

Pneumoscope development

A retrospective from 2019 to 2025



POC - V1



MVP - V2



PRODUCT - V3

Alexandre Perez

Pneumoscope device Inventor

In 2019, Alexandre joined the Pneumoscope project, taking on the ambitious challenge of developing the Pneumoscope device.

With a strong foundation in Micro-Systems engineering and a Master's in Innovation for Product and Business Development, he brings a decade of experience in startups, with a sharp focus on the Medtech industry.

From concept to industrialization, he successfully engineered the Pneumoscope device, ensuring compliance with the rigorous standards of a Class IIA medical device. His expertise and strategic vision led to the granting of a European patent for the groundbreaking design and method behind the Pneumoscope.



Pneumoscope v1 - POC
2019-2021

Original Pneumoscope design (patented)



Objective

Design a device and define a method for simultaneous measurement of the parameters of a patient (EU patent filed)



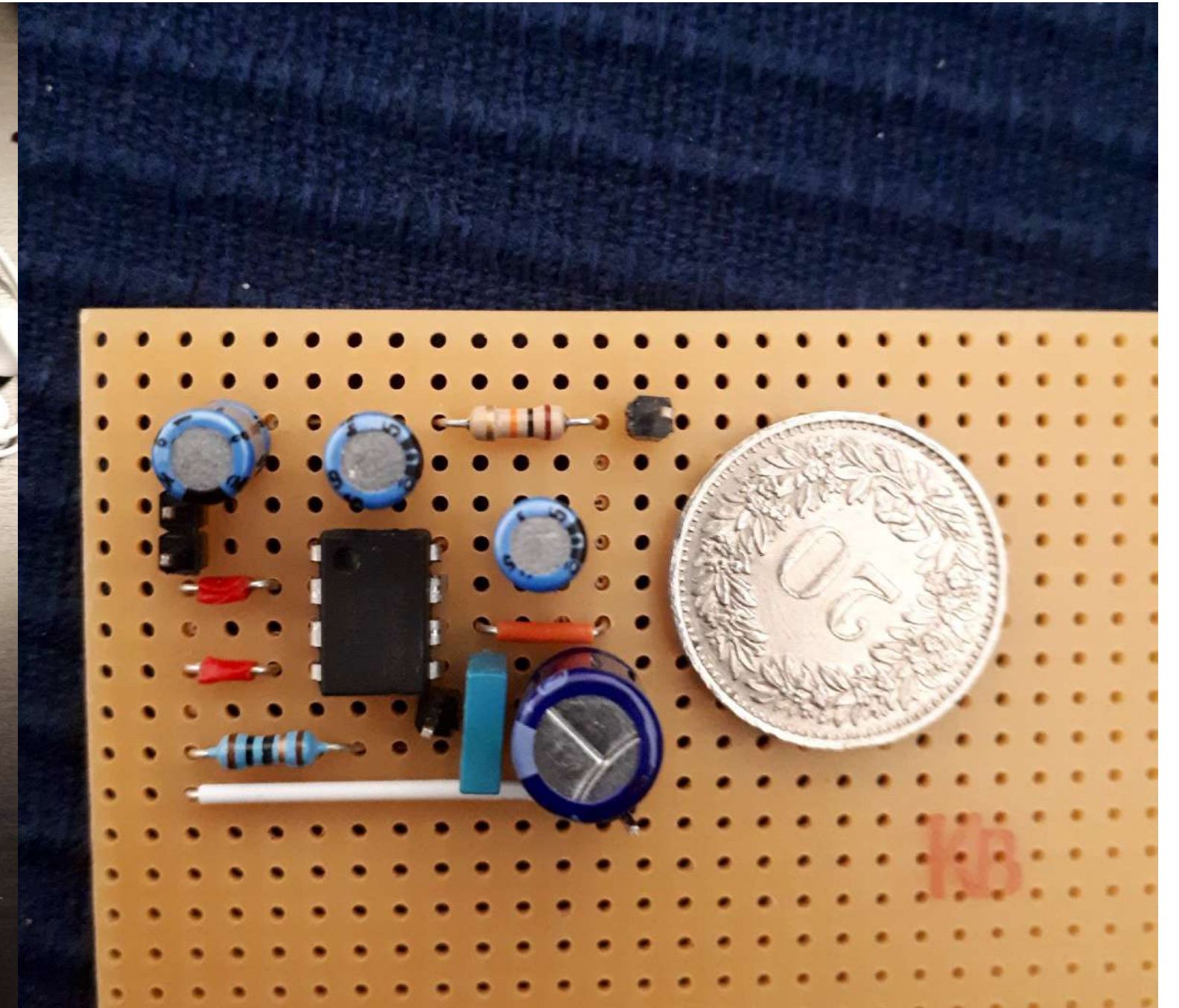
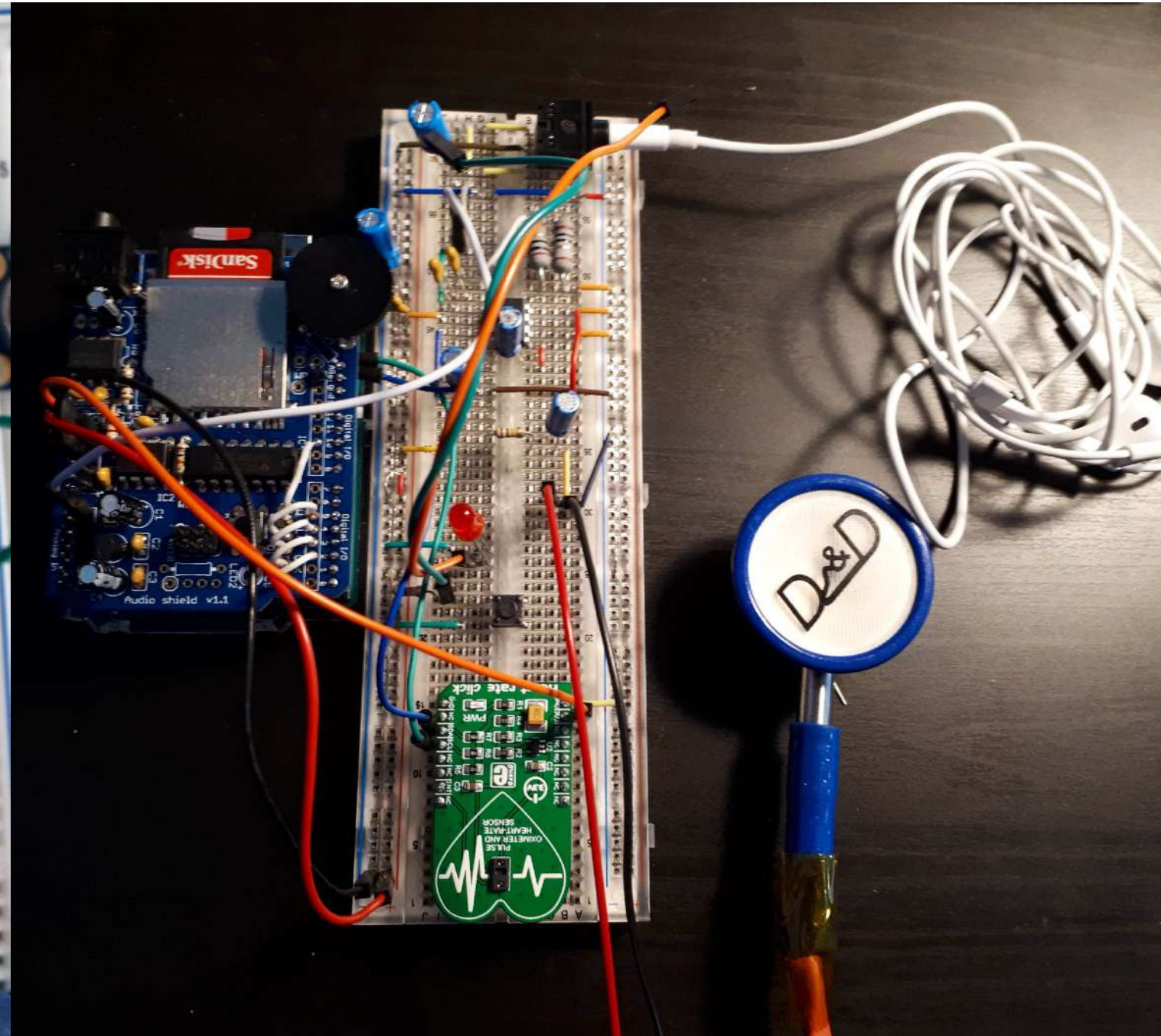
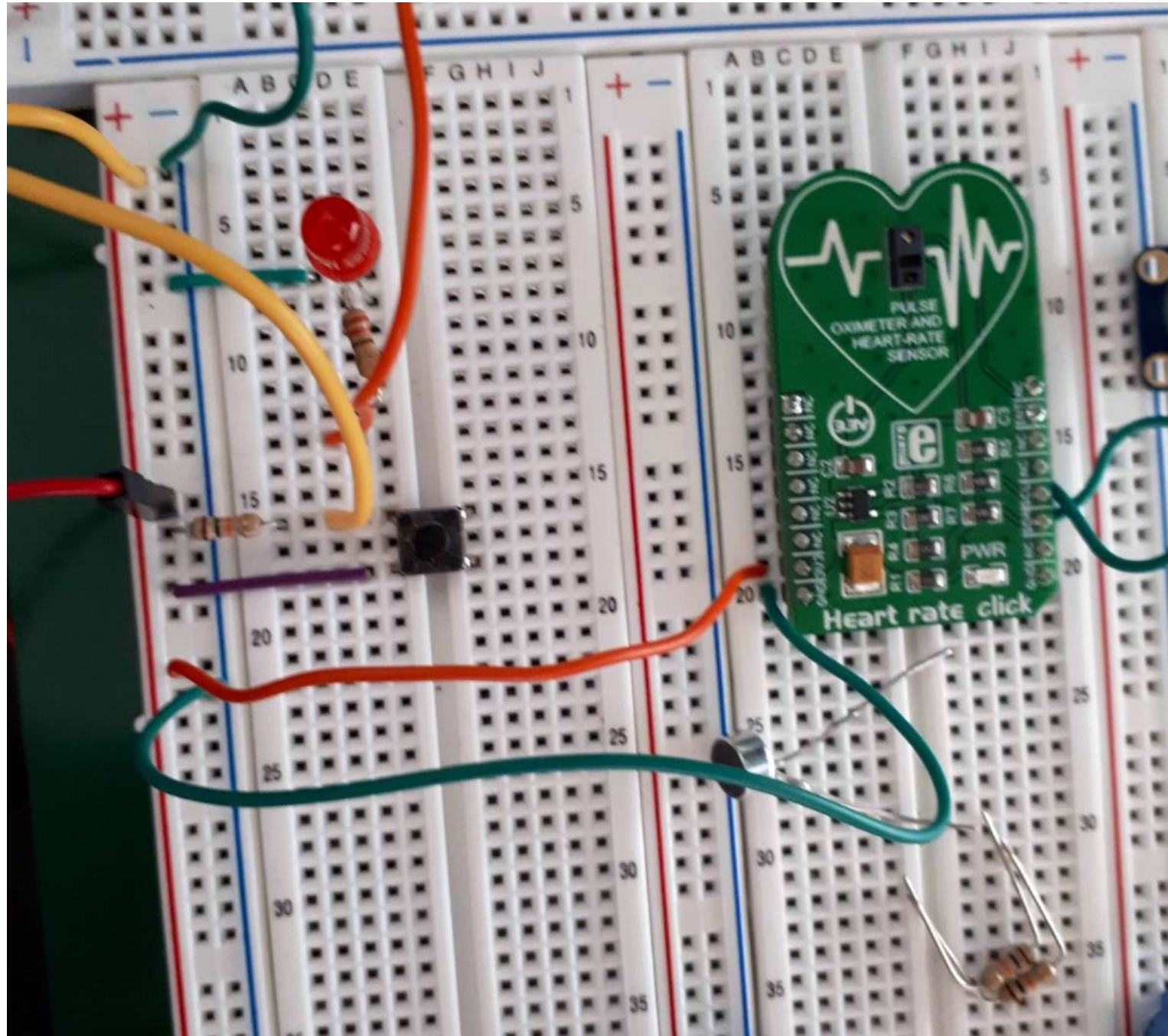
Workforce



Timeline

March to June 2019
(4 months)

Electronics PoC (audio + oximeter)



Objective

Rapid prototyping to benchmark existing solutions for electronic stethoscope and pulse oximeter

Workforce



Timeline

July to September 2019
(3 months)

First functional prototype (one sensor)



Objective

Miniaturizing electronics to embed in a compact portable case

Workforce



Timeline

October to November 2019
(2 months)

