CONTROL HOME APPLIANCES VIA INTERNET (CoHAVI) – SOFTWARE
DEVELOPMENT

SHIRRENE A/P NAI SOWAT

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BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

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Supervisor's Name : EN. ABD. SHUKUR B. JA'AFAR

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To my beloved mom and dad

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ABSTRACT

Current technology of smart home requires human to control appliances in a short range and it costs too much in maintenace. The inflexibility features decrease the efficiency of the system. Control Home Appliances via Internet, (CoHAVI) is a system which resembles a smart home environment. The concept is simple where the home is automated and therefore provides ease and convenience to everyday activities in the home. This project is to develop a web-based monitoring and control system for a home model. Hence, to build a system that uses internet as an interface of the system to control and monitor the home appliances. CoHAVI is developed by using ASP.NET and Visual Basic.NET which will communicate with transmitter device through serial port (RS 232). CoHAVI will be implemented on Hamachi server and Internet acts as a medium to control appliances such as lamps, fans, microwave and so on. CoHAVI provides a great service to remote system such as desktop and PDA, in order to control, monitor and coordinate home appliances in a long range. The success of CoHAVI system is a breakthrough of a smart home remote system.

ABSTRAK

Konsep rumah pintar masa kini memerlukan individu untuk mengawal peralatan di rumah pada jarak yang dekat dan kos membaik pulih sistem adalah tinggi. Ciri-ciri yang tidak fleksibel ini mengurangkan tahap kecekapan sistem ini. *'Control Home Appliances via Internet,'* ataupun (CoHAVI) merupakan sistem yang mencerminkan konsep rumah pintar. Konsepnya mudah, iaitu rumah diautomasi untuk memudahkan kerja seharian. Projek ini bertujuan untuk membina satu sistem pengawalan peralatan menggunakan aplikasi laman web. Seterusnya, membina satu sistem yang menggunakan aplikasi internet sebagai perantara untuk mengawal dan mengawasi peralatan di rumah. Sistem CoHAVI dibina menggunakan *'ASP.NET'* dan *'Visual Basic.NET'* yang akan berinteraksi dengan litar penghantar isyarat menggunakan *'serial port'* (RS232). CoHAVI akan dikawal oleh *'server Hamachi'* dan internet menjadi perantara untuk mengawal peralatan seperti lampu, kipas, ketuhar gelombang mikro dan sebagainya. CoHAVI memberikan perkhidmatan yang terbaik dalam pengawalan jarak jauh melalui komputer atau PDA, untuk mengawal, mengawasi dan mengkoordinasi peralatan di rumah dari jarak yang jauh. Kejayaan projek ini adalah satu penemuan baru di dalam aplikasi rumah pintar.

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LIST OF ABBREVIATIONS

AC	-	Alternating current
ADO	-	ActiveX Data Objects
ANSI	-	American National Standards Institute
ASP	-	Active Server Pages
CLR	-	Common Language Runtime
CLS	-	Common Language Specification
CoHAVI	-	Control Home Appliances via Internet
COM	-	Component Object Model
CPU	-	Central Processing Unit
DLL	-	Dynamic Link Library
GUI	-	Graphical User Interface
HTML	-	HyperText Markup Language
IANA	-	Internet Assigned Numbers Authority
IDE	-	Integrated Development Environment
IIS	-	Internet Information Service
IO	-	Input Output
NAT	-	Network Address Translation
OOP	-	Object Oriented Programming
PC	-	Personal Computer
PDA	-	Personal Digital Assistance
RF	-	Radio Frequency
SDK	-	Software Development Kit
SPP	-	Serial Port Profile
SQL	-	Structured Query Language
VB	-	Visual Basic
VPN	-	Virtual Private Network

XML - Extensible Markup Language

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CHAPTER I

INTRODUCTION

1.1   OVERVIEW

Smart home has been the talk of decade, predicted to be the next gigantic leap in the field of remote monitoring. A smart home allows the entire home to be automated and therefore provides ease and convenience to everyday activities in the home. Automated control, edutainment features, communication features and smart appliances, all contribute to the ease and convenience a smart home permits, and remote access to these features through telephone or Internet makes it even more convenient and applicable.

Control Home Appliances via Internet, (CoHAVI) is a system which resembles a smart home environment. CoHAVI works on a basis of smart home which provides various services to remote system such as desktop and palm-top, in order to control, monitor and coordinate home appliances in a long range. This concept mainly uses internet as the interface to control home appliances. Users can access to this system anywhere around the world as long as there is an internet access. In general, CoHAVI system provides users with security, convenience and energy management features, as well as having added benefits for disabled individuals.

1.2   PROBLEM STATEMENT

Current technology of home control system requires human to control home appliances in a very short range. Some systems are vendor dependent and cost too much in maintenance supports. Current home control system with smart home concept is not flexible and not adaptable to new standard of lifestyle. These could not deliver the system to the fullest efficiency and it is not applicable for users to control their appliances all the time. In some cases, their home appliances need to be maintained or controlled even when users are not around their home. This is when Control Home Appliances via Internet, (CoHAVI) system is needed to play its vital role. CoHAVI can be accessed whenever there is an internet access. Table 1.1 shows the current and future trends of smart home concepts.

