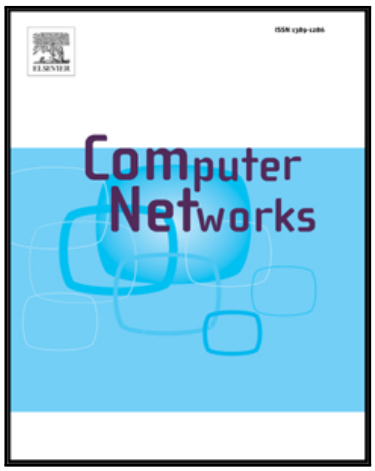

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ResiDI: Towards a Smarter Smart Home System for Decision-Making Using Wireless Sensors and Actuators

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Abstract

This article proposes ResiDI, an intelligent decision-making system for a residential distributed automation infrastructure based on wireless sensors and actuators. ResiDI transmits events using wireless technologies embedded in WSANs to reduce the wire load capacity of traditional systems. In addition, the nodes are equipped with batteries, as a backup system. These features allow the ResiDI to be installed anywhere in the house, without the need for drilling or changing any other pre-existing infrastructure. Furthermore, the roles and intelligence of ResiDI are distributed among the network nodes. Besides increasing precision in decision-making through a neural network, the ResiDI seeks to reduce node energy consumption by means of a temporal correlation mechanism. As proof of concept, a prototype was developed to integrate with ResiDI in order to demonstrate its viability. When compared with an approach in the literature, real and simulated results show that ResiDI makes three key contributions: (i) 22.03% increase in decision-making; (ii) 44.35% reduction in node energy consumption in a homogeneous way; and (iii) 95.24% efficiency in information transmission. Finally, ResiDI provides a gain in response time of 30.21%, so that the decision-making process is performed faster.

Keywords: Home Automation System, Domotic, Smart Home, Decision-Making, Infrastructure, Wireless, Sensor, Actuator, Energy Consumption, Energy Efficiency, Energy Management

1. Introduction

Energy efficiency has become a major global challenge, in particular the problem of energy waste. In this area, energy consumption in the residential sector has increased

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