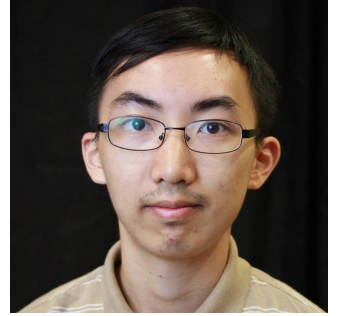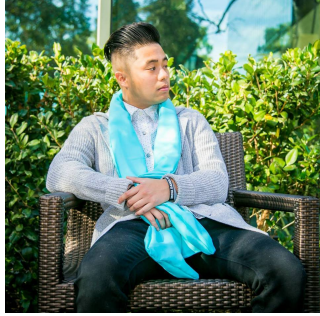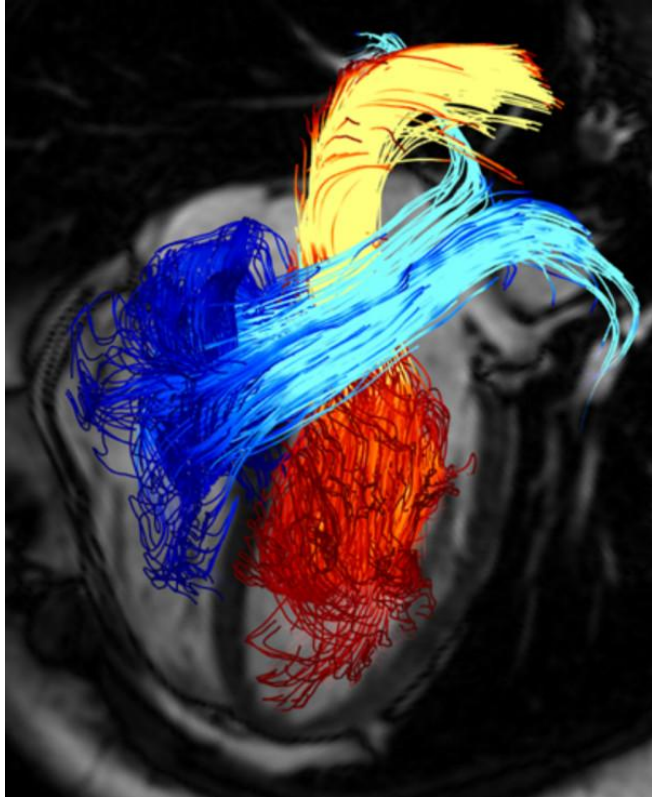# Team Love <3

"Because it's all about heart."

UI for 3D Cardiac Flow

Erick Kusnadi, Khang Tran, Marissel Llavore, Christelle Valmores, Nathaniel Valerio

Problems

1) Lack of domain expertise

2) Creating something new and very specialized

3) Changing requirements

Lack of domain expertise

Methods used:

- Interviewing experts
- Field Study

Difficulties:

- Finding experts
- Getting their time

Interviews
(and some field study)

Interview Questions

- **Background**
  - experience with cardiac flow visualization
  - technical experience (how tech savvy are they; any programming/engineering background?)

Interview Questions

- **POV on applications of flow visualization**
  - current practices

  - what should clinicians be able to accomplish with the program

  - who would make most use of system and how?
    - what kind of training would they need?

Client (Ahmad) - *(Idealist / Optimist)*

Insights

1) Listed software that is already in use
2) Not many people use cardiac flow visualization for ultrasound
3) Got a better understanding of our 4 modules

Dr. Elliot Groves - *(Practical / Pessimist)*

Insights

1) This kind of software is very specialized.
2) The data and visualization is not valuable if it can't be read and understood

Dr. Myriam Jones - *(Practical / Optimist)*

Insights

1) Let us go in the hospital where she works and see how she uses her EchoCardiogram
2) 2D visualizations are already in use
3) Lack of time for training is going to be a problem

Dr. Myriam Jones - *(Practical / Optimist)*

Ethnographic Study

Observation and Interaction (Baxter and Courage)

-Heavy emphasis on Contextual Inquiry

-Process analysis

-Couldn't take pictures or video for HIPAA compliance

Creating something new and specialized

Methods Used:

- Personas
- Cognitive Walkthrough

Difficulties:

- Getting into the mindset of someone with domain knowledge.

Personas & Cognitive Walkthrough

Example Persona

https://app.xtensio.com/folio/evotd7i

Insights

-Able to understand users more

-Needs vs Wants

Cognitive Walkthrough

Insights

- Created user stories as tasks
- Found out the most important features to add.
- Difficult to do tasks, and how to simplify them from user perspective.

Changing requirements

Methods Used:
1) Rapid Prototyping
   a) Paper
   b) Wireframes (Balsamiq)
   c) Interactive (Invisionapp)
2) Heuristic Evaluation
3) User Testing

Difficulties:
1) Unknown requirements
2) Needed to quickly make incremental changes

Changing Requirements

Rapid Prototyping - *(Balsamiq & Invisionapp)*

Iteration 1: http://invis.io/TD2XOOG52

Insights From Heuristic Eval

- **Need for more feedback (Nielsen: Visibility of system status)**
    - hover to show functionality
    - progress bars to show system is processing user commands/inputs
    - error messages
    - confirming actions
    - make a lot more screens for our prototype

Rapid Prototyping - *(Balsamiq & Invisionapp)*

Iteration 2*: http://invis.io/9Q32NM94C

*Redesigned from client feedback, and heuristic evaluation.

User Testing

- 5 so far.

- people interested in science:
    - bio majors
    - pre-med students
    - business majors
    - compsci/informatics

Insights from User Testing

Some Quotes:

- "Bland, but familiar."

Pros:

- Looked like a simple interface to use (toolbars, icons/tools mirrored similar applications they've used).

Cons:

- Invisionapp as a user testing tool had some limits.
- Postprocessing was hard to find.

Testing Tasks

Tasks corresponding to each of the 4 modules

1. Load 3D flow dataset
2. Image pre/processing
3. 3D flow visualization
4. post processing data

1. Load MRI/Ultrasound data
2. Mask area of interest and define variables/vectors of interest
3. Create and visualize: streamlines
   a. path lines
   b. isosurfaces
   c. contours
   d. vectors
4. compute:
   a. shear stress
   b. helicity
   c. reynold's stress

Testing Tasks

In general, the first two modules (Loading Data, and Preprocessing) were very easy and intuitive, the third, 3D flow visualization, was not as intuitive as it required specialized knowledge, and more feedback than our prototype allowed. The final module was just hard to find.

What's left?

1) Finish User testing insights (Thursday, 6/4)

2) Final Redesign* (Friday 6/5)

3) Finish Final Report (Sunday, 6/7)

4) Prepare all final materials (Tuesday 6/9)

1) (Christelle, Marissel, Nathaniel)
2) (Erick, Khang)
3) (Everyone)
4) (Everyone)

*The final redesign will be based on client feedback from design 2, and user testing.