Project Design Phase-II
Solution Requirements (Functional & Non-functional)

Date	03 October 2022
Team ID	PNT2022TMID19938
Project Name	Classification of Arrhythmia by Using Deep Learning with 2-D ECG Spectral Image Representation.
Maximum Marks	

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through gmail Registration through mobile number.
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP.

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Our main target are heart specialists(cardiologist), medical labs. Our software is used by our customers in an easy manner.
NFR-2	**Security**	The ECG images are encrypted. Our Application is secured using various layers of firewall. Only the Authorized person can able to access the images.
NFR-3	**Reliability**	We achieved a state-of-the-art average classification accuracy of 99.11%, which is better than those of recently reported results in classifying similar types of arrhythmias.
NFR-4	**Performance**	The performance is significant in other indices as well, including sensitivity and specificity, which indicates the success of the proposed method.
NFR-5	**Availability**	Our Software is available 24*7 for registered authentic users. The images are only available to the authorized Medical Specialists.
NFR-6	**Scalability**	We proposed a 2-D CNN-based classification model for automatic classification of cardiac arrhythmias using ECG signals. An accurate taxonomy of ECG signals is extremely helpful in the prevention and diagnosis of CVDs. Deep CNN has proven useful in enhancing the accuracy of diagnosis algorithms in the fusion of medicine and modern machine learning technologies. Using 2-D images, can classify eight kinds of arrhythmia,

		namely, NOR, VFW, PVC, VEB, RBB, LBB, PAB, and APC, and it achieved 97.91% average sensitivity, 99.61% specificity, 99.11% average accuracy, and 98.59% positive predictive value (precision). These results indicate that the prediction and classification of arrhythmia with 2-D ECG representation as spectrograms and the CNN model is a reliable operative technique in the diagnosis of CVDs. The proposed scheme can help experts diagnose CVDs by referring to the automated classification of ECG signals. The present research uses only a single-lead ECG signal. The effect of multiple lead ECG data to further improve experimental cases will be studied in future work.