Testing case finishing



Objective

Testing different techniques and method for 3D printing finishing



Workforce



Timeline

December 2019
(1 month)

Second prototype (2 sensors)



Objective

Optimization of electronic design to include transmission pulse oximeter with hepia electronic & optoelectronic labs

Workforce



h e p i a

Haute école du paysage, d'ingénierie
et d'architecture de Genève

Timeline

January to December 2020
(12 months)

Designing acoustic characteristics



Objective

Optimization and characterization of acoustic signal with hepia acoustic & electronic labs

Workforce



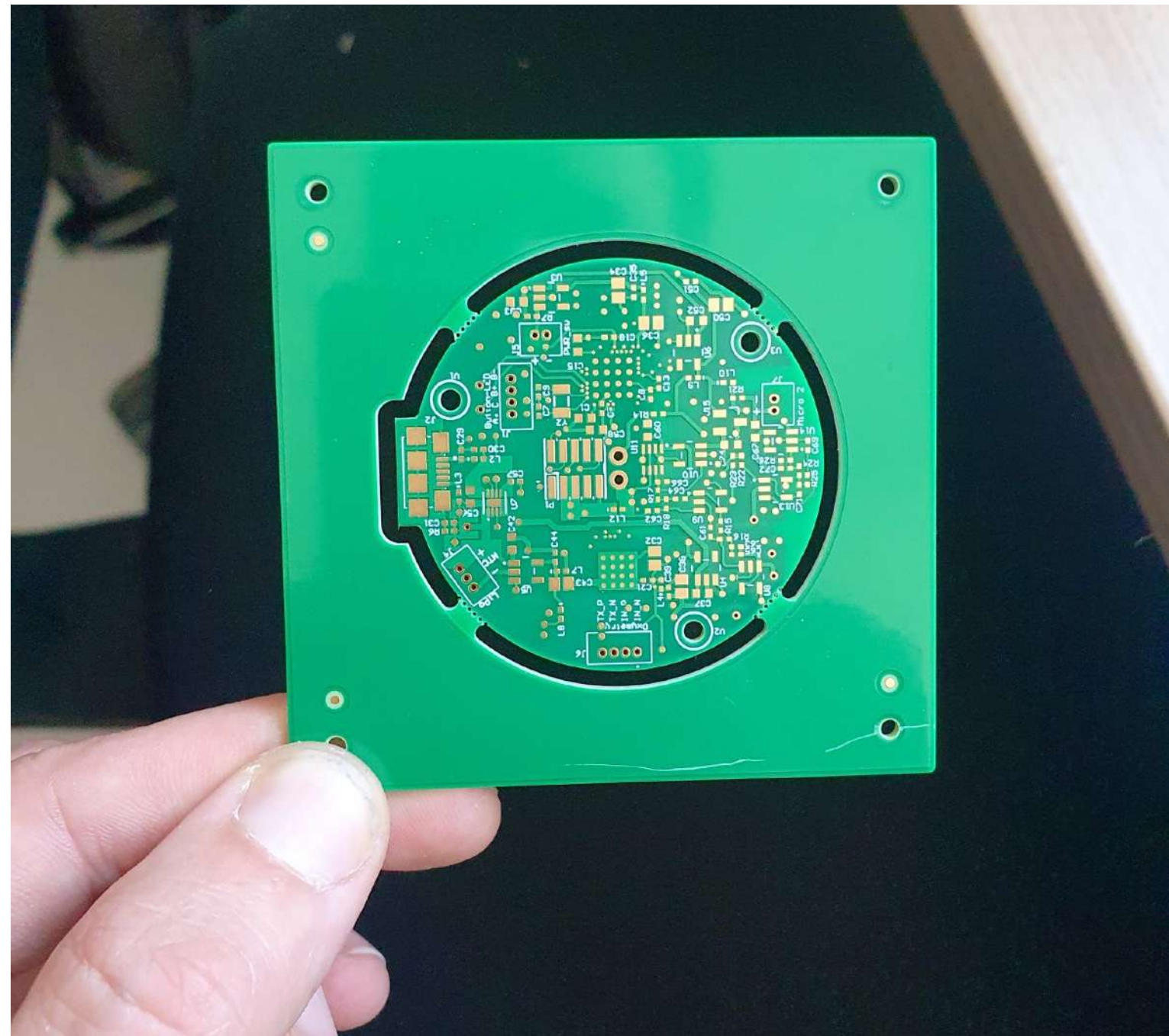
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Haute école du paysage, d'ingénierie
et d'architecture de Genève

Timeline

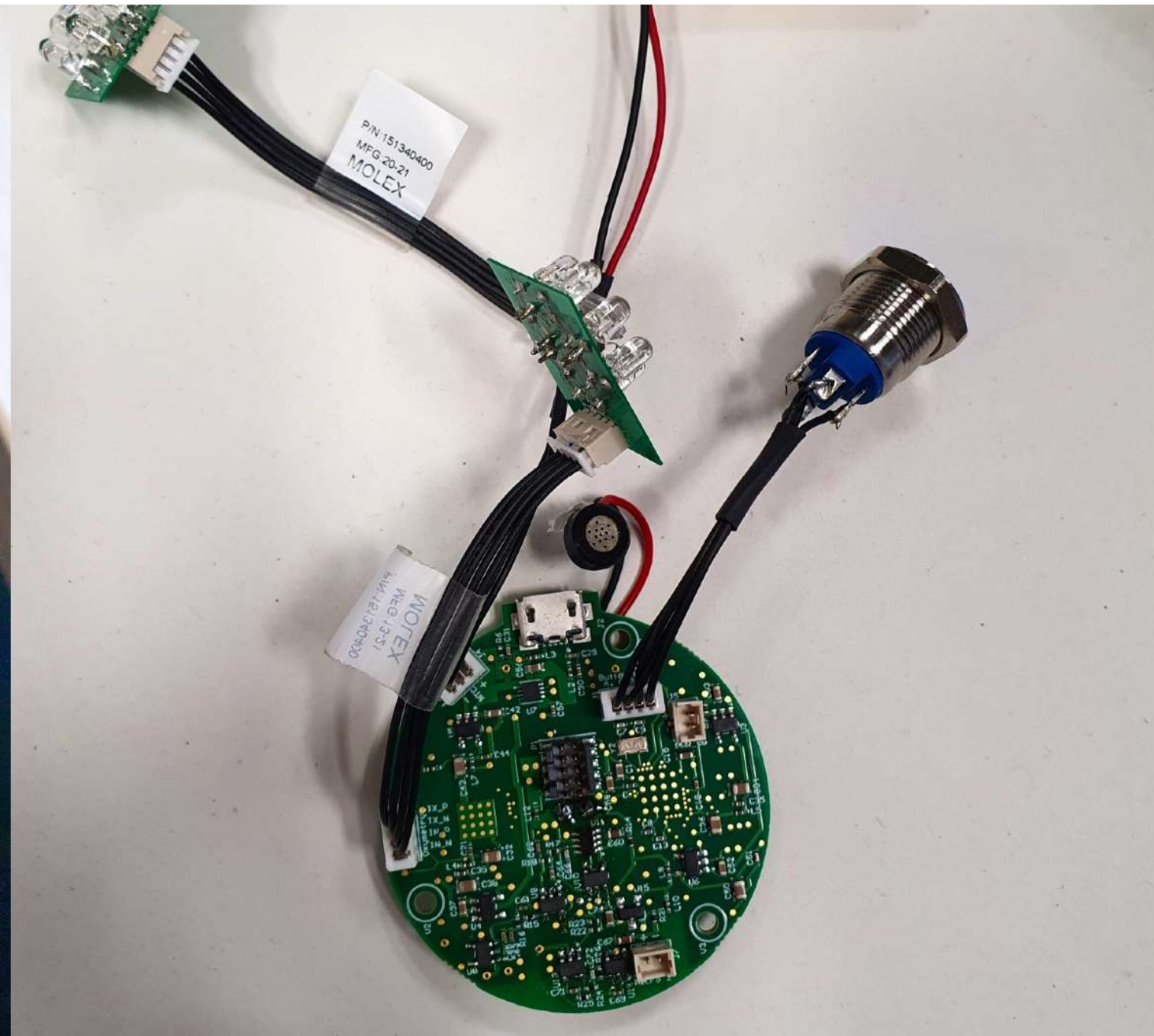
January to June 2021
(6 months)

Optimization and adding 3rd sensor



Objective

Optimization of electronics and adding the contact thermometer with hepia electronic lab

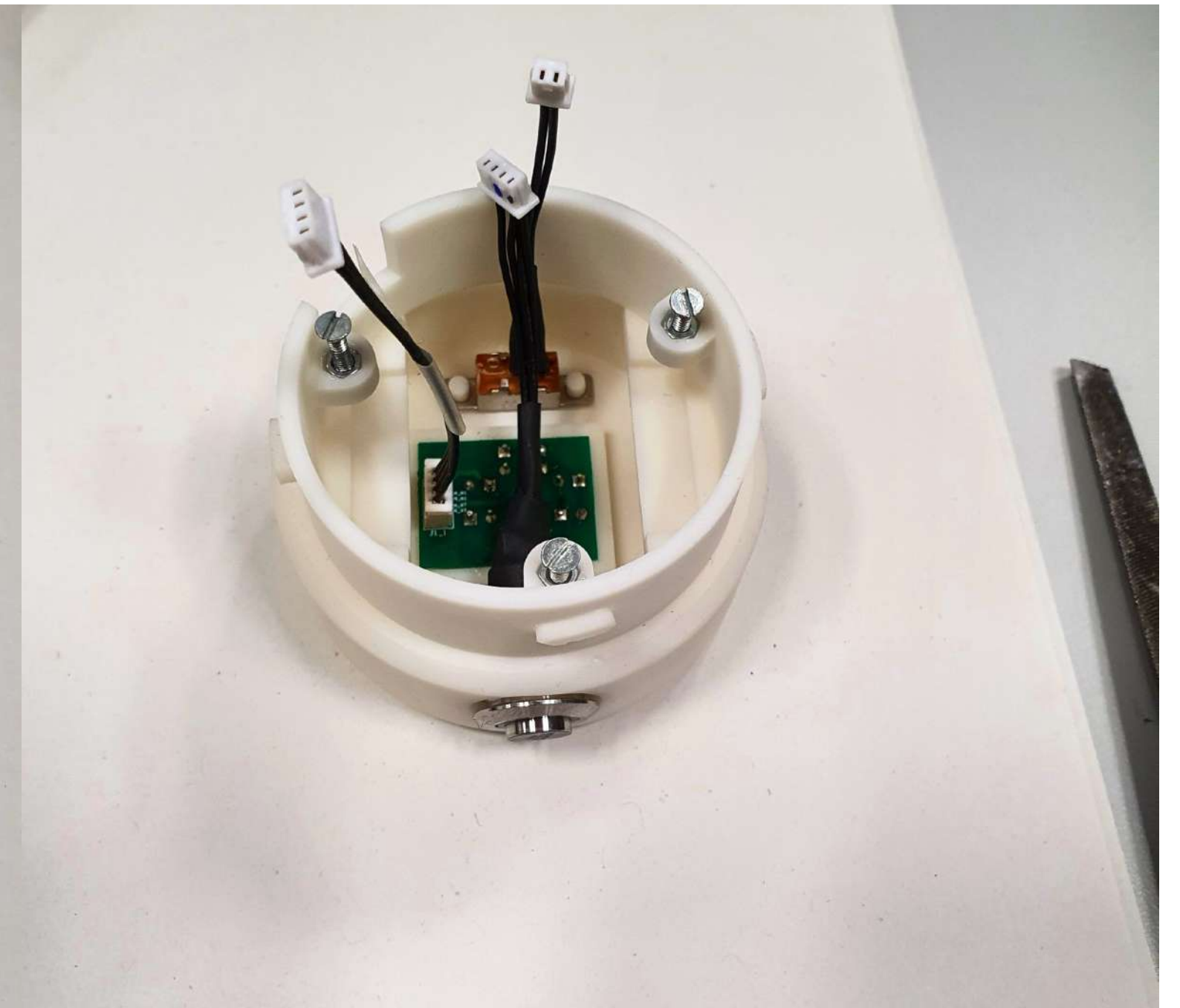


Workforce



h e p i a

Haute école du paysage, d'ingénierie et d'architecture de Genève



Timeline

June to September 2021
(4 months)

3rd prototype (3 in 1)



Objective

Validating technical feasibility for a 3-in-1 device with digital stethoscope, contact thermometer and pulse oximeter



