Personalized Heart Models for Atrial Fibrillation Therapy

1446664 CPS: Frontier: Medical Cyber-Physical Systems, 2015 | Rahul Mangharam, University of Pennsylvania

Challenge:

- Atrial fibrillation electrical activation is spatiotemporally complex.
- Lack of technology for obtaining detailed fiber organization and propagation anisotropy.
- Contact electroanatomical mapping system gives unsynchronized electrical recordings.

Solution:

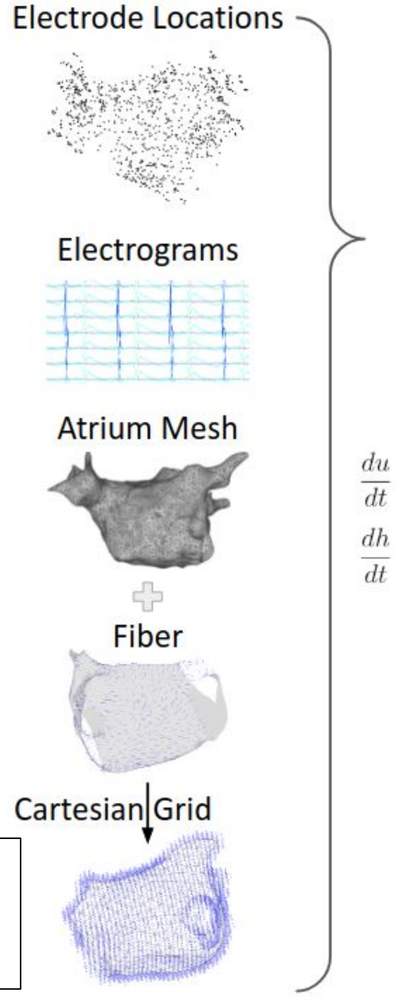
- High resolution patient electroanatomical map of the left atrium is exported.
- Patient data is processed to extract spatiotemporal electrical activations and fed into our heart model.
- An optimization process locally tune model parameters for the entire atrium.
- The personalized heart model can accurately reproduce patient atrium activations.

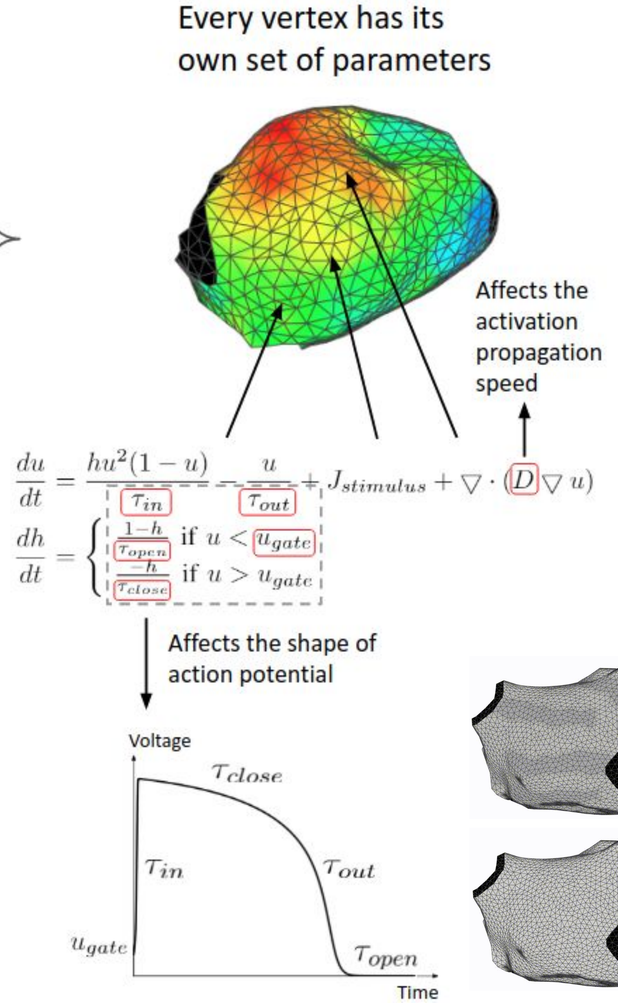
Broader Impact:

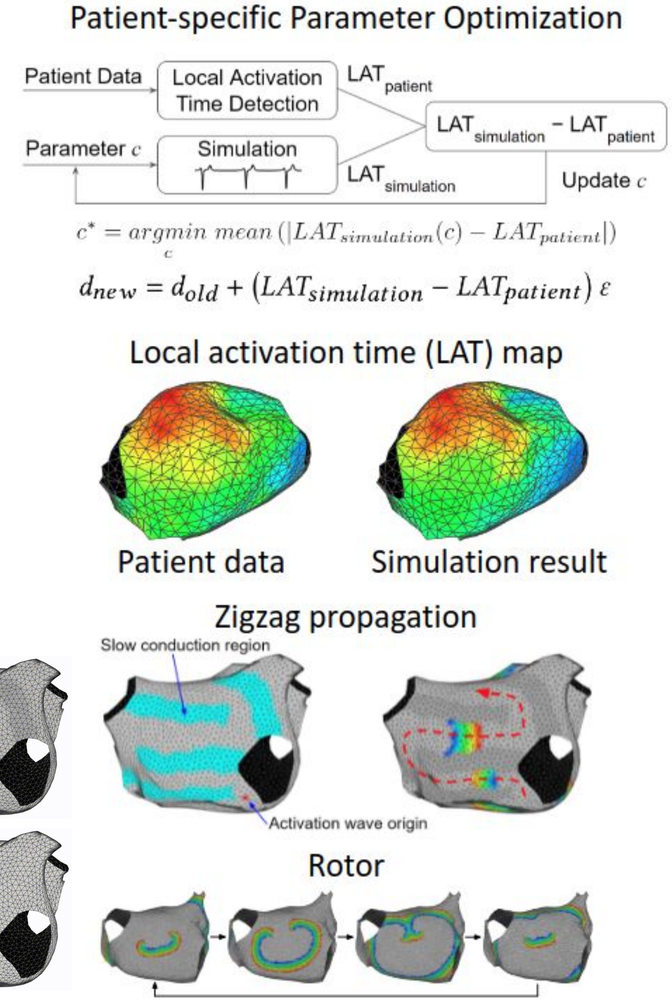
- More than 6 million people in United States have atrial fibrillation.
- Personalized heart models can aid catheter ablation of persistent atrial fibrillation in finding ablation targets.

Scientific Impact:

- To show the importance of local fiber organization and propagation anisotropy to a clinically practical heart model.
- To present a heart modeling framework that is capable of incorporating real-time clinical data.
- To share a whole-atrium optimization that tunes parameters locally.







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