Table 1.1 Current Smart Home versus Future Smart Home

Current Smart Home	Future Smart Home
• Affordable by high-end homes	• Standard features in every home
• Vendor dependent	• Open standards and DIY concept
• Very expensive maintenance	• Zero maintenance
• Proprietary and stand-alone	• Integrated solution
• Not flexible and adaptable to new lifestyle	• Modular and expandable

1.3   OBJECTIVES

The objectives of Control Home Appliances via Internet, (CoHAVI) are as below:

a) To develop a web-based monitoring and control system for a home model.
b) To build a system that uses internet as an interface of the system to control and monitor home appliances.

1.4 **SCOPE OF WORKS**

The main scope of Control Home Appliances via Internet (CoHAVI) project is to develop a software controller system using ASP.NET 2.0 and Visual Basic.NET which will communicate with transmitter device through serial port (RS 232). CoHAVI will be implemented on Hamachi server and Microsoft SQL Server 2005 is needed in order to create database to store data. Internet acts as a medium for CoHAVI to be accessed and through this project, distance will no longer be a trouble for users to monitor and control their home appliances effectively.

1.5 **REPORT STRUCTURE**

This paper of Control Home Appliances via Internet, (CoHAVI) consists of 5 chapters. First part of this paper discusses the basic features of a typical smart home system, the factors that initiate CoHAVI to be developed and its objectives.

The second part describes literature review and background study of CoHAVI system.

The third part which is Chapter III covers the design and development of a Control Home Appliances via Internet, (CoHAVI) system. Internet and database settings are discussed in detail.

Chapter IV consists of the results and application of CoHAVI. It includes the webpage and database development.

Finally, the last part concludes the overall development process and the system as well.

CHAPTER II

LITERATURE REVIEW

There have been several smart home projects undertaken by individuals over the last few years. The most popular of these has been Microsoft founder, Bill Gates' residence on Mercer Island east of Seattle. The home includes art frames that can display different "paintings" on demand and customize the music played in a room based on the guest's preference. Some of the smart home researched projects are discussed below.

2.1   RESEARCHED PROJECTS

2.1.1   HOME APPLIANCES CONTROL SYSTEM (HACS)

Home Appliances Control System consists of home appliances, a cellular phone, bluetooth communication adapters for the appliances and cellular phone as shown in Figure 2.1. Hardware and software for those adapters, Java applications running on the cellular phone and the interface software between the Java applications and the adapter have been made for the prototype system.

Bluetooth act as a communication medium for the home appliances and cellular phone connections. The home appliances can gain communication functionality easily by attaching the bluetooth communication adapter.
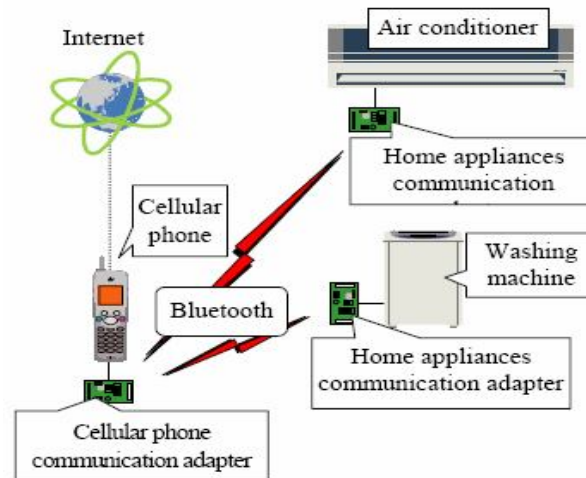
Figure 2.1 Home Appliances Control System Overview [5]

The home appliance communication adapter and the cellular phone communication adapter use common board. Figure 2.2 shows the hardware block diagram of the communication adapter board. The communication adapter hardware consists of a 20MHz 16bit CPU, SRAM and a bluetooth module. The CPU is used for its low cost availability even though it is not powerful. Serial ports connect the communication adapter board to the home appliance and to the cellular phone.
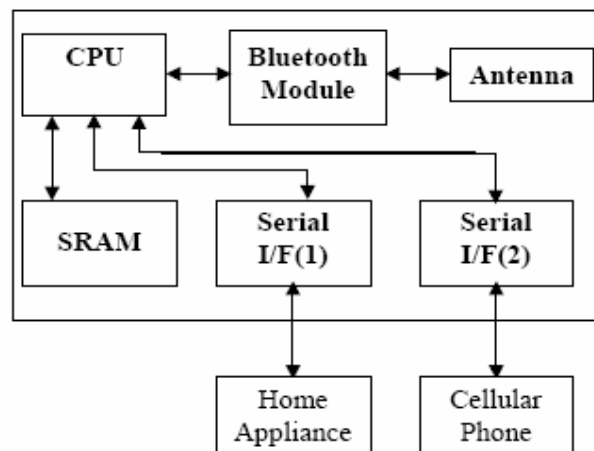

Figure 2.2 Hardware Block Diagram of the Communication Adapter Board [5]