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| To be filled by Student | | | |
| **Course** | Digital Signal Processing (CPE324) | | |
| **Course Instructor** | Mr. M Abdul Rehman | **Lab Instructor** | Mr. M Abdul Rehman |
| **Student Name(s)** | Rahim Ullah (FA19-BCE-009)  Hamza Umar (FA19-BCE-026)  Muhammad Kaleem Ullah (FA19-BCE-007) | | |
| **Project Title** | Speech Processing Using MATLAB | | |
| **Project Proposal Summary** | Speech Processing using MATLAB gives the reader a comprehensive overview of contemporary speech and audio processing techniques with an emphasis on practical implementations and illustrations using MATLAB code.  Speech process refers to the analysis of speech signals and their processing to obtain useful information. Speech processing can also be referred as digital signal processing, as the speech signals are digitized for processing.  Core concepts are first covered in an introduction to the physics of audio and vibration together with their representations using complex numbers,  Z transforms, and frequency analysis transforms such as the FFT. | | |

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| Recommendations by Instructor | | |
| Range of Complex  Problem Solving | Depth of Knowledge Required | * Basic concepts of signals and systems * MATLAB programming * Knowledge required for acquiring audio signals through MATLAB * Knowledge of interfacing audio devices with MATLAB * concepts of fourier transform * Knowledge of designing filters using Filter Design Analysis (FDA) Tool |
| Range of Conflicting Requirements | * Audio signal sampling and quantization level…. * Signals will be required in time and frequency domain * Noise addition could be random using MATLAB built in function, otherwise defined by user. Type of noise random, AWGN… * Filter specification required to remove noise such as cut off frequency, order, type etc. * Teamwork required and demonstration of project results through proper presentation is compulsory |
| Depth of Analysis Required | * Input and filtered results must be presented in time and frequency domain * Filtered signals must be presented with original signal in order to see the effect of filtering. * Frequency response of filter must be presented. * Comparison of the signals with the noise and filtered signals to observe the functionality of the project. * If different systems/components are present in project, then input/output result of each system is mandatory in both time and frequency domain. |
| Interdependencies | * MATLAB function for signal acquisition * MATLAB function for of noise addition * MATLAB function for analysis in time/frequency domain * FDA toolkit in MATLAB is necessary.   Note: If project proposed by students require different toolkits/modules or subsystems then results of all modules will be combined to provide the final desired result/output.  These are separate functions and call all these functions in one script file. |
| Range of Complex Problem Activities | Range of Resources | * Participants for data collection in case of speech processing * Testing of implemented system using voice of multiple persons (Male/Female) * MATLAB Software * Literature review from different online resources |
| Consequences of Society | * Voice recognition system can be used for various applications, e.g. security purpose, navigation etc. |
|  | Familiarity | * The project deals with a new, unfamiliar area for electrical engineers. Necessary to document and communicate how principle-based approaches address the project requirements |