



ASSISTED RESPIRATORY THERAPY WITH PERCUSSIVE VEST AND DIGITAL MONITORING

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PULMO-VEST





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Problem Statement

Global Health Challenge

Non-communicable diseases (NCDs) like cardiovascular diseases, diabetes, cancer, and chronic respiratory diseases cause premature deaths every two seconds (WHO). WHO's goal is to reduce this mortality rate by one-third by 2030 through prevention, treatment, and mental health promotion.



Problem Statement

- **Pandemic Preparedness & Prevention**

COVID-19 revealed long-term respiratory complications, highlighting the need for better therapeutic interventions and post-pandemic recovery strategies.

- **Digital Diagnosis & Surveillance (Digital Health)**

Use of telemedicine, wearable monitoring devices, and health data systems to improve patient care.



Target population

- Elderly people
- Patients recovering from respiratory infections.
- Post-surgery intubation.
- Patients with chronic respiratory diseases

Justification

Economic impact

- Reduce hospital visits through home therapies
- Patients by making treatment more accessible
- Reducing production costs of elements for therapy

Social impact

- Gender differences
- Market segmentation
- Economic gap

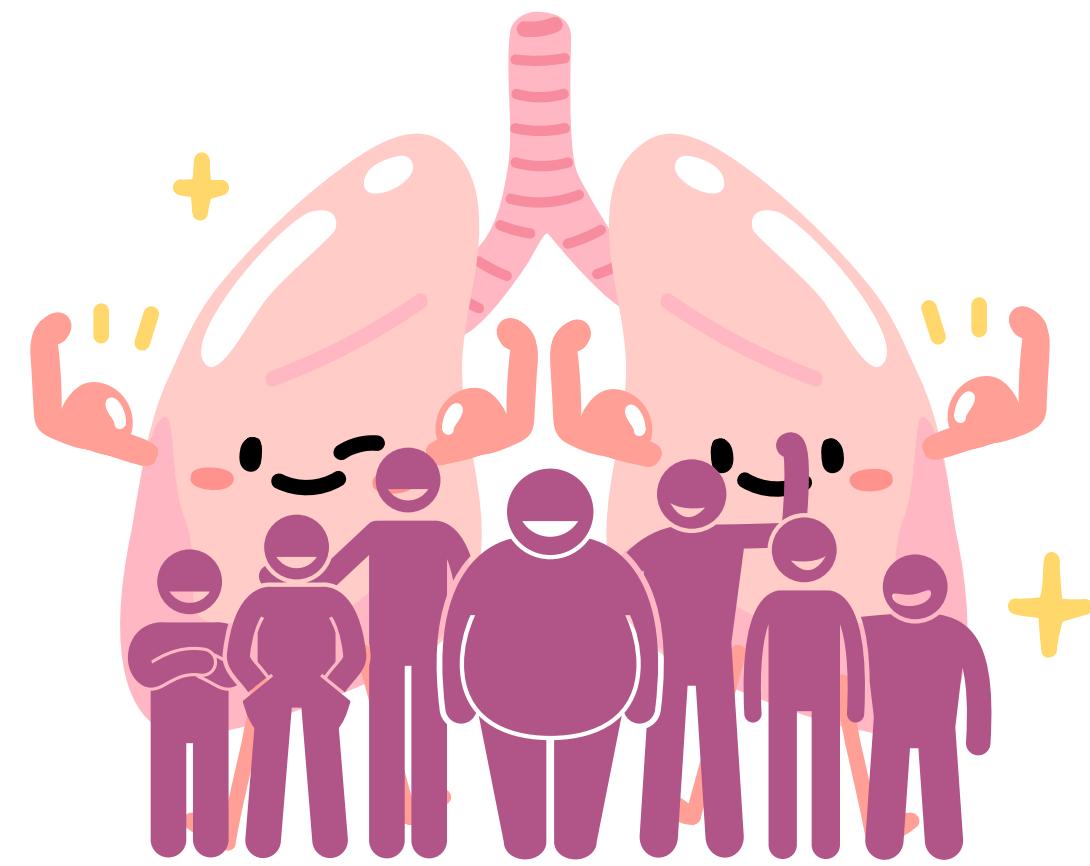
Environmental impact

- Reducing the need for transportation
- Reusable therapy system
- Reduce paper-based medical records



General Description of the Idea

This project involves developing a **wearable respiratory therapy vest** designed to help patients improve lung function through **controlled vibratory therapy**.



