The Development of a Holistic Cardiovascular Disease Screening System Utilizing a Low-Cost Electrocardiogram and a Machine Learning Algorithm

Senthilvel, Pranav (School: duPont Manual High School)
Jetty, Karthik (School: duPont Manual High School)
Srivastava, Shreshth (School: duPont Manual High School)

The electrocardiogram (ECG) is a vital component in cardiovascular disease diagnosis and functions by measuring the electrical activity of the heart. However, it has three limitations which make it difficult to use in low-resource settings: it's expensive, requires a physician, and frequently provides inaccurate diagnoses. To combat issue one, we constructed an inexpensive ECG by using software filtration, opposed to the traditional hardware approach. Using this method, we were able to keep our ECG under $15, enabling its use in low-resource settings. To address the second and third issues, we created a novel deep learning algorithm to interpret ECG waveforms. Our algorithm achieved an average accuracy of 96.8% over 100 validations for the diagnosis of normal sinus rhythm, atrial fibrillation, and myocardial infarction. Finally, to facilitate user-interaction, we created an Android-based mobile application. Our system will serve as an important cardiovascular disease screening tool, helping people in impoverished areas.

Awards Won:
Third Award of $1,000