

**Project Design Phase-I**  
**Proposed Solution Template**

Date	19 September 2022
Team ID	PNT2022TMIDxxxxxx
Project Name	Project - Classification of Arrhythmia by Using Deep Learning with 2-D ECG Spectral Image Representation
Maximum Marks	2 Marks

**Proposed Solution Template:**

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Cardiovascular diseases (CVDs) are the number one cause of death today. Over 17.7 million people died from CVDs in the year 2017 all over the world which is about 31% of all deaths, and over 75% of these deaths occur in low and middle-income countries. Arrhythmia is a representative type of CVD that refers to any irregular change from the normal heart rhythms. There are several types of arrhythmias including atrial fibrillation, premature contraction, ventricular fibrillation, and tachycardia.
2.	Idea / Solution description	An "ambulatory electrocardiogram" or an ECG) about the size of a postcard or digital camera that the patient will be using for 1 to 2 days, or up to 2 weeks. The test measures the movement of electrical signals or waves through the heart. These signals tell the heart to contract (squeeze) and pump blood. The patient will have electrodes taped to your skin. It's painless, although some people have mild skin irritation from the tape used to attach the electrodes to the chest. They can do everything but shower or bathe while wearing the electrodes. After the test period, patient will go back to see your doctor. They will be downloading the information.
3.	Novelty / Uniqueness	In the field of arrhythmia detection, it is possible by making use of IBM Watson cloud and Jupyter notebook.

4.	Social Impact / Customer Satisfaction	<p>The proposed model predicts Arrhythmia in images with a high accuracy rate of nearly 96% The early detection of Arrhythmia gives better understanding of disease causes, initiates therapeutic interventions and enables developing appropriate treatments. Disadvantages: Not useful for identifying the different stages of Arrhythmia disease. Not useful in monitoring motor symptoms</p>
5.	Business Model (Revenue Model)	<p>It is useful for identifying the arrhythmia disease at an early stage. It is useful in detecting cardiovascular disorders. Conclusion: Cardiovascular disease is a major health problem in today's world. The early diagnosis of cardiac arrhythmia highly relies on the ECG. Unfortunately, the expert level of medical resources is rare, visually identify the ECG signal is challenging and time-consuming. The advantages of the proposed CNN network have been put to evidence. It is endowed with an ability to effectively process the non-filtered dataset with its potential anti-noise features. Besides that, ten-fold cross-validation is implemented in this work to further demonstrate the robustness of the network.</p>
6.	Scalability of the Solution	<p>For future work, it would be interesting to explore the use of optimization techniques to find a feasible design and solution. The limitation of our study is that we have yet to apply any optimization techniques to optimize the model parameters and we believe that with the implementation of the optimization, it will be able to further elevate the performance of the proposed solution to the next level.</p>