ABSTRACT

The thesis deals with the Human Computer Interaction through Speech and EEG signals. Advances in computer hardware and signal processing made possible use of Speech, Facial and brain signals for communication between humans and computers. These signals contain different types of information. The electroencephalogram contains information of the brain signals. The work describes analysis of Speech and EEG signals to determine different modes using different techniques. The information regarding different modes be extracted using appropriate digital signal processing. Different methods based on statistical techniques have been applied for analysis of modes. The thesis contains six chapters as follows.

Chapter 1 provides background of the work. It discusses the basic concept involved in human computer interaction, components of HCI, and bio-signal based approaches for speech and EEG technology.

Chapter 2 describes the basic concept of production and perceptions of speech mechanism, types of speech recognitions. The chapter 2 also describes the work done in various institutes or universities related to brain signals.

Chapter 3 is specifically devoted to database design and word recognition system. The chapter describes the result obtained by using computerized speech Laboratory (CLS) on isolated spoken words. The chapter contains description related to design of Marathi Speech database for isolated words. 50 subjects including males and female have been selected for our study. The MFCC features have been computed for the above database. By comparing features of the database, the Euclidean Distances have been calculated. 100% recognition rate can be achieved for the isolated spoken words.

The chapters 4 and 5 describe the results related to EEG experiment. The first experiment was designed to get information about EEG signals related to Calculation, Counting and Reminding modes along with relaxation modes. The second experiment was designed to understand EEG signals induced by various types of songs. The results of first and second experiment are described in the chapter 4 and 5, respectively.

Chapter six provides conclusion and future scope of the work.