

# Systems and Methods for Diagnosing Cardiovascular Conditions

**R**esearchers at the University of South Florida have developed a system and method for diagnosing cardiovascular conditions via a 3-lead vectorcardiogram (VCG).

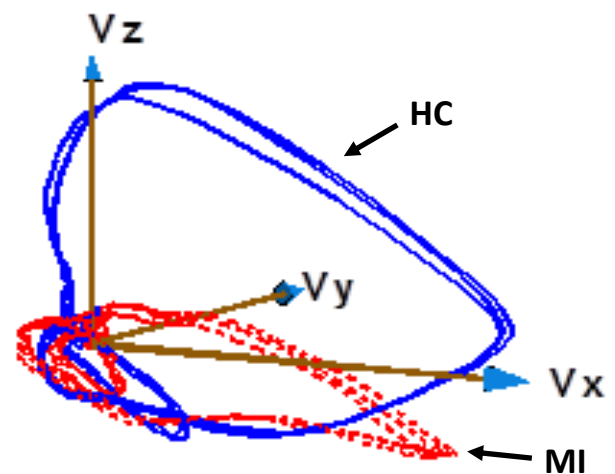
A myocardial infarction (MI), or heart attack, is the leading cause of death in the United States. It often occurs due to the occlusion of coronary arteries, thereby leading to insufficient blood and oxygen supply which then damages cardiac muscle cells. The accurate diagnosis of a MI is critical for timely medical intervention. An electrocardiogram (ECG) is the first test used to diagnose a heart attack. It records the electrical activity of the heart. While ECGs are important diagnostic tools, their features tend to diminish significant spatial information of cardiac pathological behaviors. This means that key medical decisions are made without all of the relevant information as to the condition of the heart, especially in cases in which there is a lesion in initial stages of growth. This highlights the need for a new MI diagnostic tool to be developed.

USF researchers have developed a system and method for diagnosing cardiovascular conditions that fully accounts for both time- and space-domain information about cardiovascular function. This method allows for the real time motion of VCG cardiac vectors in a 3D space to be displayed. Further, the trajectories are color coded with additional dynamical properties of space-time VCG signals to enhance the information visibility. These dynamic properties include curvature, speed, octant and phase angles. Spatiotemporal VCG signal representation facilitates the characterization of space-time cardiac pathological patterns and enhances the automatic assessment of cardiovascular diseases.

### ADVANTAGES:

- Efficient cardiovascular disease assessment
- Display real time motion
- A wearable diagnostic tool
- Cost efficient

*An Enhanced Method for the Automatic Assessment of Cardiovascular Diseases*



*Example 3-VCGs of Space-Time Cardiac Electrical Activity for a Healthy Control (HC) and Myocardial Infarction (MI) Subject*

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