

MOBILE PHONE CONTROLLING HOME APPLIANCES

MUHAMMAD FAIDHI BIN ZAINAL

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RIDZA AZRI BIN RAMLEE

Pensyarah

Fakulti Kejuruteraan Elektronik
Dan Kejuruteraan Komputer
(UTeM)


(TANDAPANGAN PENULIS)

Alamat : NO 24, JLN MJ 8,
TAMAN MERDEKA JAYA,
BATU BERENDAM, 75350
MELAKA.

Tarikh: 25/06/2012

Tarikh: 25/06/2012


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Author : MUHAMMAD FAIDHI BIN ZAINAL

Date : 25/06/2012

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Signature : 

Name : MR. RIDZA AZRI BIN RAMLEE

Date : 25/06/2012

RIDZA AZRI BIN RAMLEE
Pensyarah
Fakulti Kejuruteraan Elektronik
Dan Kejuruteraan Komputer
(UTeM)

Special dedication to my beloved parents, Zainal Bin Abu Bakar and Hamedah Binti Ab.
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ABSTRACT

Soon the smart phone may be the only light switch we will ever need. The open Accessory Development Kit (ADK) will allow developers to wire lights and other common electrical devices to control boards that can interact directly with Android (via Bluetooth). This hardware interactive capability will be used to turn our home into a smart living space. An application that can control home appliances will be invented using Android developer which is Eclipse SDK. This project will discuss the connection between the phone and the board via Bluetooth. Moreover, understanding its basic operation on how the platform can control home appliances is one of the methodologies for this project. This project will take comprehensive ideas on how the project will work and discuss the project implementations in future.

ABSTRAK

Tidak lama lagi, telefon pintar mungkin menjadi satu-satunya suis yang kita perlukan. Pembangunan Aksesori Terbuka Kit (ADK) membenarkan pembangun-pembangun untuk mengawal medium yang boleh berinteraksi secara langsung dengan Android (melalui Bluetooth). Keupayaan perkakasan interaktif ini akan digunakan untuk mehidupkan rumah kita kepada ruang hidup pintar. Suatu penggunaan Android yang boleh mengawal peralatan rumah akan dicipta menggunakan pembangunan Android iaitu Eclipse SDK. Projek ini akan membincangkan pertalian antara telefon pintar dan medium yang mengawal perkakasan rumah melalui Bluetooth. Selain itu, salah satu kaeah dalam projek ini adalah memahami operasi asas bagaimana platform ini boleh mengawal perkakasan rumah. Projek ini akan mengambil idea-idea yang menyeluruh tentang bagaimana projek ini berfungsi dan membincangkan perlaksanaan projek ini pada masa akan datang.

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CHAPTER I

INTRODUCTION

This chapter will discuss briefly about introduction of the project where, it state about purpose of the project, objective, scope of work, problem statement and advantage acquire from the project.

1.1 Introduction of Project

Generally, this project will use android platform to develop the user interface software for controlling electrical appliances. Moreover, this project will also useable in helping the disable people and easier to control the electrical appliances.

1.2 Objectives

- To facilitate disable people and seniors as well in their daily life.
- To lighten their burden in handling with electrical appliances.
- To command our entire house from the phone or tablet.

1.3 Problems Statement

Based on article written by Wendy Taormina-Weiss there are about 650 million people in the world are disabled, according to the World Health Organization. Among them, 80% of disabled people live in developing countries. Perhaps they are having difficulty to handle electrical appliances at home indeed this project will turns their difficulty into a convenience life.

1.4 Scope Of Work

- Study feasibility about Android platform.
- Determine the connection between Android platform and controller via Bluetooth.
- Include two parts: software and hardware.
- In software part, Android platform will be covered.
- In hardware part, a PIC controller will be designed.
- Interfacing both software and hardware part.

1.5 Project Methodology

This project is dividing into two sections. The first section is software. Software that will be used in this project is Eclipse SDK. It is used to program and create an application to connect the phone with the board via Bluetooth. PIC 16F877A is chosen to construct the board. Below is my methodology for this project:

- i. Install Android platform on computer and get familiarize with it.
- ii. Determine the Bluetooth connection between the platform and the PIC controller.

- iii. Understanding its basic operation on how the platform can control electrical appliances.

1.6 Thesis Outline

This thesis consists of five chapters. The following chapters are the outline of the implementation of dynamic feedback swing control of the gantry crane.

Chapter I will discuss briefly the overview of this project such as introduction, objectives, problem statements, scope, methodology and thesis outlines.

Chapter II contains the research and information about the project on several important concepts of smart home, Android applications and tools used in the study. Every facts and information, which found through journals or other references, will be compared and the better methods have been chose for the project.

Chapter III includes the detail about designing and modeling the Android interface and Bluetooth kit. This chapter all those methodology should be followed to get a better performance.

Chapter IV describes more about the discussion, and project findings. The result is then presented in figures or plotted graph. Simulation results, analysis, observation and discussion of the result are presented in.

Chapter V includes the detail about the hardware design involved schematic diagram, PCB layout, components required and working principle for each circuit.