Workforce



h e p i a

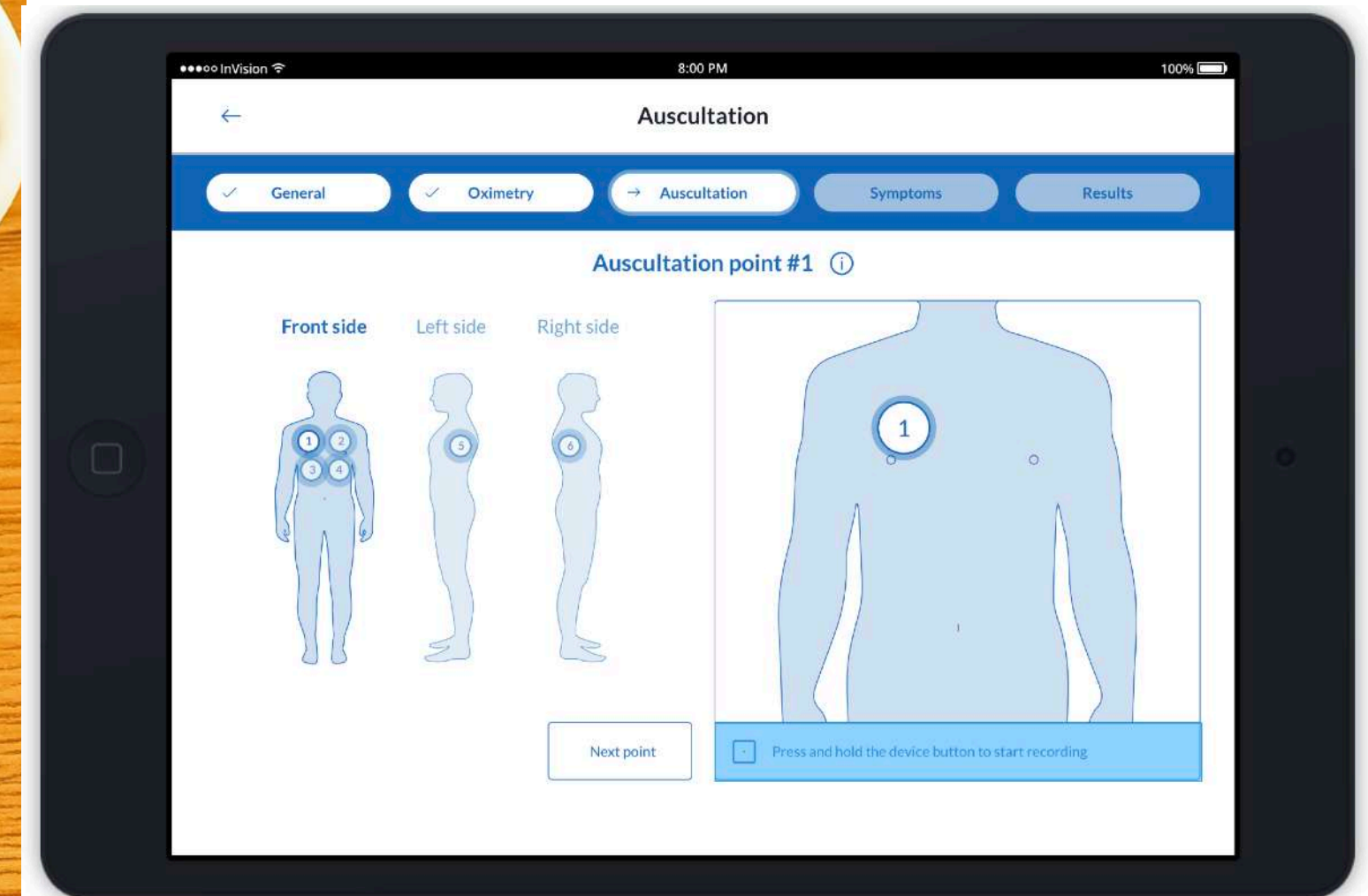
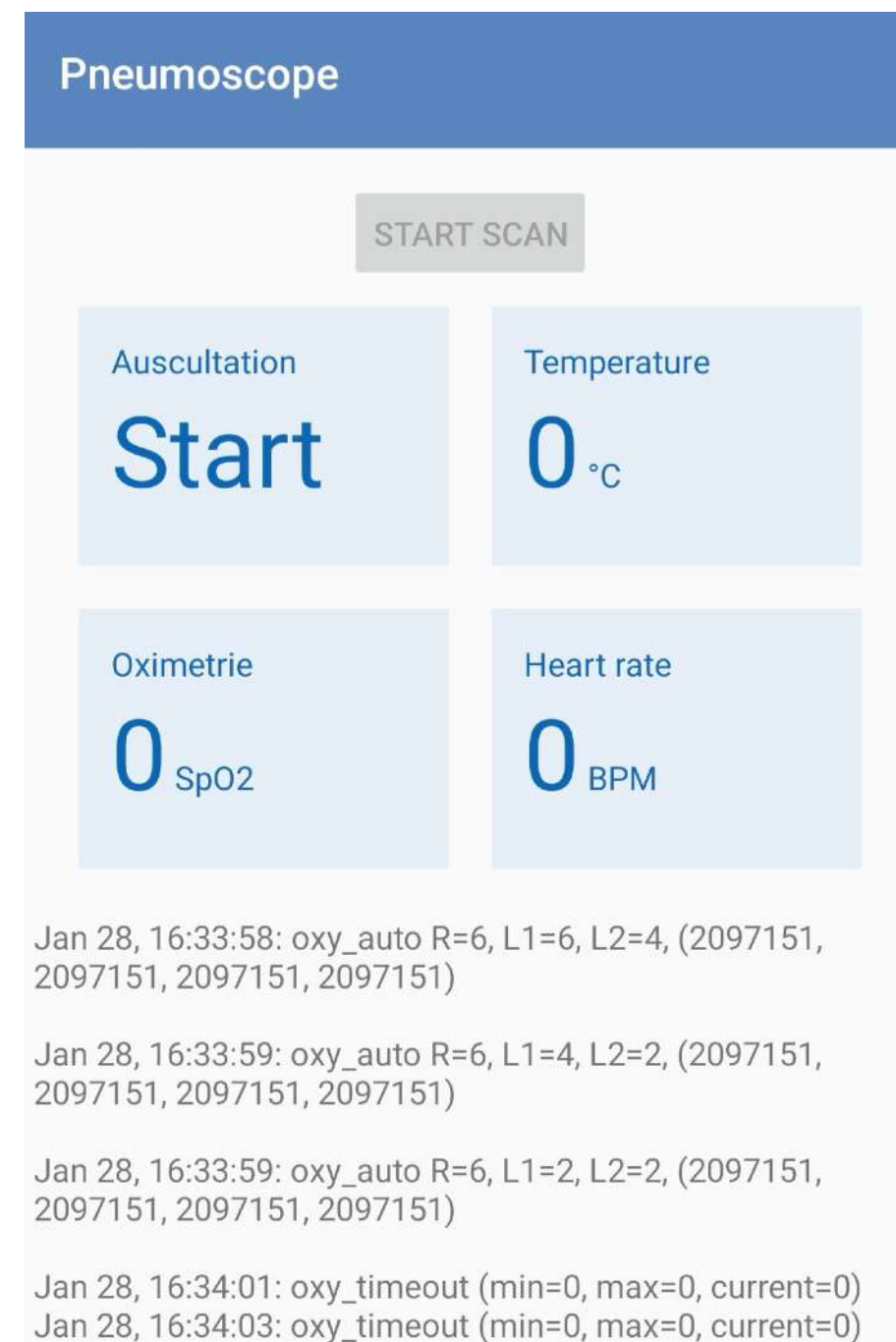
Haute école du paysage, d'ingénierie
et d'architecture de Genève



Timeline

September to December 2021
(4 months)

First App (PoC)



Objective

Develop a PoC App that communicates over BLE with Pneumoscope and a mock-up of the final App design with end-users

Workforce



apptitude

ppik
studio

Timeline

January 2020 to December 2021
(2 years)

Pneumoscope v2 - MVP
2022-2024

Designing Pneumoscope MVP



Objective

Design a tool that meets the user and technical requirements based on previous patented design



Workforce



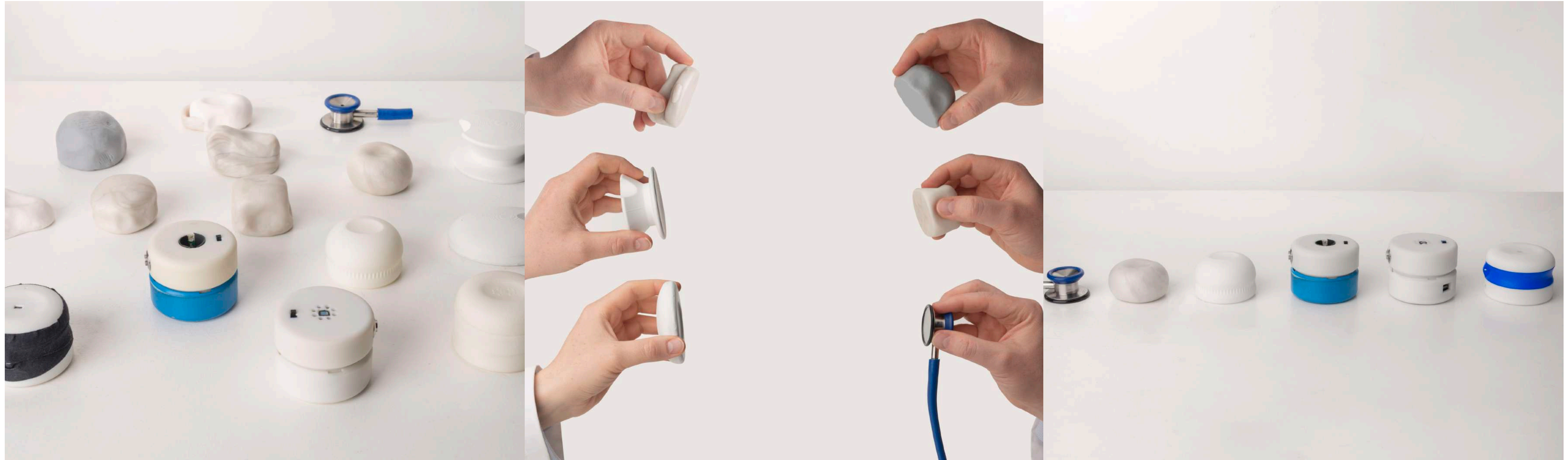
BUREAU 141



Timeline

January 2022 to March 2023
(14 months)

Co-development with end-users



Objective

Interviews, rapid prototyping and user tests to validate design, ergonomics and functions with end-users (Doctors, Nurses, Pharmacists)

Workforce



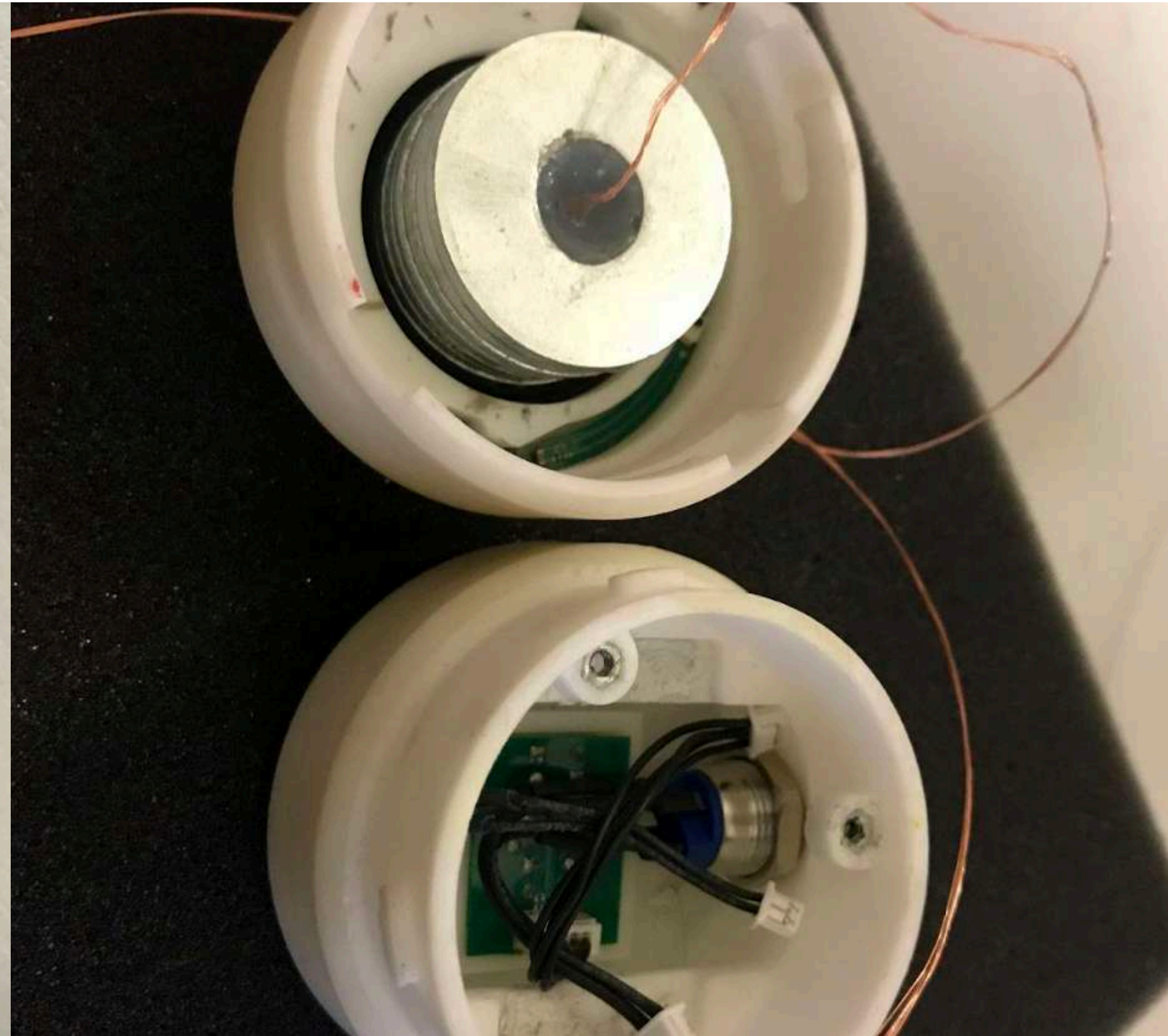
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Timeline

