**Project Design Phase-I**

**Proposed Solution Template**

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| Date | 23 October 2022 |
| Team ID | PNT2022TMID34032 |
| 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 in the following information in the proposed solution template.

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| **S.No.** | **Parameter** | **Description** |
|  | Problem Statement (Problem to be solved) | An arrhythmia is a problem with the rate or rhythm of your heartbeat. It means that your heart beats too quickly, too slowly, or with an irregular pattern. When the heart beats faster than normal, it is called tachycardia. When the heart beats too slowly, it is called bradycardia. The most common type of arrhythmia is [atrial fibrillation](https://medlineplus.gov/atrialfibrillation.html), which causes an irregular and fast heartbeat. |
|  | Idea / Solution description | Heart arrhythmia treatment is usually only needed if the irregular heartbeat is causing significant symptoms, or if the condition is putting you at risk of more serious heart problems. Treatment for heart arrhythmias may include medications, and therapies such as vagal maneuvers, cardioversion, catheter procedures, or heart surgery. |
|  | Novelty / Uniqueness | Many factors can affect your heart's rhythm, such as having had a [heart attack](https://medlineplus.gov/heartattack.html), smoking, [congenital heart defects](https://medlineplus.gov/congenitalheartdefects.html), and stress. Some substances or medicines may also cause arrhythmias.  Symptoms of arrhythmias include:   * Fast or slow heartbeat * Skipping beats * Lightheadedness or dizziness * Chest pain * Shortness of breath * Sweating |
|  | Social Impact / Customer Satisfaction | All 25 patients (100 %) felt their arrhythmia affected their life every day. This encompassed social and domestic activities as well as voluntary and paid work. For many the random nature of their symptoms prevented them from carrying out routine activities such as swimming and dog-walking “just in case” they experienced an episode of palpitations. This had a wide-ranging impact for some: “*You stop going shopping, visiting friends or even having a conversation with your family*….”. Others had stopped going out alone as they were too worried about what might happen if they felt unwell. These limitations on patient activities resulted in a feeling of frustration and helplessness, with some stating that they felt alone as a result of their arrhythmia. |
|  | Business Model (Revenue Model) | The heart is one of the body's vital organs which controls many tangible or non-tangible body functions and organizes emotional and human life attitudes.Business runs in the same manner, with ups and downs and a re-adaption attitude. Sometimes change management starts like heart beats in a regular amplitude with a continuous rhythm, when we try to apply a change through changing management methodology or managers or even policies, we need to find out the calculation of flexible re-habitation and adaption process to reach the minimum change as the heart (organizational personnel) will have a reflex to adapt, motivation or depression, pushing to business or slowing or even stop to small process to resist changes. |
|  | Scalability of the Solution | Using patient recordings from the MIT-BIH AF database, we demonstrate the importance of patient specificity and present a scalable method of constructing a personalized detector based on active learning. Using a generic detector having a sensitivity of 76% and a specificity of 57% as its seed, our active learning approach constructs a detector with a sensitivity of 90% and specificity of 85%. This performance approaches that of a patient-specific detector, which has a sensitivity of 94% and a specificity of 85%. By selectively choosing examples for training, the active learning approach reduces the amount of expert labeling needed by almost eightfold (compared to the patient-specific detector) while achieving accuracy within 99%. |