Abstract

Many a times the industrial HVAC (Heating Ventilation Air Conditioning) systems do not rely on occupancy. Even if the number of occupants is less it continues to run thus consuming huge amounts of power. Real-time occupancy information can potentially be used to reduce energy consumption. The paper proposes an Arduino based dynamically controlled system which takes occupancy into account and then produces an optimum power solution. The proposed solution can track real-time location of tagged occupants, and report the occupancy at zone level. Using efficient power control mechanisms the efficiency of detection can be maximized and then an optimum solution for power consumption can be determined. Simple IDs to the RF/Zigbees tags are assigned so that it can be used to track people around a room and report real time occupancy. Then using Gobotwino [1] the details are logged which are then sent to the central server and the exact occupancy is determined. To determine the exact location, Matlab is used to solve optimization equations. Now it has been observed that a person working in an organization has a fixed seat or it has only some minor variations. So using the proposed optimization algorithm it can determine whether that the person will sit in a particular location and then it optimizes the power requirement. So this will help in determining the optimum solution for that person and based on that the power will be delivered to that particular location. The system has been designed as a module so that it can be repeated and
scaled to any level. Though at the beginning the system (machine learning algorithm) takes time
to find the equilibrium for a particular tag but once it establishes equilibrium it holds on to it and
optimizes the power requirement. This paper aims to achieve the solution to the occupancy and
optimization problem through a simple Arduino solution.

References

- "Gobetwino. " a software written in python to log on the details from the serial port into a text file.
- "434 MHZ Receiver Module for receiving the data" 434 MHZ Receiver Module Pin Configuration.
- "Path Loss Exponent Values for different areas"
- MRF24J20 Datasheet
- "XCTU Terminal" A test utility software to configure and use Zigbees
- RFID-based occupancy detection solution for optimizing HVAC energy consumption Shuai Li*, Nan Li, Burcin Becerik-gerber, and Gulben Calis Sonny Astani Department of Civil and Environmental engineering, University of Southern California, Los Angeles, USA.

Index Terms

Computer Science Wireless

Keywords

Arduino Occupancy Detection Energy Database Management System RF tags
Zigbees