January 2022 to December 2023
(2 years)

Audio optimization (2nd iteration)



Objective

Optimization of acoustic signal compared to the specs of 3M™ Littmann® CORE & 3200 digital stethoscopes

Workforce

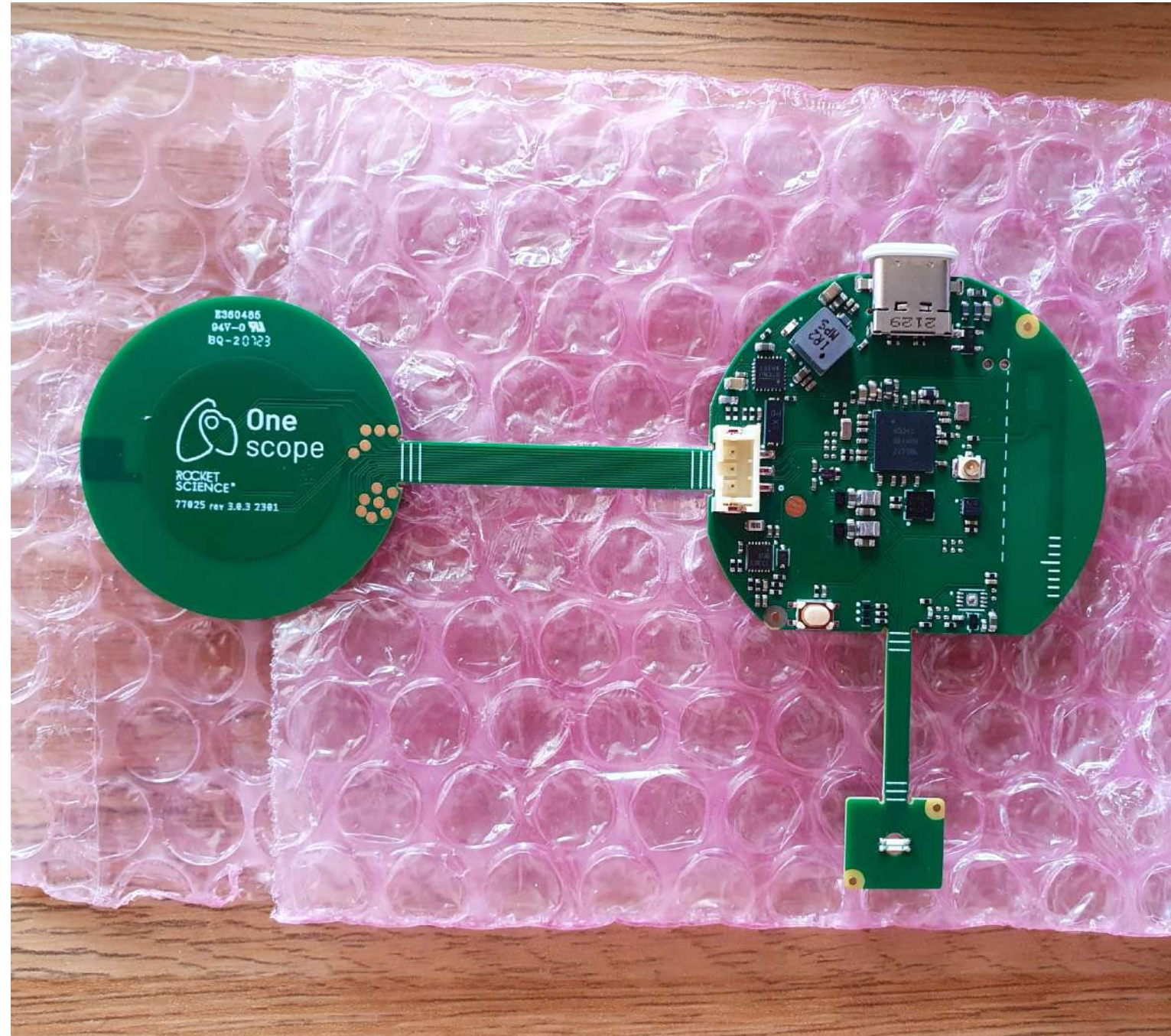


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Timeline

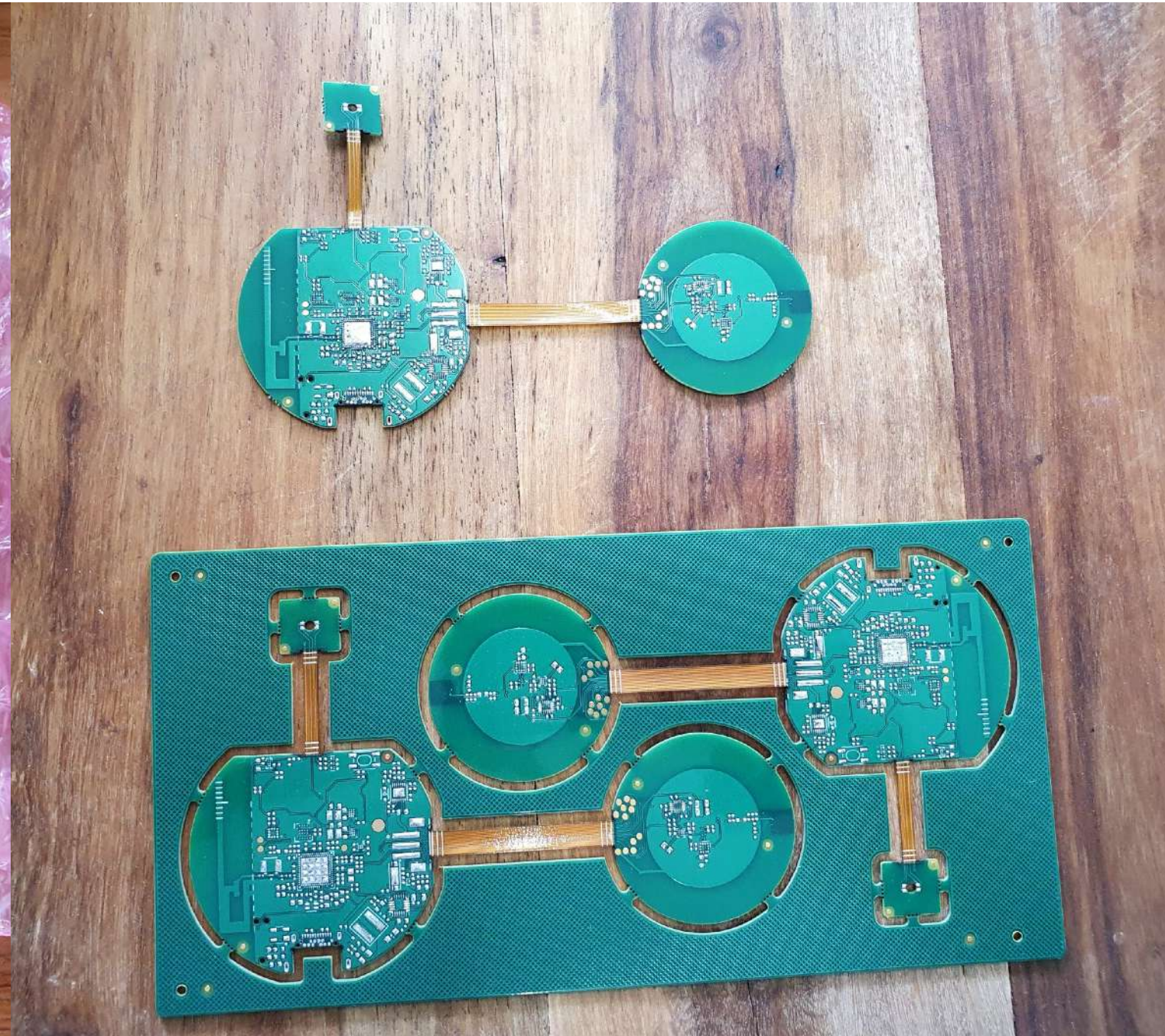
August to October 2022
(3 months)

Industrialization of electronics



Objective

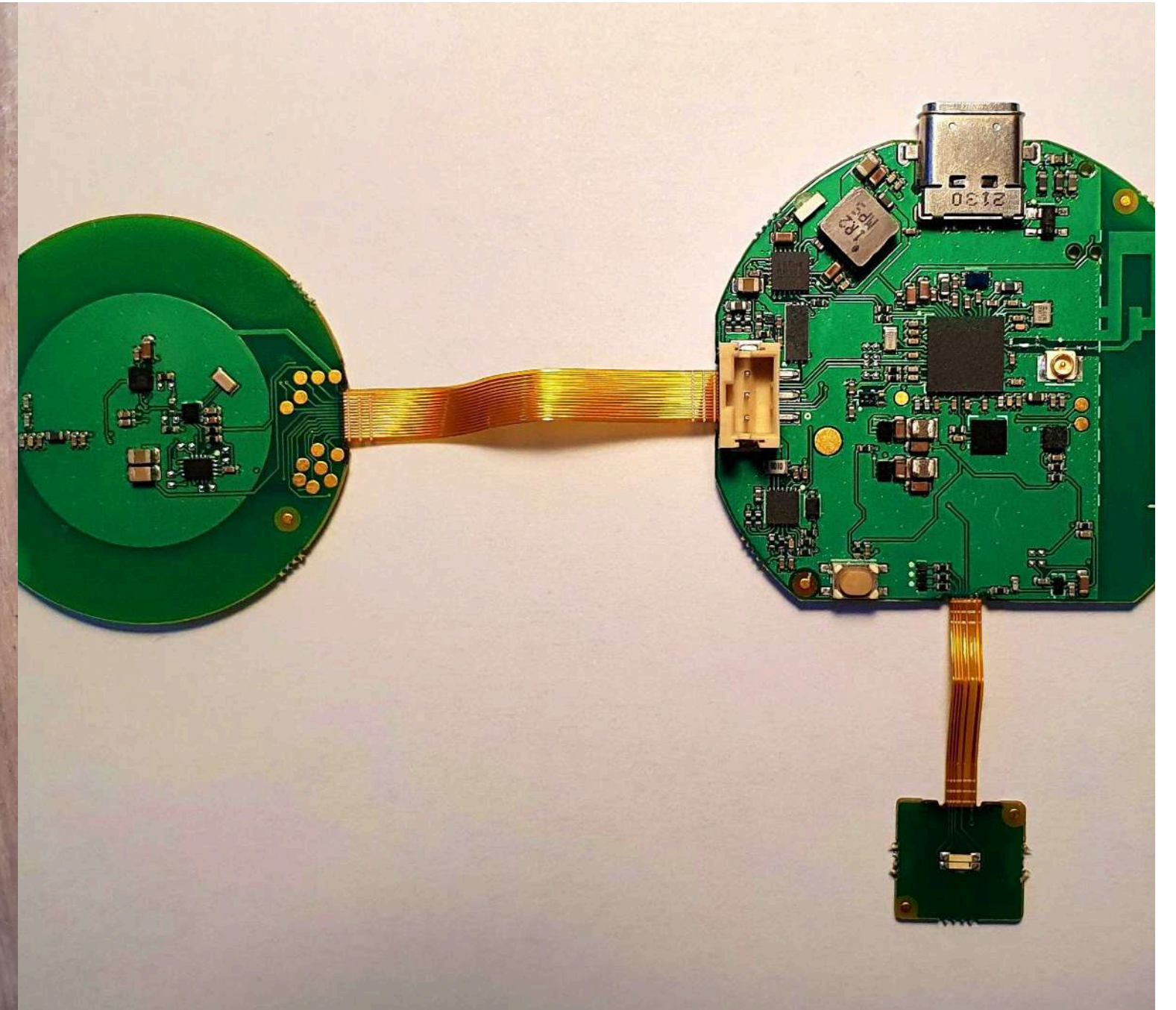
Complete re-design of the electronics to meet industrial and regulatory standards



