

Title: 3D Printed Respiratory Motion Phantom PgR 1

Date: 9/9/2026

Client: Dr. Andrew Shepard

Advisor: Prof. Mehmet Orman

Team:

Student 1: Matthew Niemuth - Team Leader

Student 2: Royal Swick - Communicator

Student 3: Drew Kruse - BSAC

Student 4: Natalie Waibel - BWIG

Student 5: Avi Ganti - Co-BPAG

Student 6: Jahan Ingraham - Co-BPAG

Problem statement: Design and Fabricate a 3D-printed respiratory motion phantom insert that simulates two lung lesions with realistic density and anatomy for evaluation of real-time tumor tracking during radiotherapy.

Brief status update: This week, the team came up with initial questions to be addressed during the first meeting with the client, Dr. Shepard. The team also began initial research starting with the article provided by Dr. Shepard. Finally, the team met with Dr. Shepard for the first client meeting to ask the initial questions and learn more about the scope of the project. A second meeting was scheduled for September 23rd to see the current phantoms and QUASAR system setup.

Difficulties / advice requests: No difficulties to discuss at this time.

Current design: N/A

Materials and expenses:

Item	Description	Manufac-turer	Mft Pt#	Vendo r	Vendo r Cat#	Date	#	Cost Each	Total	Link
Category 1										
									\$0.00	
									\$0.00	
Category 2										
									\$0.00	
									\$0.00	
								TOTAL:	\$0.00	

Goals

Major team goals for the next week

1. Continue to conduct research into respiratory phantoms, potential 3D printing materials, and radiotherapy techniques involving CT scans.
2. Get dimensions of the phantom and understand how it integrates with the QUASAR system.
3. Begin to sketch possible designs for both the phantom and the tumors.

Next week's individual goals

- Royal Swick
 - Begin researching possible designs for the phantom and materials for the phantom. Begin the PDS to complete by next Thursday.
- Matthew Niemuth
 - Conduct more research on respiratory phantoms and radiotherapy techniques. Begin the PDS to complete by next Thursday.
- Drew Kruse
 - Learn as much as I can about the project, so we will be able to brainstorm some designs and start working on our PDS and our presentation.
- Natalie Waibel
 - Research more on respiratory phantoms and lung cancer. Work on the PDS for next Thursday.
- Jahan Ingraham
 - Continue to research and gain understanding on the lung phantom and the materials needed for fabrication.
- Avi Ganti
 - Conduct research on radiotherapy and lung tumor tracking, and find out what materials are likely to be needed and where we can get them. Work on PDS for next Thursday

Timeline:

Task	Sep			Oct					Nov				Dec	
	12	19	26	3	8	17	24	31	7	14	21	28	5	10
Project R&D														
Research														
Design														
Prototyping														
Testings														
Deliverables														
Progress Reports														
PDS														
Design Matrix														
Prelim Presentation														
Prelim Report														
Final Poster														
Final Report														
Meetings														
Client		X												
Advisor														
Website														
Update														

Filled boxes = projected timeline

X = task was worked on or completed

Detailed accomplishments

Previous week's goals and accomplishments

- Royal Swick:
 - Previous Goals: Become more familiar with the project and read the article in the project description. Set up the client meeting.
 - Met with our client to better understand the full scope of the project, and read the article in the project description which was very helpful and provided many possible materials to use for our phantom that replicate the density of human tissue. Emailed the client and set up the meeting, and communicated with my group members. Completed 2 research entries in lab archives.
- Matthew Niemuth
 - Previous Goals: Come up with questions for the client and attend the first client meeting to learn more about the project.
 - Accomplishments: Set up a team lab notebook, began researching by reading the article provided by the client, and met with the client to gain a better understanding of the goal of the project and how the client envisions it being accomplished.

- Drew Kruse
 - Previous Goals: Brainstorm questions for our client to ask during our meeting. Gain a better understanding of the project assignment and meet with the client.
 - Accomplishments: We met with the client and got a lot of our questions answered. We learned a lot about the project in a short meeting. I completed a few entries for research in my lab archives notebook and filled out progress report.

- Jahan Ingraham
 - Previous Goals: Work on understanding the project and understand the needs of the client.
 - Accomplishments: Began research and learning about lung tumor phantoms, helping to understand what our goal and end result could look like. I also reviewed the questions answered by our client, understanding their vision.

- Natalie Waibel
 - Previous Goals: Meet with client and ask questions to better understand the project.
 - Accomplishments: Met with the client, developed a better understanding of the QUASAR phantom and what the client is looking for. Started researching about phantoms.

- Avi Ganti
 - Previous Goals: Research and ask questions in order to gain a better understanding of the project's specifications and the client's needs.
 - Accomplishments: Caught up with information from client meeting (missed due to illness) and began researching about the functionality of phantoms.