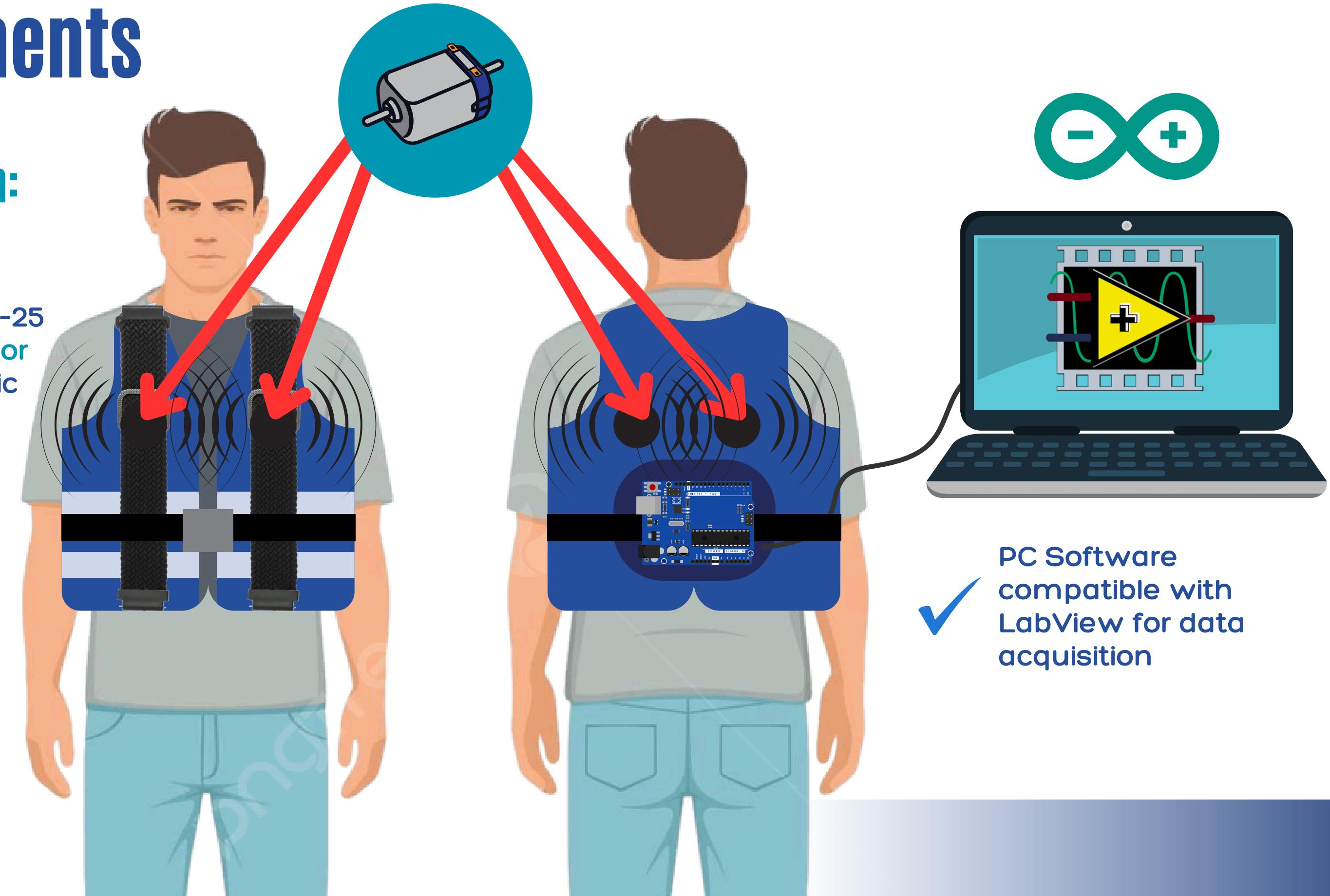
The vest is intended to be **adjustable** so that it can comfortably fit a **range of body sizes** while providing a stable platform for the integration of the necessary components.

x4 RS-550 12 V Micro Motors

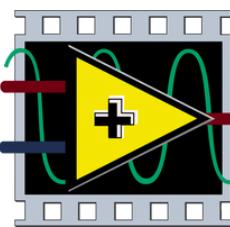
Core Components

Oscillation Mechanism:

- ✓ 4 stimulation points
- ✓ Create oscillations (2-25 Hz) across the **anterior** and **posterior** thoracic regions
- ✓ Adjustable straps
- ✓ Motors managed through Arduino UNO

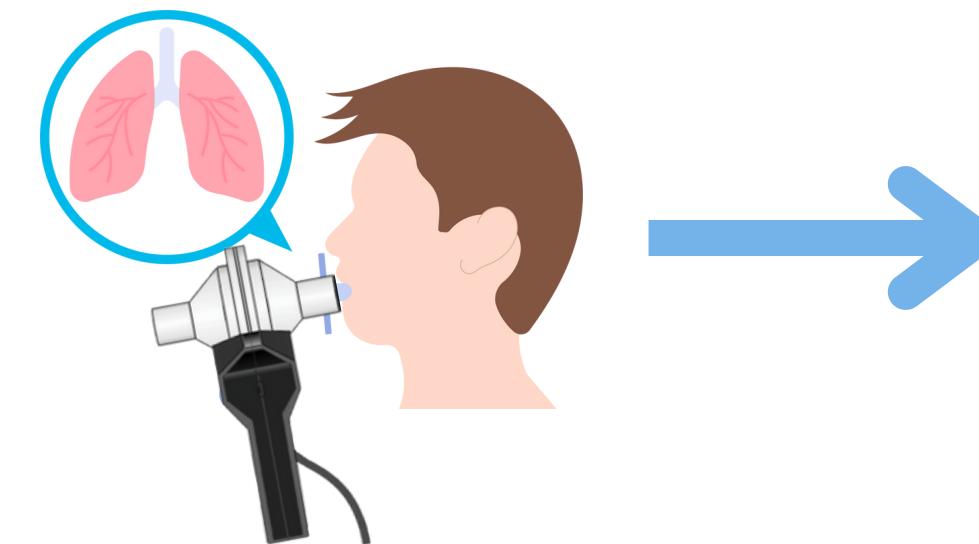


Measurement of lung capacity: SPIROMETER



- Inhalation
- Exhalation
- Forced inhalation and exhalation

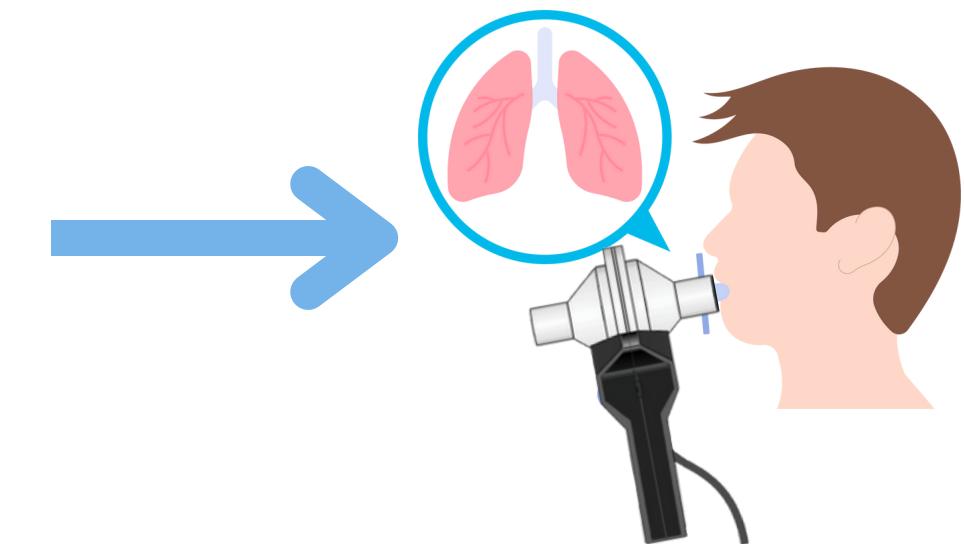
(1 min)
Before therapy



(30 min)

VIBRATORY
THERAPY

(1 min)
After therapy



Although we are **not planning** to **directly analyze** the lung capacity data as part of this project, the design will **facilitate the monitoring and visualization** of the latter by using an interface on LabVIEW.

LabVIEW Interface:



User configurable parameters:

- start button
- emergency stop button

The interface will **guide patients** on when and how to breathe to start measurements, **following a predefined reference** and will indicate the start of therapy.