Workforce



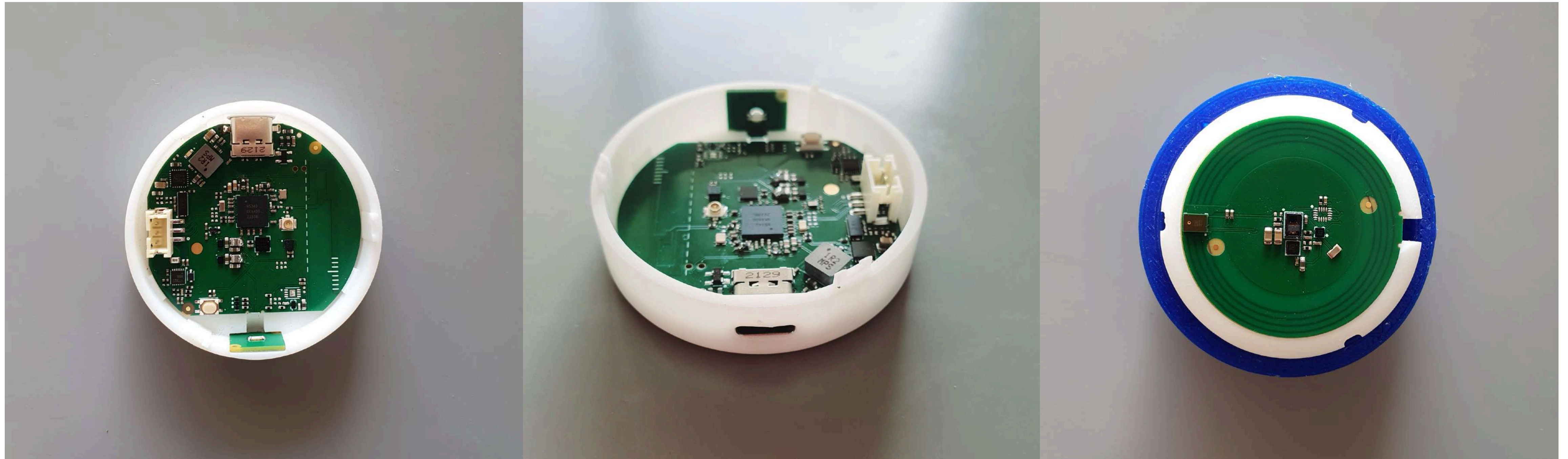
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Timeline

November 2022 to December 2023
(13 months)

Electronics implementation



Objective

Re-design of the inside of the case to fit new electronic board design

Workforce

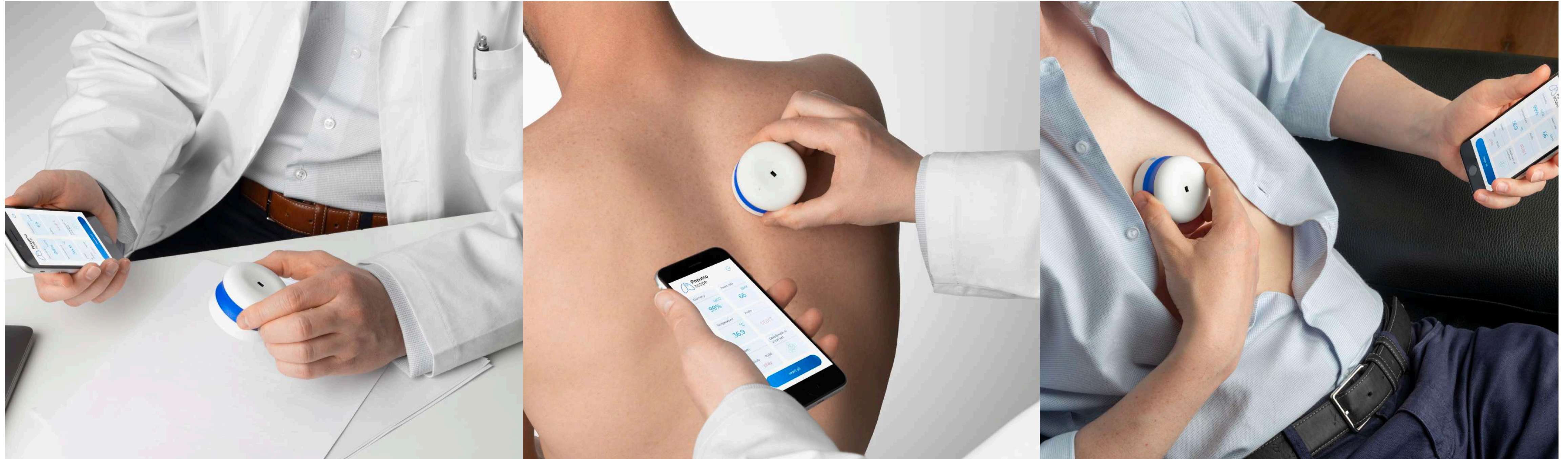


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Timeline

January to April 2023
(4 months)

Photo shooting



Objective

Produce communication material for product and business development

Workforce



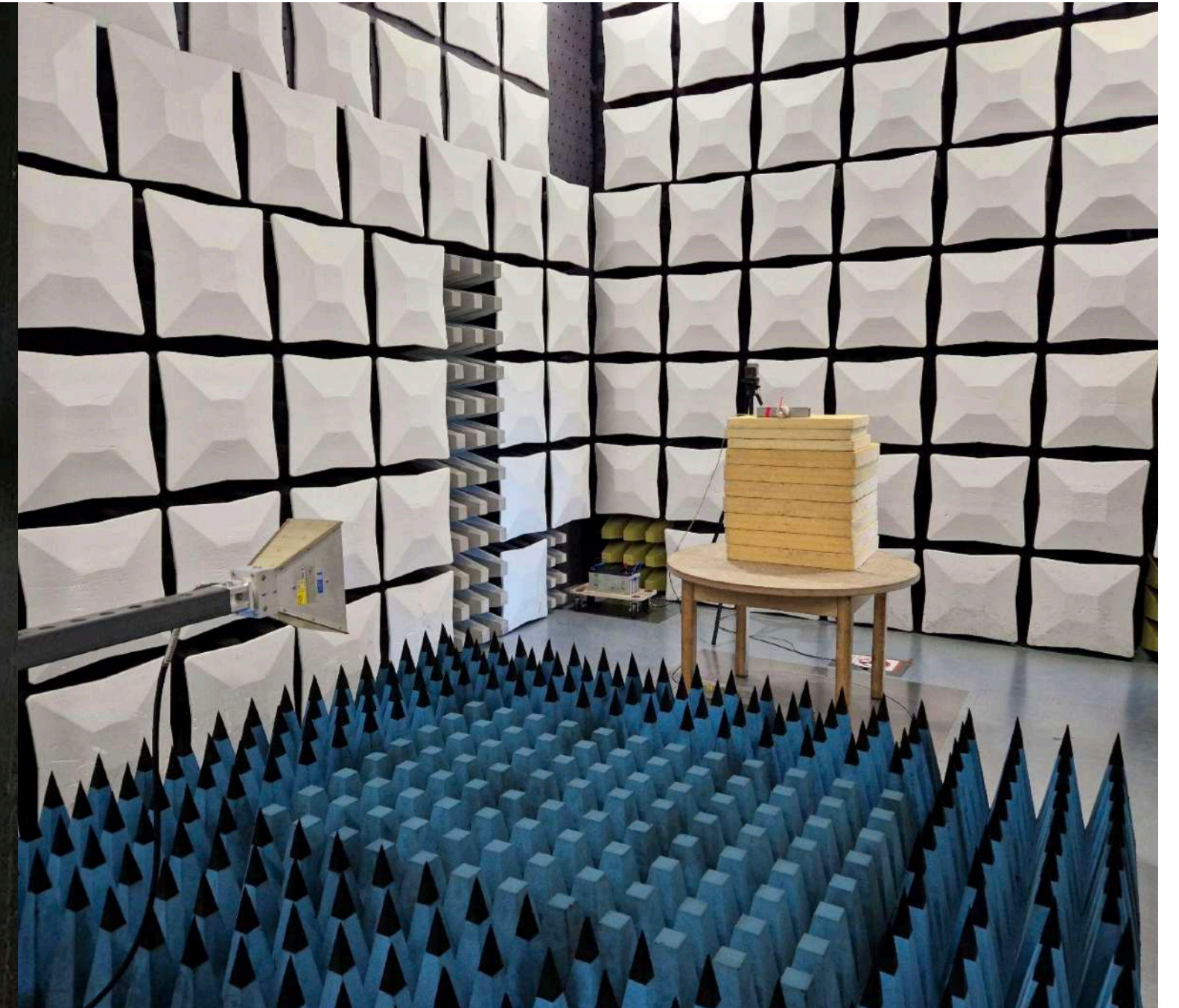
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Timeline

May to June 2023
(2 months)

Product pre-testing for CT and CE

pass



Objective

Pre-testing prototypes in lab with EMC and Electrical safety tests to meet medical standards

Workforce

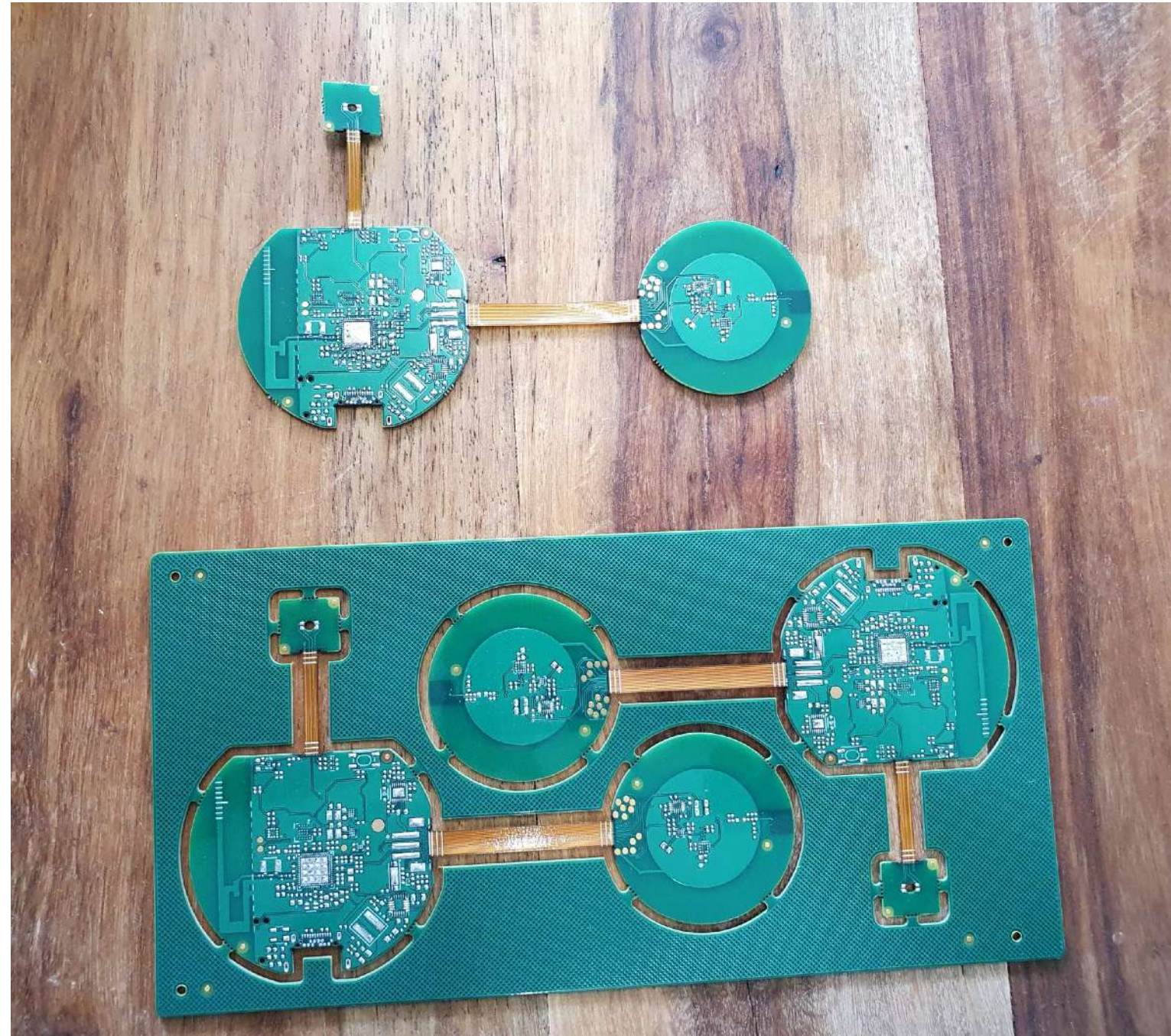


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Timeline

June to December 2023
(6 months)

