Int J Sens Netw Data Commun 2017, 6:1(Suppl)
DOI: 10.4172/2090-4886-C1-009

Wireless and cloud based, remote and real-time built environmental measurement for healthy human habitats

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The environmental measurement of buildings has historically relied on analogue or digital data logging equipment located reasonably close to hard wired temperature and humidity sensors. Occasionally, the data logging devices included WAN based systems to upload data to an off-site server. Invariably, these methods allowed for data to be analysed months after collection. The advent of increased wifi, data and radio network typologies, combined with more flexible low current sensor technologies has allowed for the redesign of building environmental measurement and management systems. Recent research in Australia has utilized cloud based servers as points of data storage for temperature, relative humidity and current transducer sensors connected to data network transmission devices. Initially developed for the purpose of assessing causes of condensation and mould within roof spaces, subfloor zones, and interior zones of new homes, this methodology is now being explored for much greater data gathering functions and data driven building management systems. Australia, like many nations, has many older homes with low quality external envelopes and newer homes with questionable internal environmental conditions. With an increasingly aged population, who choose to age at home, live data is required to inform the quality of internal environments to enable real-time action by care providers or the automated operation of home based heating, cooling and ventilation systems. The use of temperature, relative humidity, infra-red and microwave sensors, combined with a new generation of wireless and radio frequency based data transmission system can provide the data needed to better provide healthy internal environments.

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Optimizing multiple services scheduling in cloud computing using progressive evolution

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Cloud concepts have moved enterprise computing from the classical host-based architecture pattern into the elastic computing pattern. While QoS problems in service and cloud based systems have been addressed in the literature, it is believed that green based cloud computing problems have not received as much attention. In particular, when addressing the problem of constrained resource allocation, which is proven to be a difficult problem since it is affected by several parameters, such as assumptions about the services, tasks, subtasks, and communication between servers. The problem of scheduling multiple tasks for multiple users on given number of resources is considered NP complete problem and; therefore, it has been addressed in several research methods, yet, there are still many improvements can be done, since the problem has several optimization parameters and in addition, most proposed solutions are built on top of several assumptions and simplifications. This work proposes a green evolutionary based algorithm for task-oriented resource allocation in cloud computing, where the problem of scheduling multiple users with dependent subtasks on multiple available resources with different execution time and cost is addressed first. The proposed solution is provided by introducing a selection function based on subtasks completion time and task costs. Then, the proposed solution is further enhanced using an evolutionary based method. The proposed method runs in linear time vs. different design parameters. In addition, as compared to existing techniques, is applicable on scheduling problems without any restrictions on the execution time and price, in particular as compared to game theoretic approaches cite{wei2010game}, where the execution time must be given in ascending order, and the price in descending in order to find Nash equilibrium. Finally, the proposed method outputs schedule with better utility than game theoretic one.

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