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ZigBee-Based System for Remote Monitoring and Control of Switches

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Abstract

Home automation technology has existed for nearly four decades, but is nonetheless mostly absent in the average home today. The systems that do exist are often highly customised and expensive, catering to a very niche market, or overly sophisticated and complicated. Many of these also require extensive, dedicated cabling as their communications backbone and as such are only practical to install during the construction of a new house.

The core aims of this project are to develop a cheap and simple home automation system that can be easily installed in new and existing houses. These aims are achieved by creating a centralised system where most of the intelligence is managed by a PC server and the end nodes are kept as simple as possible.

The server is responsible for basic security, maintaining awareness of the current system state and providing the user interface. At the outer edge of the system is a ZigBee network of wall switches and, in between, a home gateway provides a protocol translation service between the two. The new, “smart” switches are designed to be entirely compatible with existing wall switches in terms of their mounting and wiring requirements, and so ZigBee is chosen to provide a reliable wireless communication channel between the end nodes and the gateway.

Development of the system is undertaken in three stages; design of the server software (including the user interface and server processes), design of the home gateway embedded software, and design of the hardware and embedded software of the switches.

The end result is an effective, entry-level system that provides the benefits of remote management without the need for a costly or complex infrastructure.

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