First medical compliant prototype



Objective

Production of prototypes for the 1st Pneumoscope clinical trial to validate Hardware performance

Workforce

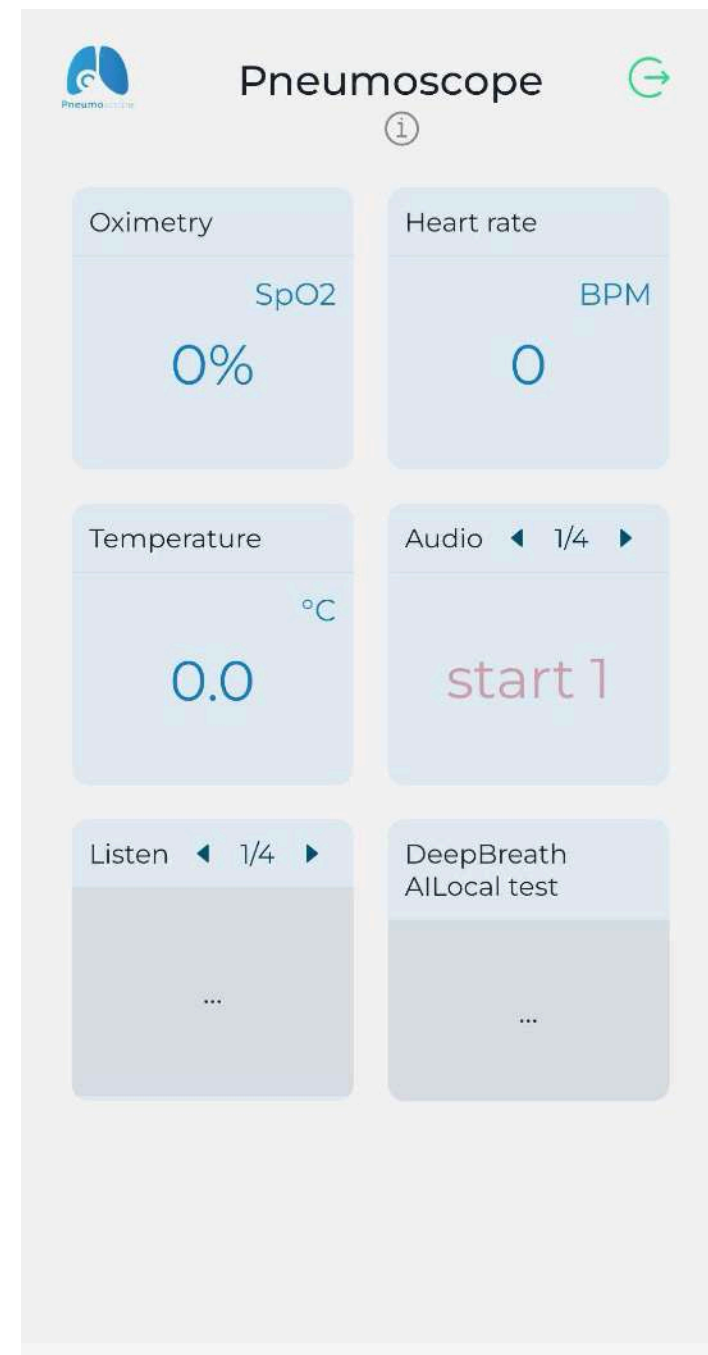


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Timeline

January to April 2024
(4 months)

Second App (MVP)

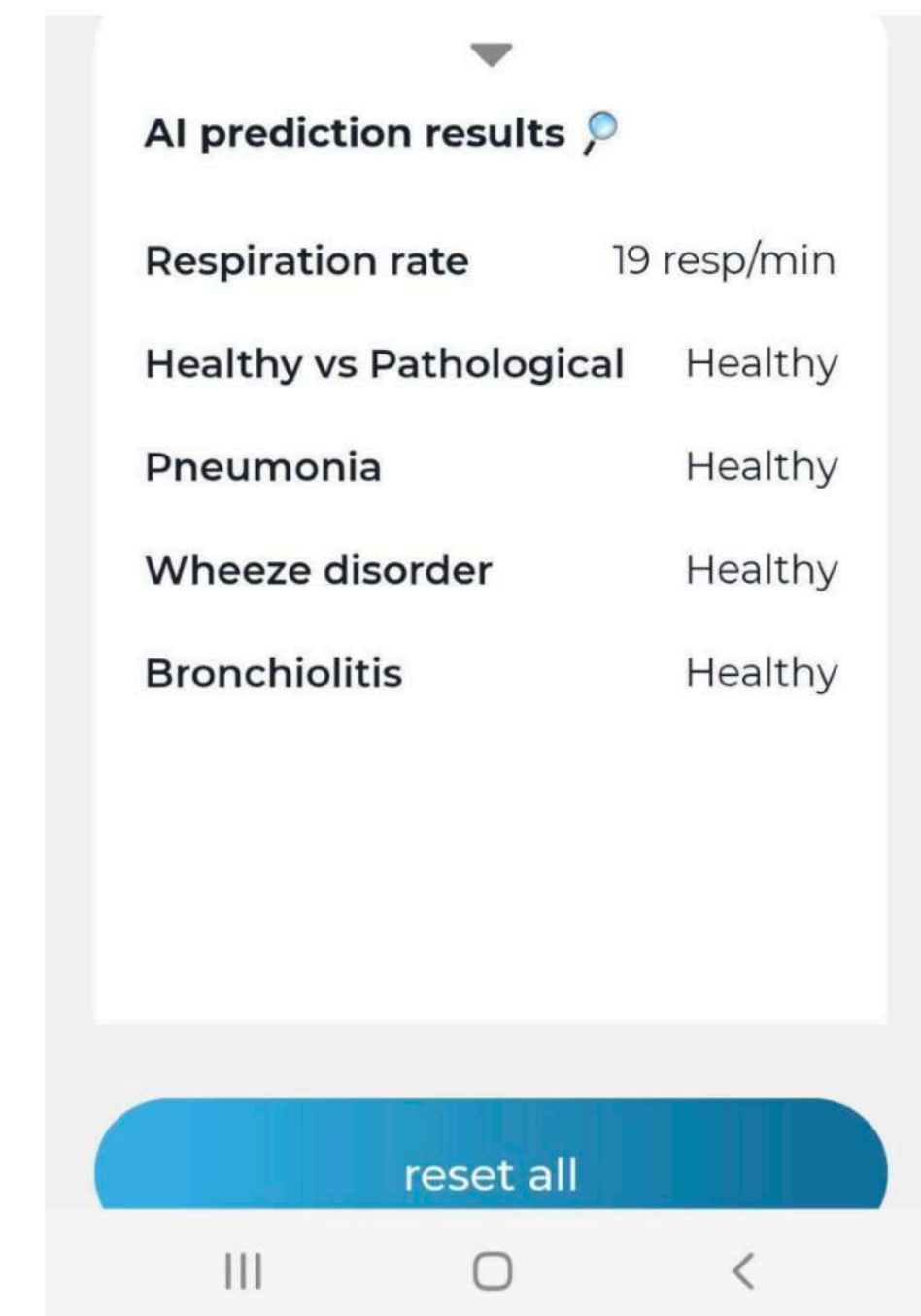


Objective

Update previous POC App to include DeepBreath AI model and offline mode for clinical studies



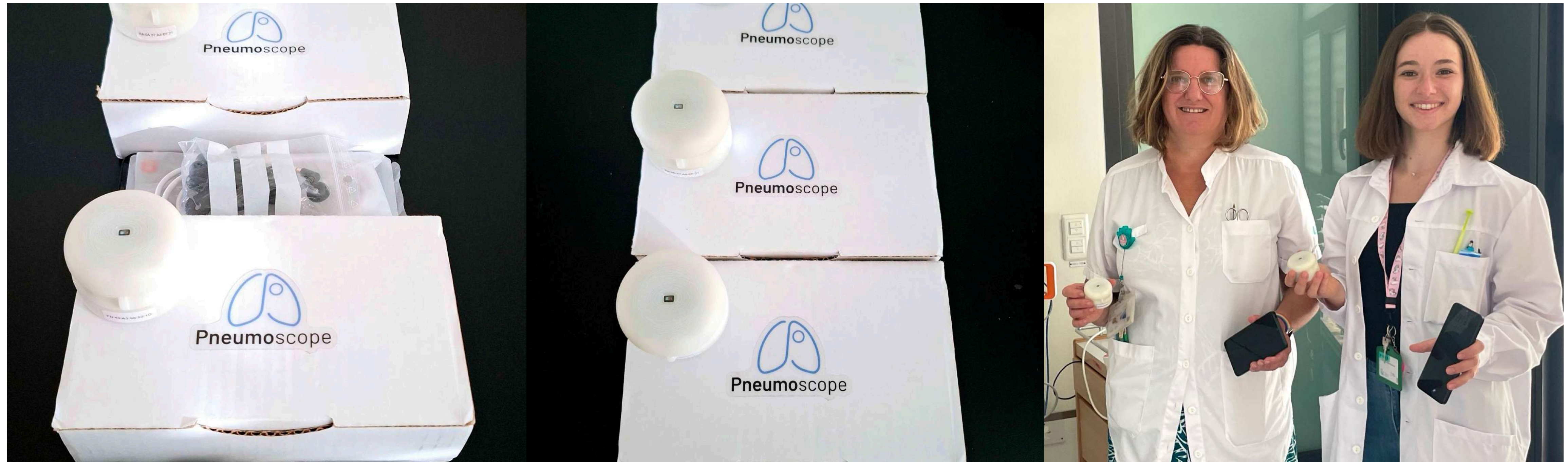
Workforce



Timeline

June 2023 to April 2024
(10 months)

Clinical trial #1 in HUG (Geneva)



Objective

Setup Pneumoscope packs for the clinical study in Geneva University Hospital on 250 patients

Workforce



Timeline

May to August 2024
(4 months)

Results of clinical trial #1

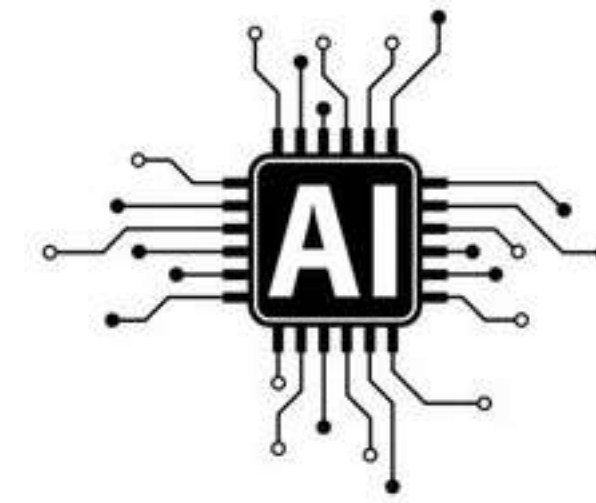


Digital stethoscope

64%

Pneumoscope > 3M™ Littmann® CORE

Consensus of 2 senior doctors rating blindly the quality of 100 recorded lung sounds (randomly selected) with Pneumoscope and 3M™ Littmann® CORE digital stethoscope



