functionality of building Ad hoc networks. Radio duct-modules allow for an easy retrofit, particularly since most parts of the air distribution system can be utilized. The air-duct-radio-technology is strongly resource-friendly and cost-efficient.

Biography

Prof. Dr. Jörg Wollert studies electrical engineering at RWTH Aachen. After his diploma in communication systems he changed to the faculty of mechanical engineering at RWTH Aachen. Here he finished his Ph.D in the area of distributed object oriented real time systems. After a 5 year stage as senior project manager in the field of logistic systems he was called as a full professor at Bochum University of Applied Sciences in 1999. Within the research and teaching area of software systems and industrial communication he was leading a group of researchers on industrial wireless systems. In 2014 he gets the opportunity to develop the industrial 4.0 activities at Aachen University of Applied Sciences. Here is responsible for the teaching and research area Embedded Systems and Mechatronics. With his working group he is developing solutions for seamless digitalization in different working areas. Within his research and development he published more than 250 publications. The contribution of this conference is out of a granted research project together with RWTH Aachen and the company TROX, with is leading in air handling systems. Aachen University of applied Sciences is responsible for the communication concept.

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