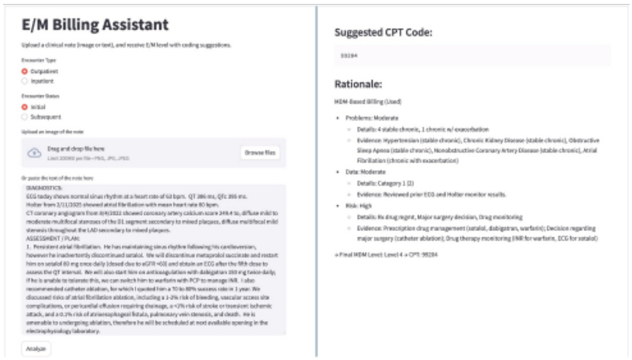
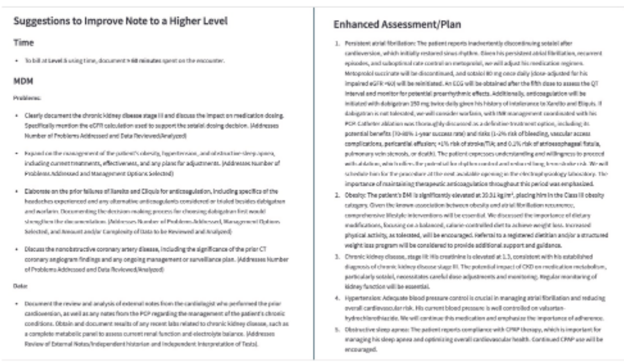
Conclusion: This prototype demonstrates that LLMs can interpret clinical notes and improve documentation. While current agreement with human coders is moderate, continued advancements in AI models and prompt engineering are expected to significantly enhance accuracy and reliability over time.



1st panel. App user interface with sample note's Diagnostics and Assessment/Plan sections.
2nd panel. App output showing suggested CPT code based on MDM components.



1st panel. App output for time and MDM-based suggestions.
2nd panel. App output for Enhanced Assessment/Plan.

ID: 4316174

STUDYING LEFT ATRIAL ARRHYTHMIAS USING A REAL-TIME, INTERACTIVE DIGITAL TWIN

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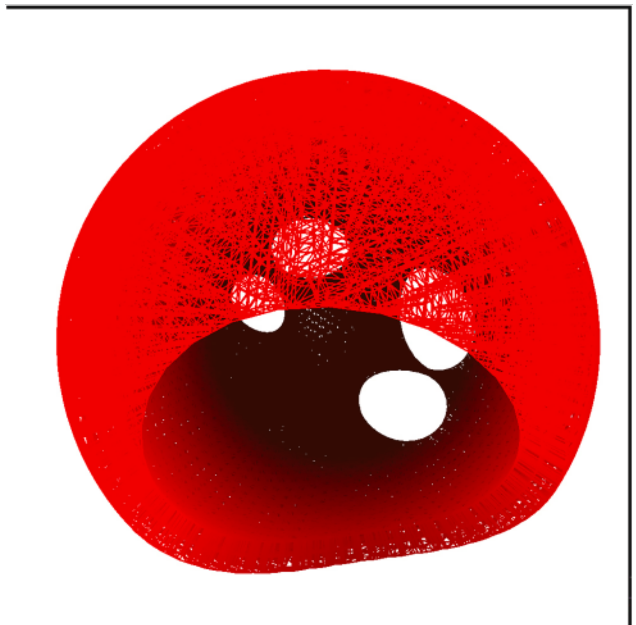
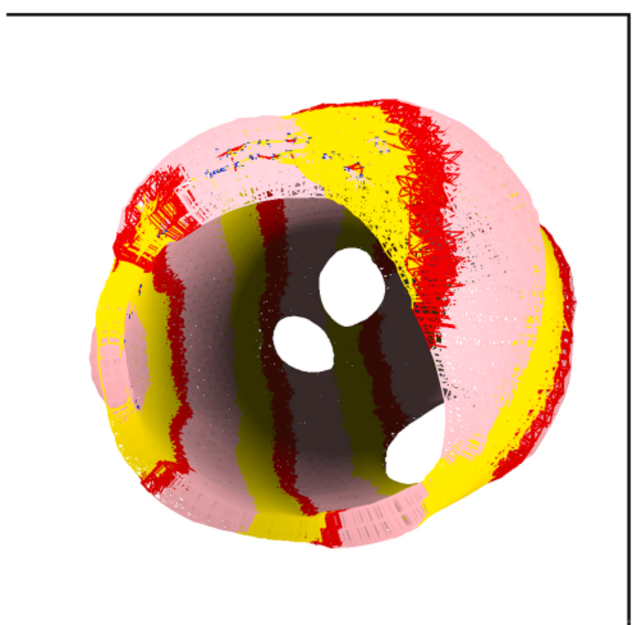
Background: Left atrial arrhythmias—such as atrial fibrillation—are major contributors to stroke and heart failure. While catheter ablation is a common therapeutic approach, its success can be improved through predictive modeling. However, current computational tools often lack the interactivity and realism needed for dynamic arrhythmia exploration.
Objective: To develop and validate a real-time, interactive, patient-specific N-body model of the left atrium for simulating arrhythmias and evaluating ablation strategies.
Methods: An N-body modeling framework was used to construct both anatomically idealized and patient-specific left atrial models. Muscle tissue was parameterized with dynamic mechanical and electrophysiological properties, allowing live adjustments during simulation. Arrhythmias were induced via ectopic triggers and structural modifications, while virtual ablation lesions were tested for their ability to restore sinus rhythm. Simulations ran in near real time using GPU-accelerated parallel processing.
Results: The model reproduced clinically relevant arrhythmias—including micro-reentries, atrial flutter, and the disorganized rhythm characteristic of atrial fibrillation—by tuning local conduction velocities and refractory periods. Simulated ablations successfully isolated arrhythmic foci and restored sinus rhythm in all test cases. A patient-derived model, generated from imaging data, demonstrated comparable performance, underscoring its potential for personalized procedural planning.
Conclusion: This real-time, interactive N-body digital twin provides a novel platform for the study of left atrial arrhythmias and the optimization of ablation strategies. Integration of patient-specific data supports future applications in clinical decision-making, procedural planning, and electrophysiology training.



Idealized left atrium



Chaotic arrhythmia in idealized left atrium