DeepRR AI model

0,89

AUC score

2 Results

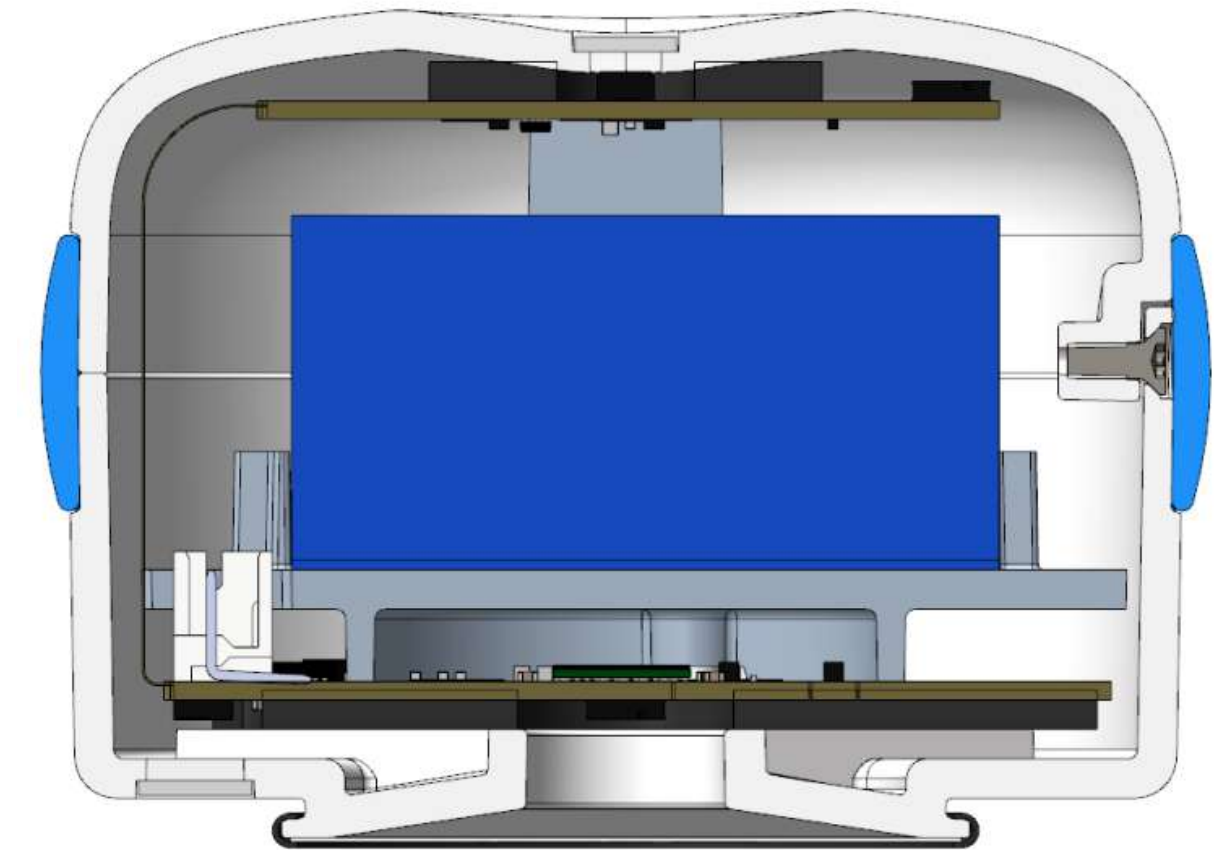
Table 2 shows that the best performing model is the pre-trained on Littmann, fine-tuned on Pneumoscope (L+P_ft).

Table 2: AUROC for each training procedure

Name	AUROC
L_only	0.78
P_only	0.51
L+P	0.87
L+P_ft	0.89

Pneumoscope v3 - Product 2024-2025

Housing industrialization



Objective

Optimization of housing design for plastic injection and assembly

Workforce



Timeline

April to June 2024
(3 months)

Pneumoscope housing elements



Objective

Design and rapid prototyping of housing elements to facilitate production and final assembly

Workforce



multiple
global design

Timeline

July to October 2024
(4 months)

Plastic injected part (FOT)



Objective

First-Out-of-Tool plastic injected part in biocompatible material

Workforce

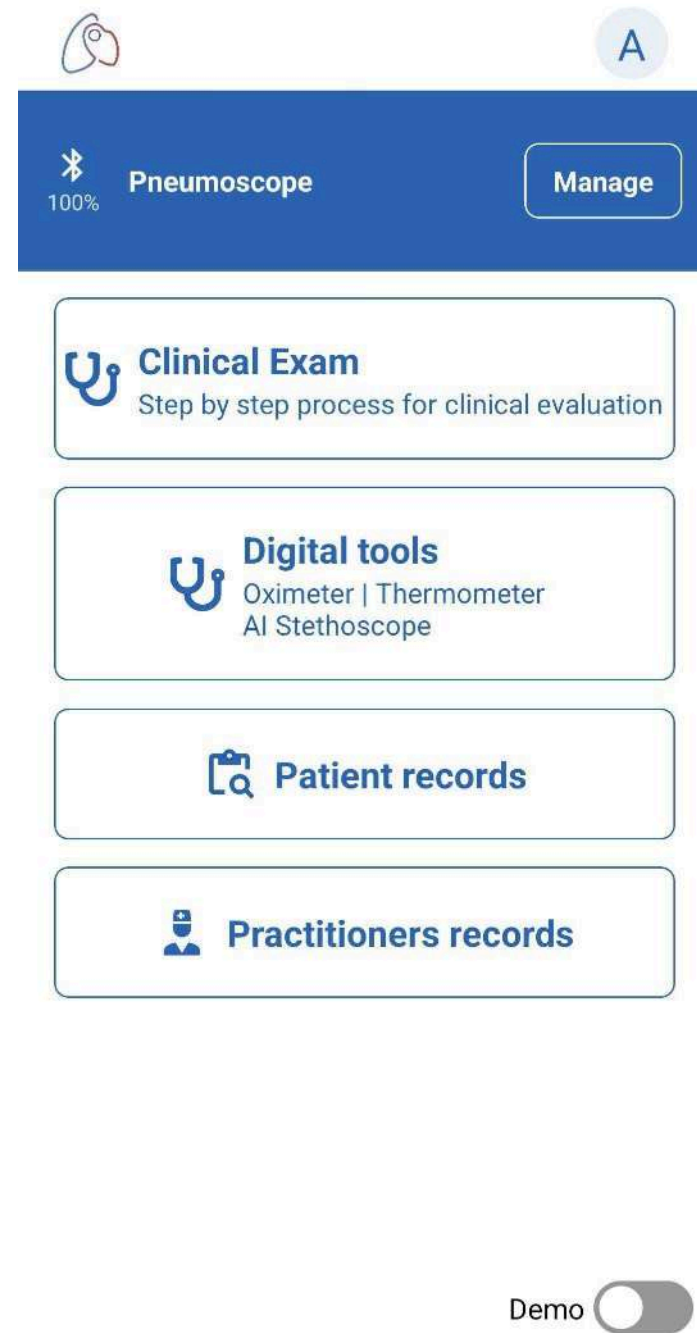


multiple
global design

Timeline

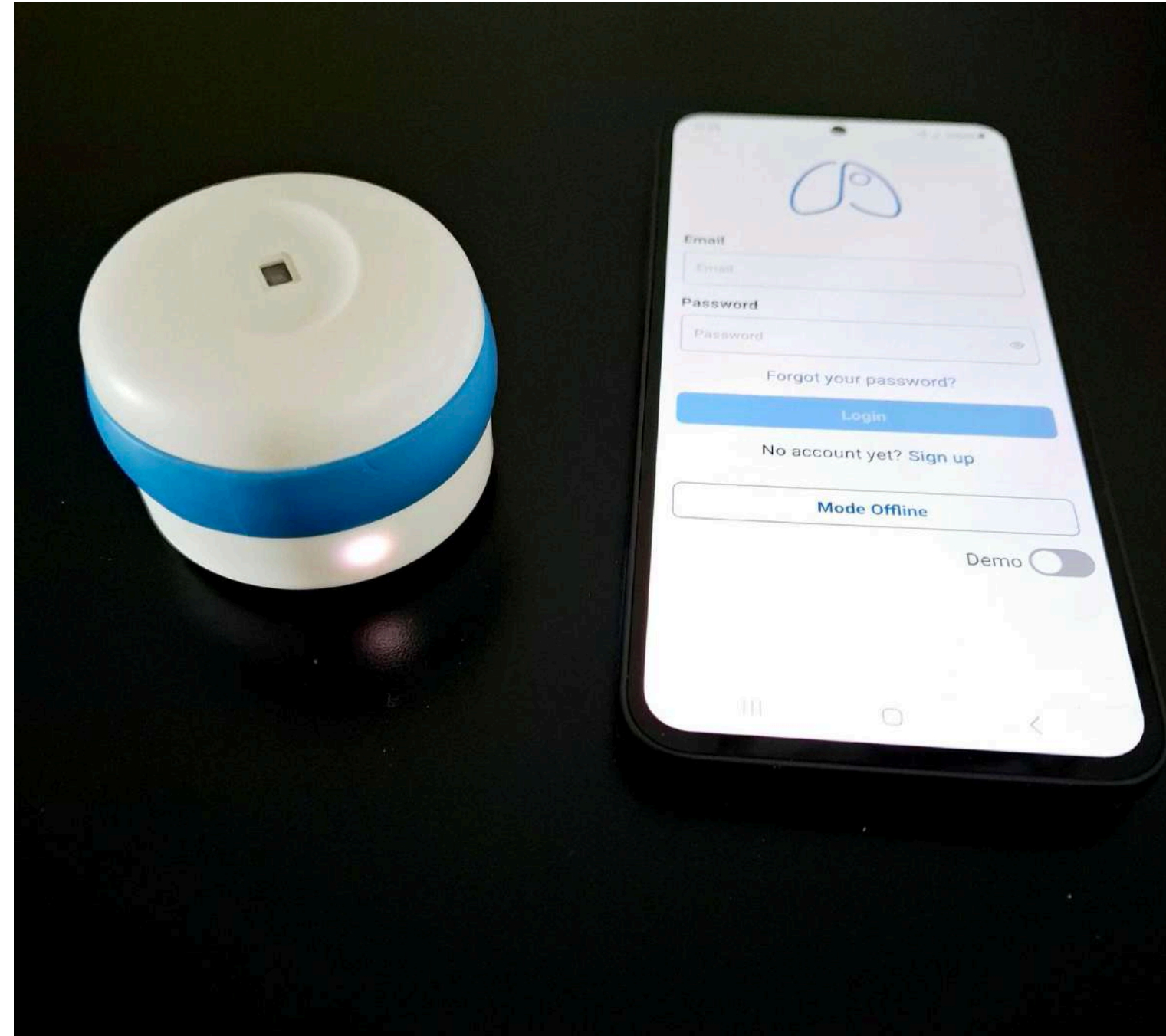
November to December 2024
(2 months)

App beta version (Product)



Objective

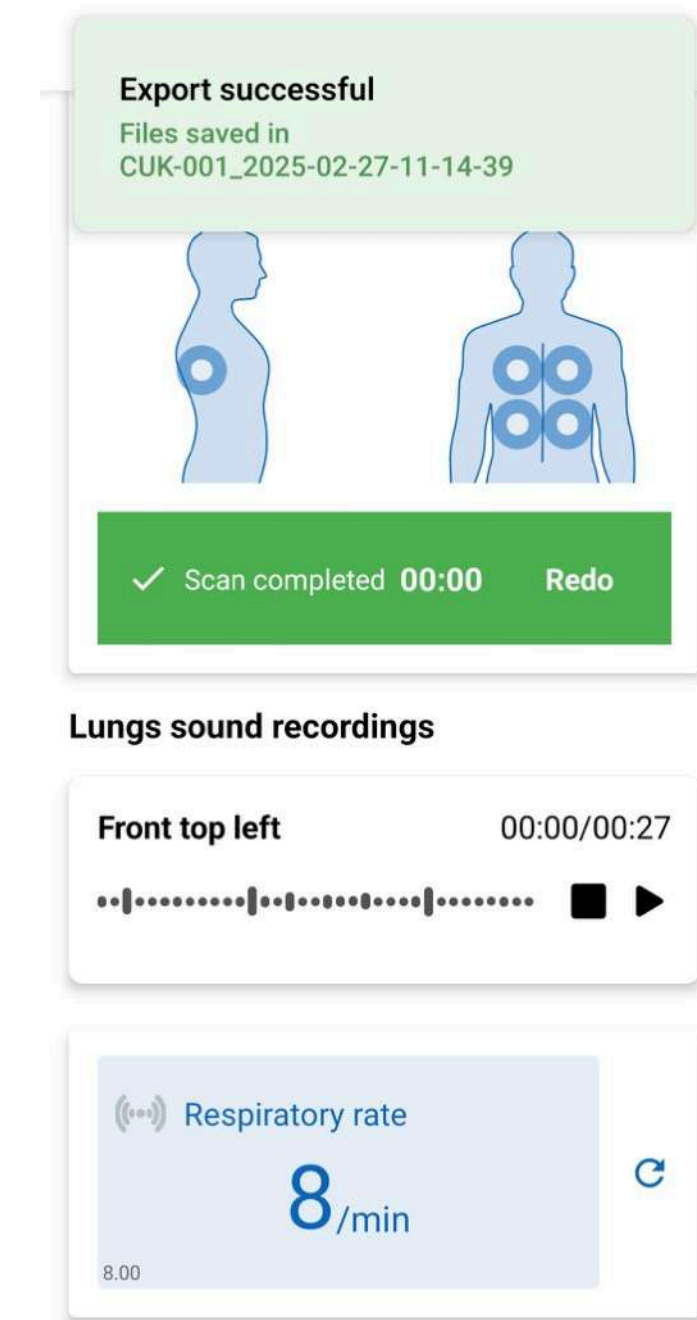
Develop the final version of the App for B2B segment (design freeze for CE) that meets user and medical requirements



