CHAPTER 1
INTRODUCTION

1.1. Motivation

Rapid advances in technology and its application in various fields made man kept trying to find a technology that can facilitate their work. With so many existing electronic equipments, humans need a tool that can control all the devices remotely.

In the development of computer science, known speech recognition technology, in which the computer is able to translate the words spoken user. This technology is then developed into application of voice command. With the technology, the sound can be used as a tool to control a device remotely, replacing the previous remote control tool.

Previous researches - about speech to text design [7], dialect detection for telephony [8], and Balinese words translator system [9] - are analyzing speech recognition in a system. However, those researches still in a simulation form. In this research, writer tried not only simulating but also implementing speech recognition system into a hardware aside of general PC.

Introduced to BeagleBoard-xM[5], called as a single-board computer, It's tempting to be observed more. Besides of its open source system for engineering development, demonstration, or evaluation purposes, its desktop-like system also encouraged to taste more into it.

Therefore, by using the method of Mel Frequency Cepstral Coefficient (MFCC) and K-Nearest Neighbor (K-NN) developed software-based speech recognition. Result of the simulation was tried to be implemented in BeagleBoard by understanding the programming system inside of it.

1.2. Objectives

The objective of this Final Project is to design speech recognition system and implement it on BeagleBoard which includes:

1. Designing and simulating a speech recognition system by using MFCC for features extraction system and the K-Nearest Neighbor as the classification system.
2. Applying the results of simulation and implanting them into the BeagleBoard.
3. Analyzing the feature extraction method and K-Nearest Neighbor in Simulink.

4. Analyzing simulation and implementation results of speech recognition embedded into BeagleBoard.

1.3. Problem Formulation

The problem formulations for this Final Project are:

1. How the designed system extracted the features of a voice command using the right algorithms.
2. How the system algorithm can classify the user's voice with the desired command using the K-Nearest Neighbor algorithm.
3. How to implement speech recognition system design on the BeagleBoard.

1.4. Scope of Work

1. Simulation using Simulink/MATLAB R2013b
2. Audio input is a waveform format (*.WAV) with a sampling frequency of 22050Hz
3. Only used for the lights, television, air conditioner, tape, and fan.
4. Command is used to enable and disable each tool.
5. The device used was a BeagleBoard-XM from Texas Instrument.

1.5. Methodology

Methodology the research conducted in this final project are:

1. Literature study

   Search a literature related to the topic of the final project in the form of journals, books, and other resources to explore and understand the extraction methods, Mel Frequency Cepstral Coefficient (MFCC), the Classification method, K-Nearest Neighbor, as well as programming using Simulink/MATLAB R2013b and implementing it in BeagleBoard.
2. Guidance

   At this stage, with the guidance of the advisor to correct deficiencies and get new ideas for the implementation of this final project.
3. Design and simulation system

   At this point the authors make the program consistent with the theory that has been studied previously in Simulink/MATLAB R2013b then simulate it.

4. Simulation analysis

   Analyze performance of the algorithm used to obtain accuracy and some research scenarios conducted to get the best results.

5. Implementation

   At this stage of the simulation that have been obtained in Simulink is implemented by using the BeagleBoard-xM.

1.6. Outline of the Report

Chapter 1 Introduction

Introduction chapter will include the background, problem formulation, objectives, scope of work, and methodology of this Final Project.

Chapter 2 Literature of Review

This chapter describes the basic concept of the topics for this Final Project taken from books, academic journals, and other reliable resources.

Chapter 3 Design and Implementation of System

This chapter describes the architecture of the system in detail, including the modeling, the block diagrams, and the flowcharts of the designed system.

Chapter 4 Analysis and System Output

This chapter describes the implementation process the designed system, the result of the implementation, and the analysis of the system implementation.

Chapter 5 Conclusion and Recommendation

This is the final chapter of this Final Project. The chapter describes the final conclusion of the Final Project and the recommendation for future project.