ICIR 17 – Project Work (UG- ICE) – 2017-2021– Batch

Group No	13
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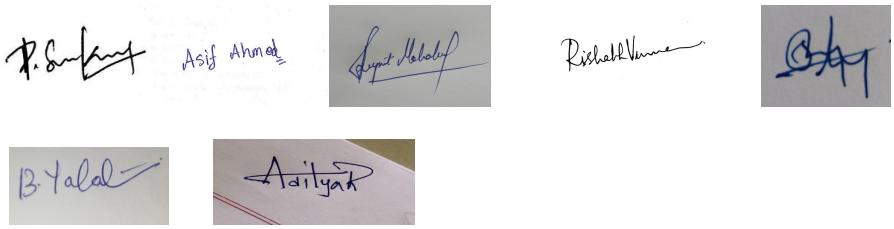
Guide Name	Dr. Periyasamy R
Project Title	Smart Digital Stethoscope for pulmonary diseases diagnosis
Nature of the project	Artificial Intelligence and signal processing based
Requirements for Implementation	1.Anaconda Navigator environment for implementing Deep Learning algorithms 2.Ecosystems of Python - SciPY, PyPI repo, Frameworks and Lib -Sklearn,Keras and TensorFlow, PyCharm

	3.MATLAB for signal processing 4. CPU, GPU - Intel Core i5-7200U(7th Gen),NVIDIA GeForce 940MX 5. Databases- Kaggle, rale repository, thinklabs sound library, ICBHI challenge repository
Project Description	Auscultation has been a prominent method for identifying pulmonary diseases for ages using a simple stethoscope by practitioners but is not an efficient way. This project aims at building an automated system to classify pulmonary sounds to 7 types and thereby assist in identifying the underlying disease based on the characteristic type of Lung Sound. While modern AI techniques are helpful in building efficient models, a lot of research is still going on to denoise the lung signals especially from cardiac signal noise. So we aim to explore possible techniques to remove heart signal and regenerate the missing samples using prediction algorithms. We also explore Deep Learning models and algorithms to generate the most accurate classifiers. <u>Stages of implementation:</u> 1) Localising and separating heart sounds from lung sounds. 2) Reconstructing the overall lung signal. 3) Importing the audio files as spectrographs for neural networks to understand. 4) Using Convolution Neural Network to classify different types of Lungs sound into varied categories

Reference Documents	1. Lung sounds classification using convolutional neural networks *by* Dalal Bardoua, Kun Zhanga and Sayed Mohammad Ahmad -*Elsevier.Artificial Intelligence in medicine 88*(2018) *58-69* 2. Enhancement of lung sounds based on empirical mode decomposition and Fourier transform algorithm-Ashok Mondal, Poulami Banerjee and Ajay Somkuwar *Published in Elsevier.COMPUTER METHODS AND PROGRAM IN BIOMEDICINE 139* (2 0 1 7) *119–136* 3. Hybrid Nelder-Mead search based optimal Least Mean Square algorithms for heart and lung sound separation Ruban Nersisson, Mathew M. Noel- Engineering Science and Technology, an International Journal 20 (2017) 4. Performance of Adaptive Noise Cancellation with NormalizedLast-Mean-Square Based on the Signal-to-Noise Ratio of Lung and Heart Sound Separation Noman Q. Al-Naggar and Mohammed H. Al-Udyni Hindawi Journal of Healthcare Engineering Volume 2018, Article ID 9732762, 1 5. Identification of asthma severity levels through wheeze sound characterization and classification using integrated power features Fizza Ghulam Nabi, Kenneth Sundaraj,Chee Kiang Lam-Biomedical Signal Processing and Control 52(2019) 302–311

Work Plan	● January Identification of the problem statement. Distribution of work and getting acquainted with required knowledge. Preparation for 0th review. ● February - March (Mid) Working on pre-processing- decomposing the corrupted signal, localizing heart sounds and their peaks and removal from IMFs Studying working of Convolution Neural Networks. Converting audio files of pulmonary sounds to spectrographs. Importing training and testing data into code for implementing the network. ● March (Mid)- April Prediction of missing values in Lung sounds and comparing performance of different algorithms for the same. Testing and validation of classifiers. Experimenting with various numbers of hidden layers, input nodes and CNN layers to improve accuracy. Introduction of artificial Cardiac noises and testing the functioning of the filter. Making improvements as and when required for robust performance. Report presentations and final project review.

Student's Signature	
Guide Signature	