

ClearPulse: Stethoscope with noise canceling headphones (and amplification option)

Date: 9/25/26 - 10/01/26

Client: Dr. Lenard Markman

Advisor: Prof. Randy Bartels

Team: Charlie Fischesser, Christian Dittmar Greaves, Johnny Sellers, Jonas Zhang, Josh Slager, Sam Wallin

Name	Email	Role
Josh Slager	jslager@wisc.edu	Co-leader
Charlie Fischesser	fischesser@wisc.edu	Co-leader
Christian Dittmar Greaves	cdittmargrea@wisc.edu	Communicator
Johnny Sellers	jsellers4@wisc.edu	BSAC
Sam Wallin	swallin3@wisc.edu	BWIG
Jonas Zhang	jjzhang6@wisc.edu	BPAG

Problem statement:

Traditional stethoscopes can be difficult to use effectively in noisy or high-vibration environments, including hospitals, helicopters, and ambulances. Environmental noise and poor acoustic conditions can interfere with healthcare providers' ability to accurately hear and distinguish heart and lung sounds, potentially compromising the reliability of auscultation. Additionally, prolonged use of traditional stethoscope ear pieces can lead to discomfort or ear canal irritation.

Our team will address these limitations by designing and fabricating a stethoscope system that incorporates active noise cancellation and optional noise amplification with passive noise isolation of over-the-ear headphones. The system will improve the clarity of heart and lung sounds across a broad range of environmental conditions while prioritizing comfort and ease of use. The final design must be durable, cost-effective, and manufacturable, with potential for commercial development through WARF or other outside organizations.

Brief status update:

To start the week, we met with a member of last semester's design team to gather advice, previous research, and materials. They provided valuable info on circuit architecture and recommended specific components for our application. After the meeting, we gathered to design and prototype initial circuit concepts, before ultimately deciding that additional research is needed prior to finalizing our design selection.

Difficulties / advice requests:

We have a few questions regarding specific techniques or circuits to help isolate body sounds from ambient noise and vibrations. In theory, simple analog circuits should filter out environmental noise, but in practice that rarely holds up. Before diving into prototyping, we're wondering if testing an analog front-end (like a difference amplifier) alone is worth the time, or if downstream signal processing is known to be required for our use case.

Goals:

Major team goals for the next week

1. Preliminary Report
2. Circuit design research and selection
3. Update preliminary deliverables

Next week's individual goals

Josh:

- Work on preliminary report (including PDS revisions)
- Continue circuit research and feasibility of some sort of signal filtering or ANC
- Look into customer discovery process interview candidates

Charlie:

- Create, assign, and work on the preliminary report
- Continue research into circuit design of our project, emphasis on frequencies needed for filtering through outside noise
- Look into customer discover process interview candidates

Christian:

- Research how to power the system. I.e Lithium-Ion Batteries.
- Acquire a microphone to begin assembling.
- Test in LT-Spice

Johnny:

- Preliminary presentation on Friday
- Work on the preliminary report
- Continue circuit research

Sam:

- Preliminary presentation on Friday
- Complete required trainings
- Gain a more complete understanding of the techniques used in construction of the prototype design

Jonas:

- Work on ordering microphones
- Preliminary presentation on Friday
- Finish training

Timeline

Task	Sept				October					November				December		
	3	10	17	24	1	8	15	22	29	5	12	19	26	4	11	18
Project R&D																
Empathize		X														
Background	X	X	X	X												
Prototyping				X	X											
Testings																
Deliverables																
Progress Reports	X	X	X	X	X											
Prelim presentation					X											
Final Poster																
Meetings																
Client	X															
Advisor			X	X	X											
Website																
Update	X	X	X	X	X											

Filled boxes = projected timeline

X = task was worked on or completed

Previous week's goals and accomplishments

Over the past week, the team finalized a primary design concept to move forward with and set up an upcoming meeting with the client to discuss our preliminary ideas. To prepare, we created and rehearsed our preliminary presentation. Additionally, we started targeted research and testing of applicable amplifier and filter circuits to support our selected design architecture.

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Josh Slager	9/25/2026	Meeting with Prior Semester Team	0.5	6.75	18.25
	9/25/2026	Circuit Design Meeting	1		
	9/27/2026	ANC & Circuit Research	2		
	9/28/2026	Team Meeting	1		
	9/29/2026	Presentation Work	.75		
	9/30/2026	Team Meeting	1		
	10/1/2026	Presentation Prep	0.5		
Charlie Fischesser	9/25/2026	Past Group meeting	0.5	4.5	16.0
	9/28/2026	Team Meeting	1		
	9/29/2026	Presentation Work	1		
	9/30/2026	Team Meeting	1		
	10/1/2026	Presentation Preparation	0.5		
	10/1/2026	Dr N Meeting	0.5		
Christian Dittmar Greaves	9/25/2026	Group meeting	1	6.5	15
	9/28/2026	Electronic Circuits Research	2		
	9/28/2026	Presentation Work	1.5		
	9/30/2026	2nd Team Meeting	1		
	10/1/2026	Circuit Assembly	1		
Johnny Sellers	9/25/2026	BSAC Meeting	1	4.5	12.5
	9/28/2026	Team Meeting	1		
	9/28/2026	Presentation Work	0.5		
	9/30/2026	Team Meeting	1		
	9/30/2026	Intro to Machining Canvas	1		
Sam Wallin	9/25/2026	Circuit design meeting	1	3.5	13.5
	9/29/2026	Presentation preparation	1		
	9/29/2026	Conducted background research on circuits/testing methods	.5		
	9/30/2026	Team meeting	1		

Jonas Zhang	9/27/2026	Circuit and microphone research	1	5.5	14.5
	9/28/2026	Team meeting	1		
	9/29/2026	Work on presentation	.5		
	9/30/2026	Intro to machining training	2		
	9/30/2026	Team meeting	1		

Current design:

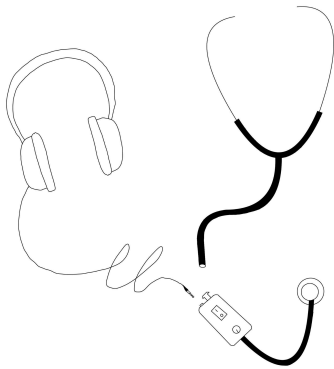


Figure of Selected Headset Design

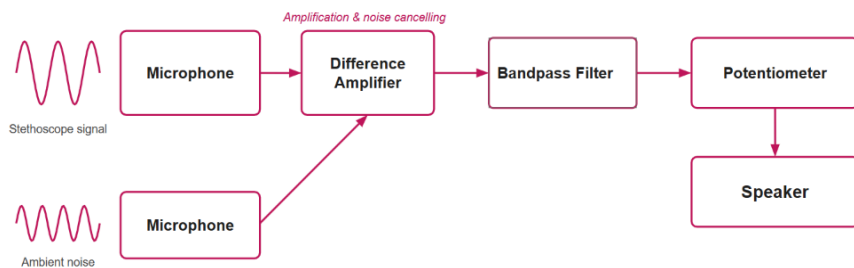


Figure of Electronic Components Parts.

Materials and expenses:

No expenses to report.