**VISVESVARAYA TECHNOLOGICAL UNIVERSITY**

**BELGAUM – 590014**

****

**A Project report on**

**DESIGN OF REAL TIME SPEECH RECOGNITION SYSTEM**

**Submitted in partial fulfilment of the requirement for the award of degree of**

**BACHELOR OF ENGINEERING**

**IN**

**ELECTRONICS AND COMMUNICATION**

**By**

**DHANANJAY KUAMR K L KARAN G BARHANPUR KIRAN UDAY PAI**

**(1PI13EC030) (1PI13EC039) (1PI13EC041)**

**Under the Guidance of**

**Dr. MANIKANDAN J**

**Professor, Dept of ECE,**

**PES Institute of Technology**

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

****

**P.E.S. INSTITUTE OF TECHNOLOGY**

**(An Autonomous Institute under VTU, Belgaum)**

**BENGALURU - 560085**

**DECLARATION**

We hereby declare that the project report entitled “**DESIGN OF REAL TIME SPEECH RECOGNITION SYSTEM”** is the bonafide record of the project carried out at **P.E.S. Institute of Technology** in partial fulfilment of the requirements for the award of degree **Bachelor of Engineering** in **Electronics and Communication Engineering** of **Visvesvaraya Technological University, Belgaum** during the academic year 2017. We further declare that the project report is not submitted to any other universities in fulfilment of the requirements for the award of any degree.

By

**DHANANJAY KUAMR K L KARAN G BARHANPUR KIRAN UDAY PAI**

**(1PI13EC030) (1PI13EC039) (1PI13EC041)**

**VISVESVARAYA TECHNOLOGICAL UNIVERSITY**

**BELGAUM – 590014**

****

PES INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under VTU, Belgaum)

BENGALURU – 560085



**CERTIFICATE**

Certified to the project entitled **DESIGN OF REAL TIME SPEECH RECOGNITION SYSTEM** is a bonafide work carried out by **DHANANJAY KUMAR K L, KARAN G BARHANPUR** and **KIRAN UDAY PAI** bearing University Seat Number **1PI13EC030, 1PI13EC039 and 1PI13EC041** respectively in partial fulfilment for the award of **Bachelor of Engineering** in **Electronics and communication** of the **Visvesvaraya Technological University**, Belgaum during the academic year 2017. It is certified that all correction/suggestions indicated for internal assessment have been incorporated in the report deposited in the department library. The project report has been approved as it satisfies the academic requirements with respect to the project work prescribed for the said degree.

**Head of Department**: **Guide:**

**Dr. Chandar T S Dr. MANIKANDAN J**

Dept. of ECE. Dept. of ECE

PES Institute of Technology, PES Institute of Technology,

Bangalore – 560085 Bangalore – 560085

**Principal**

Dr. K S Sridhar

PESIT, Bangalore – 560085

**External Viva:**

**Name of the Examiner Signature with Date**

1.

2.

**ACKNOWLEDGEMENT**

The satisfaction and euphoria that accompany the successful completion of any task would be incomplete, without the mention of people who made it possible, whose constant guidance and encouragement crown all the efforts with success.

Our most sincere and grateful acknowledgement to the P.E.S Institute of Technology for providing us with the opportunity to pursue our degree and thus helping us in shaping our career.

We would like to sincerely thank our project guide, **Dr**. **Manikandan J** Professor of the Department of Electronics and Communication Engineering for his continuous valuable guidance, advice and persistent encouragement throughout the project work.

We would like to sincerely thank **Dr.T.S.Chandar.** Head of the Department Electronics and Communication for his encouragement and support throughout the project work.

We are thankful to **Dr. Sridhar K.S**. Principal of PES institute of Technology, Bangalore for his encouragement and support in our endeavour.

We would like to thank all the teaching and non-teaching staff and management of PES institute of Technology, Bangalore for their cooperation.

Last but not the least we wish to thank our family and friends for all their love support and encouragement.

ABSTRACT

Speech is an ancient field of study and research is being done on it till date Speech recognition system deals with analysis and recognition of the input speech signal by the machine or computer in various environments. To enhance the accuracy and capability of the system various feature extraction techniques are implemented. This Project provides a overview of Speech recognition system and its various phases like analysis, feature extraction, feature classification, modeling and testing or matching. In addition it also includes detailed study on Mel-Frequency Cepstral Coefficient (MFCC) feature extraction techniques used in Speech Recognition systems. Support vector Machine (SVM) techniques used for feature classification The main objective of this Project is to develop a Real time speech recognition system.

CONTENTS

1. Introduction

1.1 Introduction 01 1.2 Speech recognition system 02 1.3 Problem statement 03

1.4 Project Objectives 03

1.5 Literature survey 04

2. End Point detection

2.1 Introduction 06

2.2 End point detection Algorithm 06

2.3 End point detection waveforms 09

3. Feature Extraction

3.1 Introduction 12

3.2 Feature Extraction Using MFCC 12

3.3 Filter bank Number as Feature 18

4. Feature classification

4.1 Feature classification using SVM 20

4.2 Feature classification using Euclidean classifier 21

5. Phoneme Extraction

5.1 Introduction 22

5.2 Phoneme Extraction procedures 22

5.3 Digit recognition using phonetic approach 27

6. Training and Testing

6.1 Training 28

6.2 Testing 29

7. Hardware components and Interfacing

7.1 Hardware components 30

7.2 Hardware Interfacing with Matlab 36

7.3 Graphical User Interface (GUI) implementation 40

8. Advantages, Disadvantages, Applications

8.1 Advantages 41

8.2 Disadvantages 42

8.3 Speech recognition softwares 42

8.4 Applications 43

8.5 Observations & Results 44

9. Conclusion and Future work 46

Appendix A 48

Appendix B49