The Mesh
—A Universally Integrated Design Approach For Device Control

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Thesis
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Dedication

This thesis is dedicated to my grandfather, Albert Maurice Kerby DSO MC, whom I never had the chance to meet. What fascinating discussions about so many things we could have had.

Contents

Abstract

The Internet is a vastly under-utilised resource, only used for half of the IT story.

Describe the Internet in two words and many might say 'sharing knowledge'. But sharing information is more accurate. It's just that all the principle ways we use the Internet—the Web, email and media streaming—happen to be examples where information is in the form of knowledge.

But IT—*Information* Technology—has another side: the realm of software programming where information means the dynamic control of how things work. The Internet is the driving force in the IT industry, so why isn't it also known for sharing control? True, there are examples of specialised, one-off software applications interfacing with each other via the Internet, but there has yet to be any systematic and universal attempt to exploit the potential of the Internet for control-IT in the way we have seen it for knowledge-IT.

Taking the strengths of the Web model as a starting point, this thesis proposes a parallel, dynamic world to the Web called *The Mesh*. In the same way that the Web seamlessly connects databases of the world to provide a global font of knowledge, the Mesh would connect software of the world to provide a global means of control. The Mesh would embody all the successful, empowering features of the Web. Everyone would have a say in how things work, mirroring Web 2.0's user-generated content but for software instead of media.

In being a universally integrated design approach for device control, the Mesh would encompass a number of research areas working on the control issue at the big picture level. It would address the problems of universal usability and ubiquitous computing. It would also provide solutions in agent-based systems and grid computing.

But many features of the Mesh would simply be unique. They would change the way we go about software design, leading to new opportunities for users, programmers and manufacturers alike.

The key to everything is design simplicity.

A concept demonstrator has been developed as an integral part of this research project. It shows that the Mesh is both feasible and practical. Examples of programs run in the concept demonstrator are discussed, showing exactly how the Mesh would be built and how it would work.

Keywords

General

- Grid computing
- Interface agents
- Internet applications
- Markup languages
- Object-oriented programming
- Ubiquitous computing
- Universal design
- Universal usability
- User interface description languages
- XML.

This thesis

- Abstract API layer
- Abstract hardware layer
- Atomic-level networking
- Building-brick design flexibility
- Code filtering
- Code integrity through accreditation
- Cost-free user flexibility
- Cut and paste programming
- Engineering integration by layering
- Futures programming
- Ghost-in-the-machine API

Statement of originality

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

I give consent to this copy of my thesis, when deposited in the University Library, being made available for loan and photocopying, subject to the provisions of the Copyright Act 1968.

Martin Lumisden Strange

Date

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