

Progress Report Week 11: Week of November 13th to November 19th 2008

Liver Phantom for MRI Guided Trans-arterial Chemoembolization Simulation

Client: Dr. Wally Block Ph.D. University of Wisconsin – Biomedical Engineering Department
Advisor: Dr. William Murphy Ph.D. University of Wisconsin – Biomedical Engineering Department
Team: Benjamin Engel, Leader
Ryan Carroll, BWIG
Eric Printz, Communicator
Justin Schmidt, BSAC

Problem Statement

Liver cancer treatment can often involve higher, more targeted doses of chemotherapy if delivered directly to the liver. Professor Block's MRI lab is integrating capabilities to guide cancer treatment to the liver using magnetic resonance imaging. Current x-ray treatments significantly over treat the liver because while x-ray can be useful in the visualization of catheters, they can't visualize soft tissue, specifically the tumor. It is proposed to develop a liver phantom that will simulate the arterial vessels of the abdomen as well as the liver in an effort to simulate treatments and train interventional radiologists on the use of the new MRI guided techniques. The project will include adding flow capabilities through the use of a programmable fluid pump to simulate pulsatile flow.

Week 11 Goals

- Create and finish vasculature (depending on arrival of parts)
- Begin/finish creation of enclosure
- Once finished begin mounting connectors and vasculature within enclosure
- Build amplification circuit on LJ Proto Board for future use
- Study software that arrives with LabJack to determine how to program analog sinusoidal waveforms to the analog output terminal (may require coding in C)

Week 11 Activities

Team Member	Accomplishments	Hours	Running Total (Hours)
Benjamin Engel	Vasculature construction, enclosure construction, helped develop parts list, team meeting	10	50.5
Ryan Carroll	Team meeting, vascular creation, helped develop parts list, enclosure construction	10	53.5
Justin Schmidt	Vasculature construction, helped develop parts list, enclosure construction, team meeting	10	50.5
Eric Printz	Vasculature construction, enclosure construction, developed parts list, meet with advisors at hospital for advice, placed orders	12	52

Week 11 Accomplishments

- Finalized vasculature and determined exact spatial relations within the phantom
- Cut sides for enclosure, determined location of inlets and outlets, drilled all holes for inlets and outlets, and adhered sides together to create enclosure
- Bought remaining necessary connectors and tubing to finalize phantom and interface device with existing tubing running to and from MR control room
- Discussed progress with client
- Scheduled tentative scan time on Dec. 1st and 2nd

Week 12 Goals

- Caulk enclosure walls to seal
- Attach all connectors to enclosure wall
- Mill a notch in the lid so that it slides nicely over the top of the enclosure
- Create seal on top of box and attach latches which close the cover
- Test vasculature with flowing water
- Connect vasculature to inside of phantom and seal all connections
- Attach entire unit to pump to test integrity of device

Schedule

	Scheduled
	Completed
	Monday of Required Presentation

	9/1	9/8	9/15	9/22	9/29	10/6	10/13	10/20	10/27	11/3	11/10	11/17	11/24	12/1	12/8	12/15
Propose project																
Conduct background research																
Discuss parameters w/ client																
Develop PDS																
Brainstorm/solidify design ideas for initial prototype																
Midsemester presentation																
Order materials																
Construct prototype																
Safety Testing/improvements																
Usability Testing w/ interventional radiologists																
Final Presentation Preparation																
Final Paper																

Project Difficulties

- Labjack equipment has not yet arrived. It is likely that pulsatile flow will be put off to next semester or implemented over winter break.

Expenses

- Currently do not have detailed list of expenses. This will be added at a later time.