



Vision Odyssey

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Agile Robots

18

million

expected global shortfall of qualified
health workers by 2030

38X

increase

in telehealth usage in the US compared to
pre-COVID-19 levels

3.2

billion people globally

cannot reach any healthcare service within
one hour by foot - most of which live in low-
and middle-income countries



By 2030, WHO estimates a significant shortage of HCPs, across all qualification levels.

An aerial, high-angle photograph of a busy city street. The street is filled with many pedestrians walking across a crosswalk. The image is in black and white, with a dark, moody atmosphere. The text is overlaid in the center of the image.

The demand for imaging is outpacing the number of radiologists.



Long wait for ultrasound imaging have resulted in acute surgery.

Research

Interview + Field Trip

Jonas

General Practitioner

A better flow of patients.

Anna

Specialist
Anesthesia & Intensive Care

Being able to perform an ultrasound instead of having to refer is desirable.

Peter

Chief Physician
Anesthesia & Intensive Care

The biggest challenges with ultrasound is to interpret the result.

You need a lot of education before you can use an ultrasound.

It is not something that they teach in med-school so it is self driven. Then you can also learn from others at the hospital.

Everything in the future revolving AI that can make our day easier is of interest.

Real Case

In June 2020 a woman in her 30's was referred to an ultrasound screening in the south of Sweden. The screening was prioritized to be performed within four weeks. Due to the lack of radiologists performing ultrasound - the woman was not called in time.

Instead, she received a time 10 months after the initial referral. During this time - the woman had to undergo acute surgery and due to complications she had to have further surgical operations.

Most likely, the complications in the surgery occurred due to long wait for ultrasound.



Identifying the Right Patient Earlier.

Early detection and treatment can be lifesaving
- Just not for all health issues.

**The case could be made that our ability to test
has outpaced our ability to interpret the
results.”**

- Robert H. Shmerling, MD, Senior Faculty Editor,
Harvard Health Publishing.

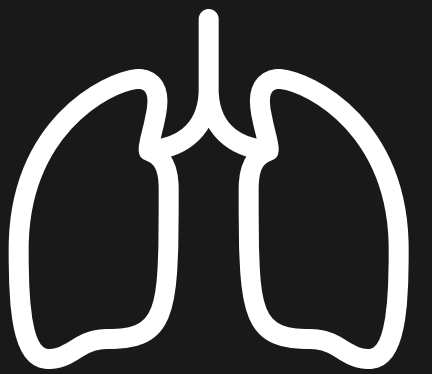


US: Image Modality of Choice in Resource Poor Environments.

Effective diagnosis and treatment of pneumonia is critical to improve child survival.

To meet the Sustainable Development Goal targets for SDG 3.2.1 (reducing child mortality). Ending preventable pneumonia-related deaths is an urgent priority.

Pneumonia



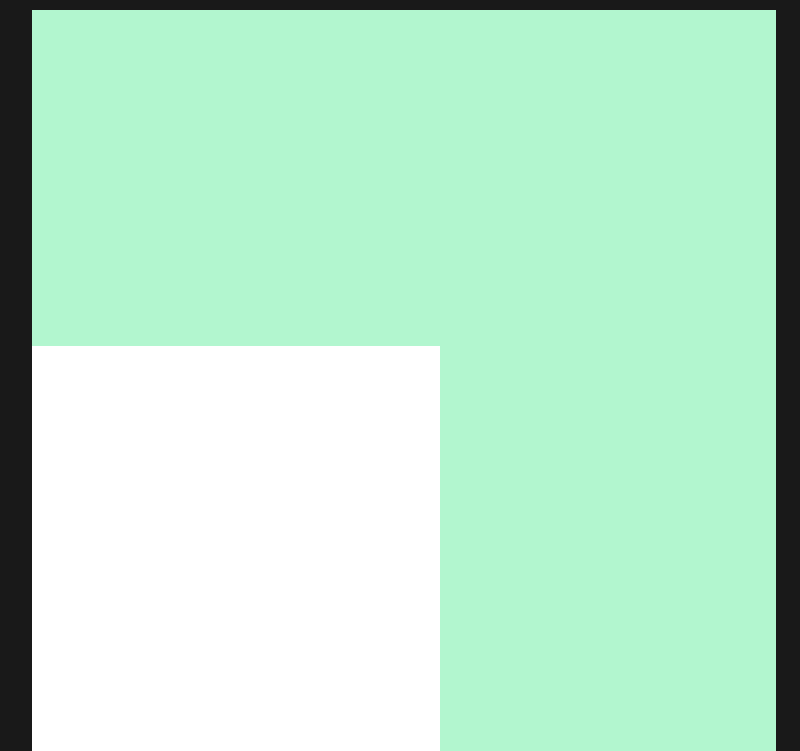
740 180 under the age of 5.
Largest infectious cause of death worldwide.
Early detection is crucial for better prognosis.