Chapter VI discuss about the conclusion of the project and the future recommendations for the next generation.

CHAPTER II

LITERATURE REVIEW

In this chapter, it will discuss about the literature review which contains information gathered to gain knowledge and ideas in completing the project. There are several sources that have been taken as a resource such as books, thesis, journal and website. It is included the operation of the circuit, the hardware and software which is useful in the project.

2.1 Overview of Project

Many projects have been proposed to facilitate human life. Although the literature covers a wide variety of such theories, this literature review explores the five dominant themes of the research: Android as server platform, elderly and disabled people are given priority, Bluetooth connection, low cost system, and smart home automation. While Android is the academic subject area of this particular research project, the scope of this literature review is expanded to include research that examines the connection between Android and the microcontroller, propose of the project and the server platform.

2.2 Disabled People and Elderly are Given Priority

A smart home is one that provides its home owners comfort, security, energy efficiency (low operating costs) and convenience at all times, regardless of whether anyone is home. “Smart Home” is the term commonly used to define a residence that has appliances, lighting, heating, air conditioning, TVs, computers, entertainment audio & video systems, security, and camera systems that are capable of communicating with one another and can be controlled remotely by a time schedule, from any room in the home, as well as remotely from any location in the world by phone or internet. A smart home appears “intelligent” because its computer systems can monitor so many aspects of daily living.

There are about 650 million people in the world are disabled, according to the World Health Organization. Among them, 80% of disabled people live in developing countries. So with this smart home concept, indeed it might facilitates these people daily living. The need for the development of such technologies increases due to the aging of the population, the cost of formal health care, and the importance that individuals place on remaining independent in their own home. Smart home contribute to caring disabled people living alone at home, the elderly, and people with chronic illness. This approach to health assessment can improve the quality and variety of information transmitted to the clinician. With help of this technology, users can access, operate, and control electrical appliances for comfort, communication, leisure, and personal security [1].

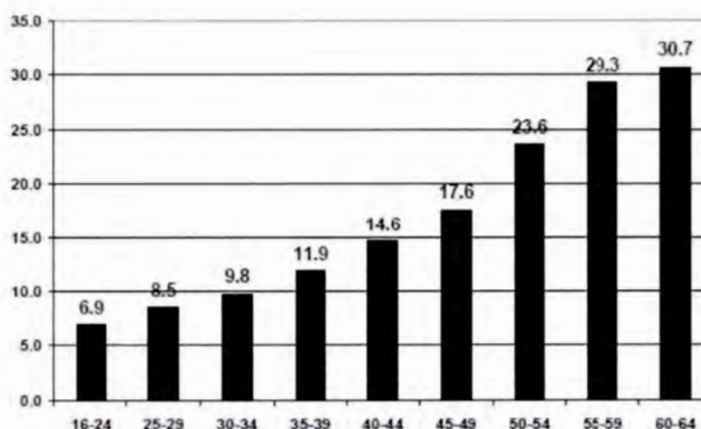


Figure 2.1: Percentage of disabled in different age groups

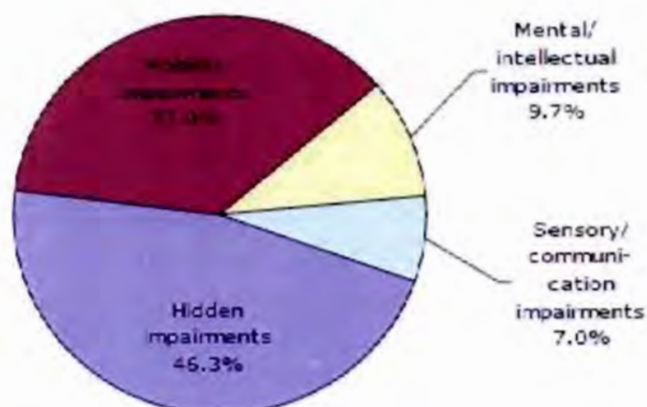


Figure2.2: Distribution of major types of disabilities

Disabled people are more likely to be exposed to daily life problems than other healthy people. While deaf people cannot hear the door bell, Alzheimer diseased people can forget the gas open in the kitchen. These are some encountered examples when they are alone at home. With the help of technology, assistant projects can be developed to overcome their difficulties. Smart homes can also be used to support disabled people, providing safe, secure and empowering environments. The system can allow the user to control many features or automate them.

The environment can also be monitored by the smart home system to ensure safety and alert people when there is some dangerous situation. This project aims to develop a smart home system for disabled people and elderly to make their life easier by using Android platform.

In each case the smart house consisting of various appliances and devices which are commonly used by the resident on daily basis. These appliances and devices have been fitted with sensors, actuators, cameras and/or biomedical monitors to detect the activities of daily life of the resident/s [1]. It is observed that many mobile users especially older generation (age>40 years) find it inconvenient to use mobile keypad for text entry as it involves continuous pressing of many keys alphabets and is time consuming [2]. [3] is focus on controlling using mobile through spoken commands. One mobile in the system is dedicated for receiving and executing commands from authentic users and informing status about change in input to the user through SMS. The derived text message is then sent as SMS to the mobile phone connected to control system through PC. On receiving SMS, the system responds by activating appropriate port bits.

