

Heating Pad for MicroPET/CT Scanner

- Week:** March 2nd – March 8th
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- Team:** Eric Printz – Team Leader
Justin Schmidt – Communications
Ryan Carroll – BWIG
Ben Engel – BSAC

Problem Statement

During anesthesia metabolism slows down, which can lead to hypothermia and eventual death. For prolonged microPET or microCT scans, where animals are kept for an extended period of time under anesthesia, it is important to keep the animals at steady temperature. Currently heating lights are used to provide that; however they lead to non-uniform and poorly controlled temperature regulation. Therefore, we proposed to design a heating pad that could be used to provide controllable and steady temperature during prolonged scans. Because of the imaging requirements, the heating pad should not contain metal parts.

Last Week's Goals

- Create mid-semester presentation
- Meet with client
- Begin mid-semester paper

Accomplishments

- We created and practiced our mid-semester presentation
- We gave our presentation to our client as well as other interested researchers on the different designs that we have considered.
 - We discussed our thought process in choosing the best design (The PVC Heater Design).
 - We also discussed numerous improvements that could be made to this design. These improvements include:
 - Instead of using a box for the mouse to sit in inside the PET/CT scanner, we will use a cylindrical tube with a flat surface on the

inside for the mouse to sit on.

- We will look into finding a polyethylene tube for this.
- The tube should fill just about the entire diameter of the opening in the PET/CT device.
- Anesthesia will come into the top portion of the polyethylene tube while heated air will come into the bottom portion. The top and bottom portion of this tube will be isolated by the flat surface that the mouse sits.
- The flat surface that the mouse sits on must be thin and a good conductor of heat to conduct the heat from the heated air running through the bottom of the tube to the top portion of the tub where the mouse is sitting.
 - This will help to avoid the mouse from becoming dehydrated by a constant air flow passing over it.
- On the back of the polyethylene tube, on the top portion where the mouse is, we will have an outlet for the anesthesia. This outlet will have a tube which wraps around the top outside portion of the polyethylene tube back to the front where the anesthesia is safely transported out of the machine.
- We also found out that it is OK to have a small amount of metal inside the device which is outside of the field of interest. This allows us to potentially have a temperature probe inside the box to continuously monitor the mouse's body temperature which will allow us to adjust the amount of heat that is sent into the bottom portion of the polyethylene tube. This may be part of a phase II of this project next semester depending on how far we get this semester.
- Went shopping to buy some parts for our design.
- Briefly discussed writing the paper.

This Week's Goals

- Finish our mid-semester paper.
- Get a key card to access the bioinstrumentation lab as well as get approved to use the shop downstairs in ECB.
- Buy materials and start building.

Difficulties

- No difficulties to report at this time

Team Effort

Team Member	Accomplishments	Time (Hrs)	Running Total (Hrs)
Ryan Carroll	Class Time, Presentation creation and practice, Client Meeting	7	31
Ben Engel	Class Time, Presentation creation and practice, Client Meeting	7	31
Eric Printz	Class Time, Presentation creation and practice, Client Meeting	7	31
Justin Schmidt	Class Time, Presentation creation and practice, Client Meeting	7	31

Project Schedule

TASK	JAN	FEB					MAR					APR				MAY	
DATES	25	01	08	15	22	01	08	15	22	29	05	12	19	26	03	10	
WORK																	
Brainstorming	█	█	█														
Research	█	█	█	█	█												
Designing Prototype					█	█	█	█									
Selecting Prototype					█												
Obtaining Materials								█	█	█							
Building Prototype									█	█	█	█	█				
Testing Prototype														█			
Modifications																	
DELIVERABLES																	
PDS	█	█			█					█							
Mid-Sem. Report						█	█										
Mid-Sem. Presentation						█	█										
Final Report													█	█			
Final Presentation															█		
Weekly Reports	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
Notebooks	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
MEETINGS																	
Team Meetings	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
Client Meetings	█	█			█	█							█				
Advisor Meetings		█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
BSAC Meetings																	
OTHER																	
Web Page		█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
Special Lectures																	

Expenses to Date:

- At the time that this report was written, we had not gone shopping (we are going tonight), so the exact cost of the materials that we will buy tonight is not known. However, we will be “cost conscious” and not buy any overly expensive materials without first getting the approval of Dr. Jeraj.