ZigBee-Based System for Remote Monitoring and Control of Switches

A thesis presented in partial fulfilment of the requirements for the degree of

Master of Engineering

at Massey University, Albany,

New Zealand.

October 2010

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.

Acknowledgements

A number of people have made a valuable contribution to this thesis through their support, guidance and help with various technical problems.

Many thanks are extended to Jamie McIntyre for his assistance with the use of Altium, and sound advice during the design and production of the switch hardware.

I also gratefully acknowledge Reece McCarthy, long-time friend and electrician, for lending his knowledge and experience in mains wiring and existing smart house products.

To my parents, many thanks for your endless motivation and support, especially in the final stages.

And finally, this project owes much of its success to the support and guidance of supervisor, Dr Tom Moir, whose direction throughout the process of developing and writing has been hugely appreciated.

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