2.3 Bluetooth Connection

The Bluetooth radio interface operates in the unlicensed ISM (industrial, Scientific and Medical) band starting at 2.402 GHz and ending at 2.483 GHz [4] and [5], using a spread spectrum, frequency hopping, full-duplex signal at a nominal rate of 1600 hops/sec. Bluetooth network consists of sensors and devices. The controller i.e, server Bluetooth commands a device module such as curtain, lighting, heater and air conditioner. Each Bluetooth is connected with an integrated device and sensor module. This method is useful to increase a

Bluetooth communication compare with each sensors and devices attached each Bluetooth module. It needs a less Bluetooth module to control many devices [4].

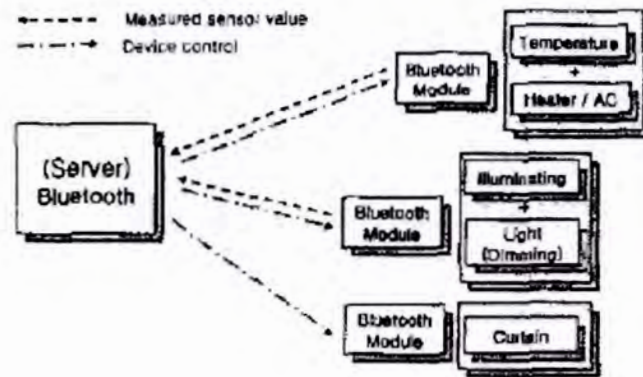


Figure2.3: Hardware configuration for the Bluetooth home network

This project is similar like [5]. The objective of [5] is to manage the computer applications executing in the Personal Computer or Laptop using a Mobile Phone. But for my project I will use Android platform as user interface to manage the home appliances. This Android should be Bluetooth enabled and the microcontroller should have the Bluetooth Dongle or any other Bluetooth hardware installed. The client side application is deployed over the Android phone or tablet and server side application is deployed over microcontroller.

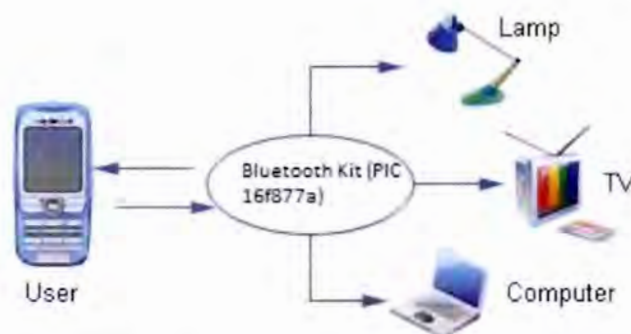


Figure2.4: Block diagram of home automation system

Reference [3] mainly focuses on the controlling of home appliances remotely when the user is away from the place. The system that is used is SMS based and uses wireless technology. As comparison to my project, Bluetooth is my based and uses wired to connect microcontroller with home appliances. Appliances control subsystem enables the user to control home appliances remotely. Microcontroller being the main module has home appliances control system installed on it. Appliances control is responsible for ubiquitous access of appliances.

Reference [4] presented the design and implementation of a low cost but yet flexible and secure cell phone based home automation system. The design is based on a standalone Arduino BT (Bluetooth) board and the home appliances are connected to the input / output ports of this board via relays. The communication between the cell phone and the Arduino BT board is wireless. After studied [7] I found that the project is not so differ with my project. The cell phone hosts the Python script which enables the user to access the home appliances and also the control commands for the appliances. But for my project, I will be using Java script and Eclipse software that control commands for the appliances.

2.4 Low Cost Home Automation

The related journal was produced by [6] which investigate a cost effective solution that will provide controlling of home appliances remotely. They built a system that is wireless therefore more acceptable and cost-effective. The user can get alerts anywhere through the GSM technology thus making the system location independent. The system contains low cost components easily available which cuts down the overall system cost. They proved that GSM technology

provides home automation and is cost-effective as compared to the previously existing system.

Same as [6], [7] presented the design and implementation of a low cost but yet flexible and secure cell phone based home automation system. The journal only operates on Symbian phones and fails to provide customization for the user in adding appliances and devices. Besides lacking in provide customization for the user, the journal provided a useful concept in connecting the appliances to a control board which is similar to my project. The ATmega microcontroller uses relay in controlling power supply to the appliances.

2.5 Smart Home Automation

Smart Home is the term commonly used to define a residence that uses a Home Controller to integrate the residence's various home automation systems. The most popular Home Controllers are those that are connected to a Windows based PC during programming only, and are then left to perform the home control duties on a standalone basis. For this project, Android phone or tablet will acts as our Home Controller. Integrating the home systems allows them to communicate with one another through the home controller, thereby enabling single button and voice control of the various home systems simultaneously, in preprogrammed scenarios or operating modes.