# Project Design Phase-I

| Date | 30 September 2022 |
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| Project Members | Anirudh BS, Bhuvaneswar AS, Bhavesh N, Chirag PK |
| Project Name | Project - Classification of Arrhythmia by Using Deep Learning with 2-D ECG Spectral Image Representation |
| Project Mentors | Industry Mentors - Shivam Shivare, Shanawaz Anwar<br>Faculty Mentor – Dr. Vasuki |

**Proposed Solution Template:**

| S.No. | Parameter | Description |
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| 1. | Problem Statement (Problem to be solved) | According to the World Health Organization, 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.<br><br>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. Although a single arrhythmia heartbeat may not have a serious impact on life, continuous arrhythmia beats can result in fatal circumstances.<br><br>The user hence needs a way to accumulate accurate knowledge about Arrhythmia and other medical terminologies enabling them to take educated, planned steps for the next phase of treatment. |
| 2. | Idea / Solution description | In this project, we plan to build an effective electrocardiogram (ECG) arrhythmia classification method using a convolutional neural network (CNN), in which we classify ECG into seven categories, one being normal and the other six being different types of arrhythmias using deep two-dimensional CNN with ECG images.<br><br>We plan on creating a web application where the user selects the image which is to be classified. The image is fed into the model that is trained and the cited class is then to be displayed on the webpage. |
| 3. | Novelty / Uniqueness | Identifying CVD's till now is in the phase of only research papers and no further working models to classify the types with high accuracy. |

| | | Many models were developed but extracting the input and predicting the accurate output is till now not that accurate. Our model focuses particularly on this aspect where we not only predict the type of CVDs but also try to do so with higher accuracy to avoid any false positives to a greater extent that may lead to dangerous results in treatment.<br><br>This is done by passing the input to the trained model which will compare the ECG image of the heartbeat with the training sample and calculate the probability that it belongs to that particular type and show the type that has a higher similarity while comparing.<br><br>In our website we display the different types of CVDs and also the predicted output mentioning the type to which it belongs. This model is tested with a large number of samples and it predicts the type accurately compared to all the previous models that have even been built till now and also gives the preferred hospital and medication details so the user can use them to contact the medical professional. |
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| 4. | Social Impact / Customer Satisfaction | Our application provides unmatched reliability and accurate diagnosis thereby reducing the dependence of patience on doctors. This approach also helps save expenses such as transport, consultation fees, and other accompanying medical test charges.<br><br>On this platform precise information will be disseminated in regards to the scientific jargon associated with Arrhythmia helping bust all myths related to it. It would also serve as a repository of resources that users can utilize to ease into the next phase of treatment. |
| 5. | Business Model (Revenue Model) | This project would be a not-for-profit initiative with the sole purpose of it being a helping aid for people in need. To recover server and hosting charges we intend on monetizing the website using Google AdSense to yield a monthly revenue. |
| 6. | Scalability of the Solution | Initially this model is focused on a small number of users in the development phase once the user traffic increases larger number of samples from users can also act as the input to the training model and as the number of users increases the platform can be moved to cloud for higher storage and performance and along with google ads we can add user subscription for a year/month and also doctors can pay money for suggesting their healthcare at the top of the list under contact details where the profiles of the healthcare providers will be thoroughly authenticated. |