Workforce



ppik
studio



Timeline

September 2024 to March 2025
(7 months)

Clinical study in Congo setup



Objective

Production and setup 8 Pneumoscope full packs for the clinical study in DRC

Workforce



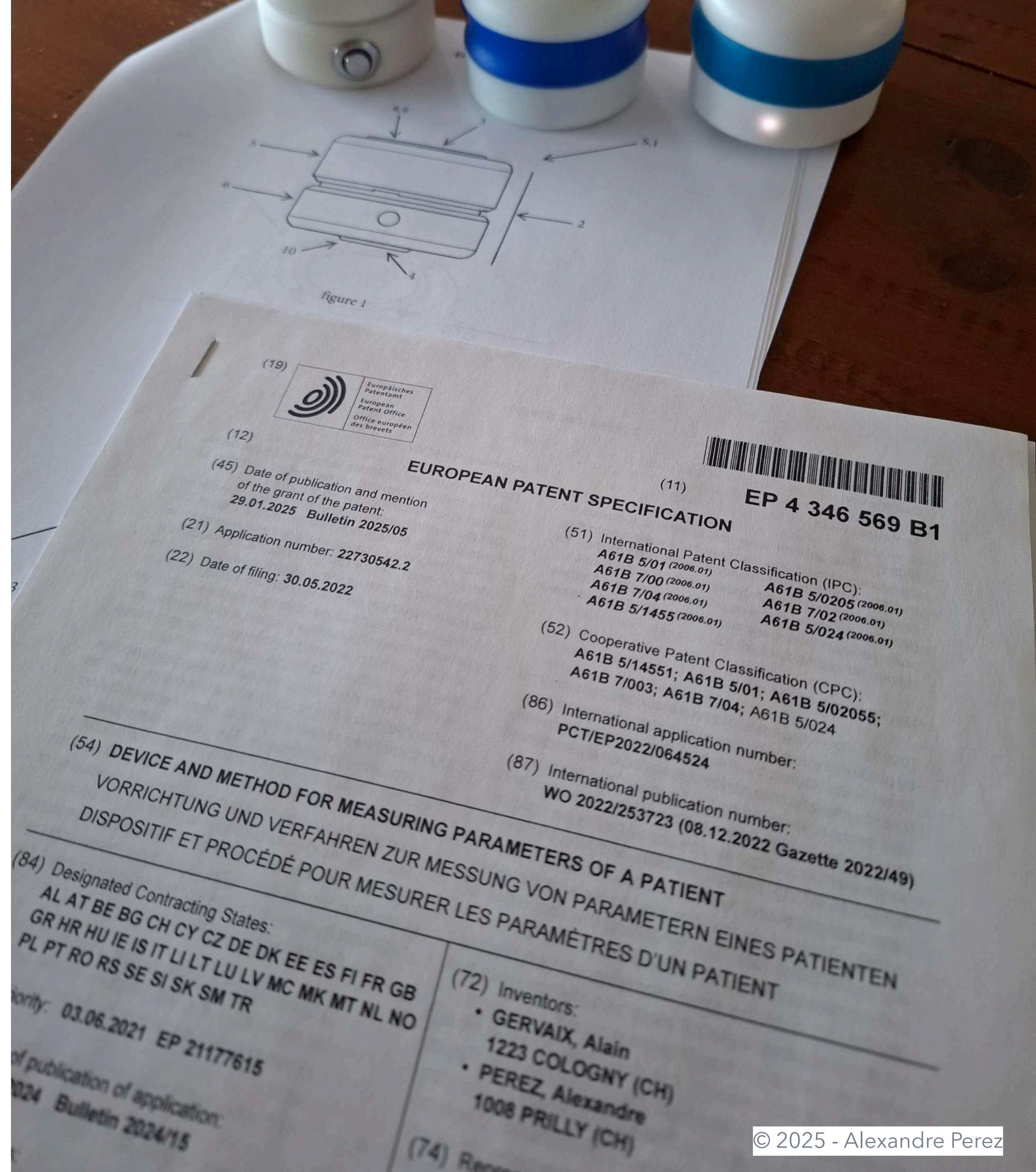
Timeline

January to February 2025
(2 months)



European Patent

Granted January 29th 2025



Clinical studies in Africa: Ethiopia/Mozambique/Gabon/Congo



Objective

Production, setup of 17 Pneumoscopes study packs and doctors training to prepare clinical trials in 4 countries in Africa

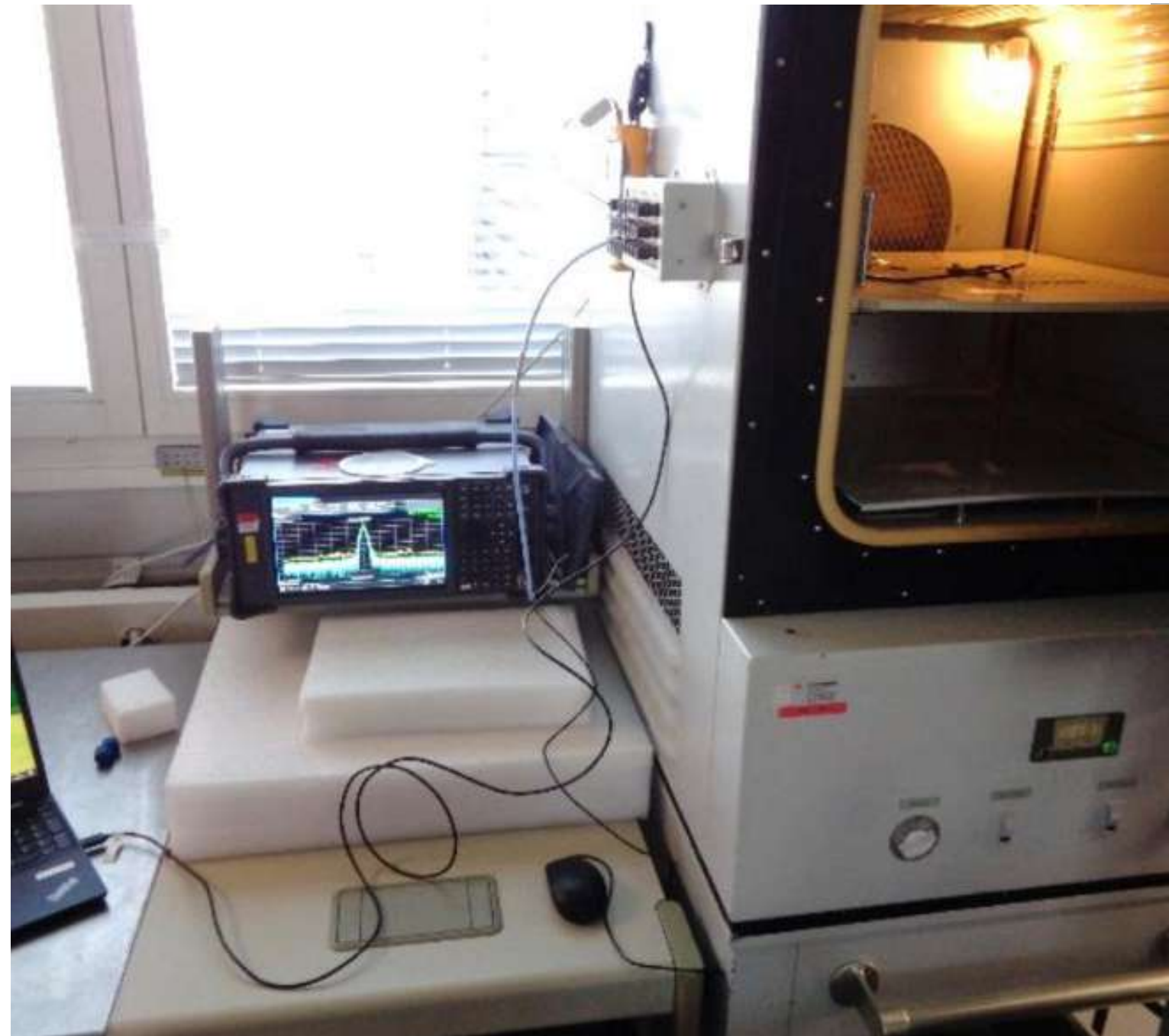
Workforce



Timeline

May to December 2025 (7 months)

Product testing for CE marking



Objective

Testing device in accredited lab (Eurofins) for CE marking (EMC/Radio, Biocompatibility, Electrical Safety)



Workforce



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Timeline

June to December 2025
(6 months)

Product industrialization



Objective

Production of the first industrialized batch (100 units) with industrial partners

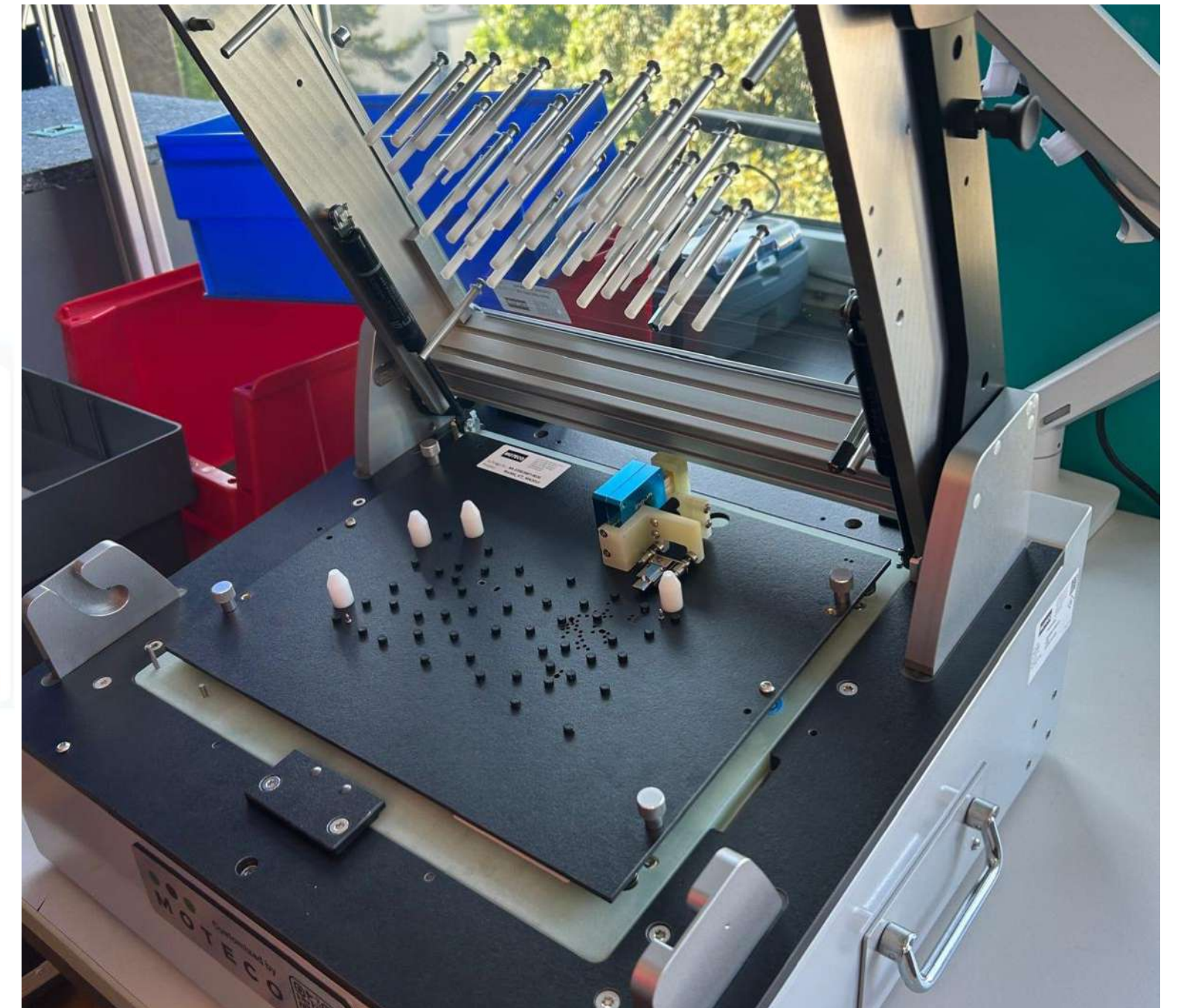


Workforce



Timeline

March to December 2025 (10 months)





Thank you to all our
development partners

Alexandre Perez - September 2025