

Abstract Submitted  
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**A Two-Dimensional Model of Three Vital Cardiac Functions.**<sup>1</sup>

ANTHONY CORTEZ, California State University, Fresno — The common understanding of the heart describes it as a pump that works to move blood around the body. While conceptually accurate, the function of the heart is far more complicated than this. The goal of this work is to add a level of detail to this everyday view by forming a two-dimensional numerical model to provide a deeper qualitative understanding of the heart. In its completed state, the model will depict the propagation of electrical waves that trigger the contraction of simulated muscle, which pump simulated fluid through the virtual heart. Electrical wave propagation, muscle contraction, and fluid flow, constitute the three parts of the model that we are proposing. These processes will be modeled with the FitzHugh-Nagumo (FHN) model, a mass-spring model, and Smoothed Particle Hydrodynamics (SPH), respectively. Thus far the electrical wave and fluid simulations have been implemented independently to run in real time. Once the mass-spring model is completed, work will begin to couple the methods to form the final version of the simulation. Coupling these popular methods should produce a real-time simulation that provides a good qualitative picture of the specified processes and gives a framework for scaling the program to three-dimensions.

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