



Acknowledgements



Team

- Nicholas Magarino
- Thy Tran
- Sang Lee
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- Enoch Solano
- Shenqi Hu

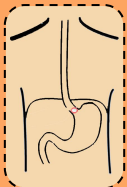
Advisors

- Dr. Chenfanfu Jiang
- Dr. Norman Badler
- Joshua Wolper

Surgical Department Collaborators

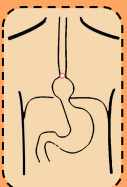
- Dr. David Sigmon
- Dr. Paul Yushkevich
- Elaine Ma
- Dr. Kristoffel Dumon

The Problem



Normal

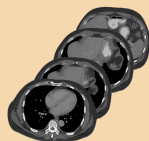
In preparation for repairing hiatal hernias, surgeons' primary tool for pre-surgery planning are CT scans. Consequently, a surgeon may miss key features and have to change their strategy mid-surgery.



Hiatal hernia

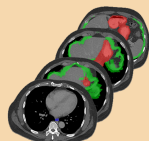
A dynamic model of the hiatal hernia anatomy constructed from CT scans may greatly help with surgical planning and determining the optimal repair strategy.

Process



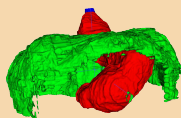
CT Scans (Hospital)

- Take CT scans from patients



Segmentation (ITK-Snap)

- Semi-automatically label diaphragm, stomach & esophagus



Mesh construction (Maya)

- Clean up, smooth & retopologize mesh



Simulation (Houdini)

- Tetrahedralize and apply newtonian physics to extracted meshes.

Tools



Results



QR code to view simulation/process.

We created a basic simulation in Houdini of the interaction between the stomach, esophagus, and diaphragm.

Future



- Making the segmentation process automated
- Adding features to simulation
- Determining optimal surgery strategies
- Applying the segmentation process to medical education