Hypothesis

The development of this device will enable the integration of the rehabilitation phase and the measurement of lung capacities, facilitating the monitoring of respiratory therapies.



Objectives

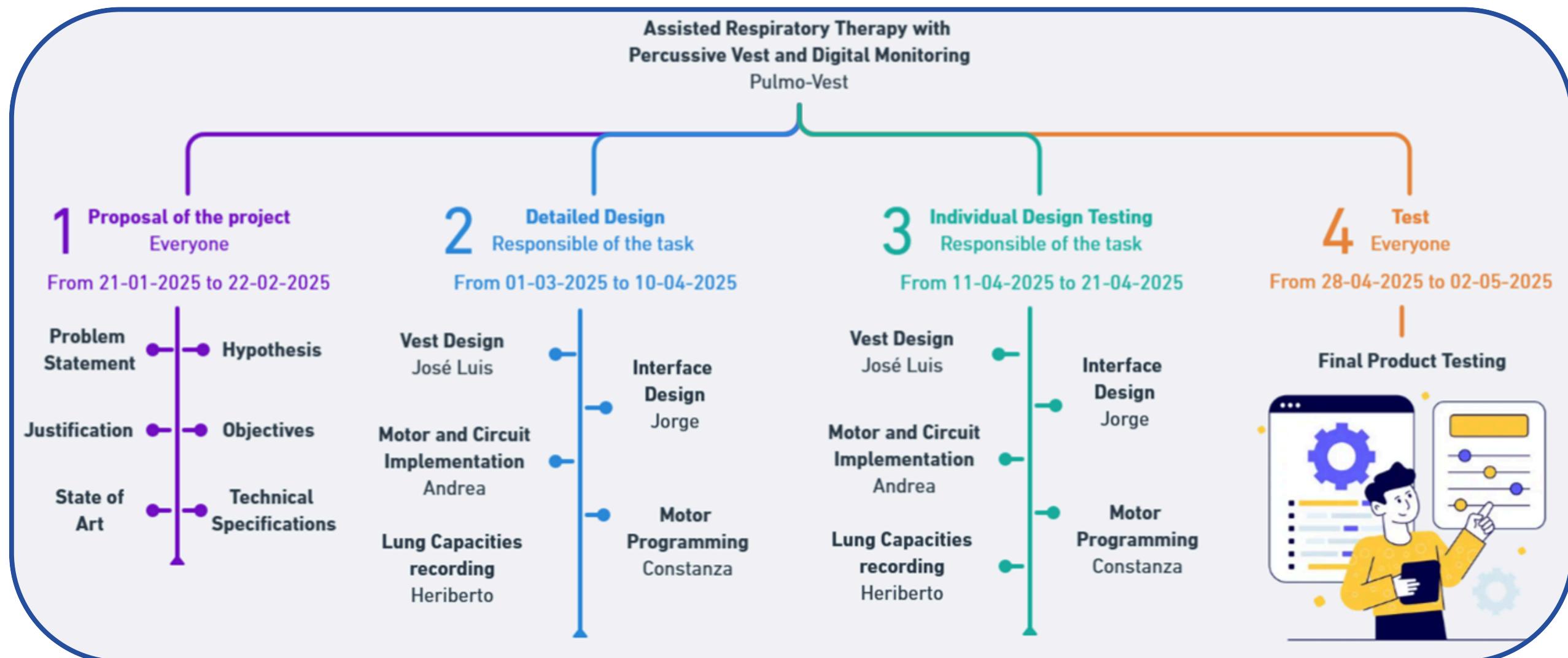


Develop a therapy system that combines the rehabilitation phase with lung capacity measurement to enhance the monitoring of respiratory therapies.

- 01 Record lung capacity measurements using LabView.
- 02 Design an adjustable vest that incorporates DC motors to provide high-frequency vibrations for respiratory therapy.
- 03 Develop a user-friendly interface that enables patients to conveniently perform therapy at home.
- 04 Improve patient follow-up by integrating rehabilitation and lung capacities measurement in a single system.
- 05 Validate the functionality of the prototype and the accuracy of lung capacity measurements.



FlowChart



WORKPLAN

01

Proposal of the project

02

Detailed design

03

Design Testing

04

Product Test

M	T	W	T	F	S	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

M	T	W	T	F	S	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

M	T	W	T	F	S	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

M	T	W	T	F	S	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

M	T	W	T	F	S	S
				1	2	3
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Thank
You

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