80-90%

Sensitivity of ultrasound when performed by an expert.

60-75%

Sensitivity of chest x-ray.



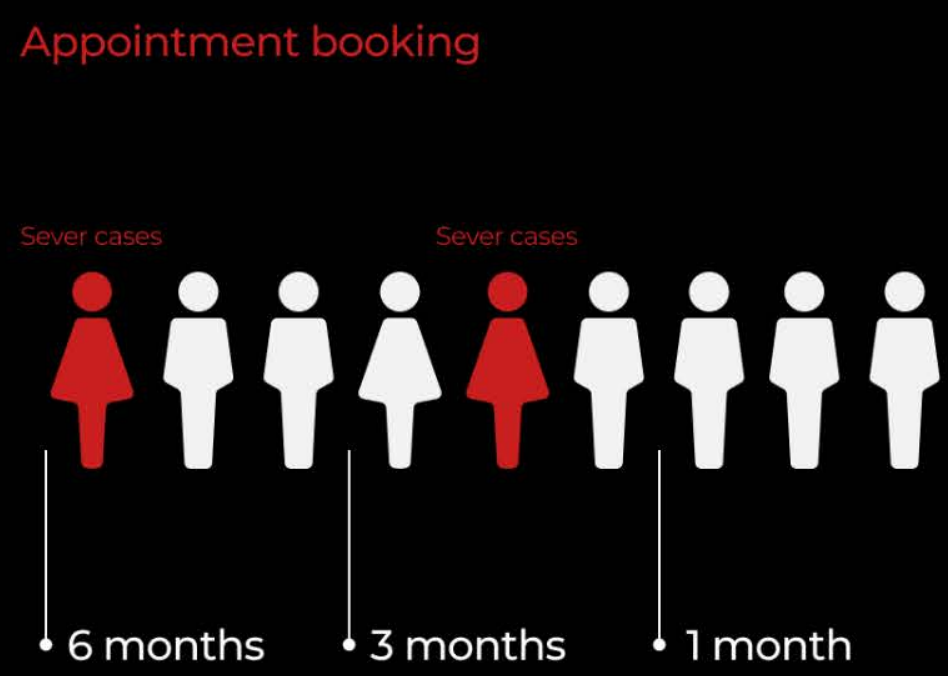
Current Diagnostic Journey





→ Case that require a specialist

↘
Filtering
(can be wrong)



→ Specialist
shortage of HCPs

→ Observation
+ test (if necessary)

→ Diagnosis



What if Agile Robots could be the filter to reduce the patient overload for HCPs.





Robot
Observe & share data

→ Case that require a specialist

↘
Filtering
(can be wrong)



Appointment booking

Travel...

→ Specialist
shortage of HCPs

→ Observation
+ test (if necessary)

→ Diagnosis



Robotics + AI as Diagnostic Support

Purpose



Significant **shortage of healthcare professionals** across all fields by 2030.



As ultrasound is a **competence driven** method, we want to create a solution that enables **ultrasound to be used by more HCP's**.



This, in order to **reduce lead time** to provide the right patient with the right treatment.



What

Ultrasound challenges

Competence driven

Limited quality of US images

Subjectivity in image interpretation.



Vision Odyssey



Solution will enable

Accurate movement

High image quality

Detailed Interpretation of result





Vision Odyssey



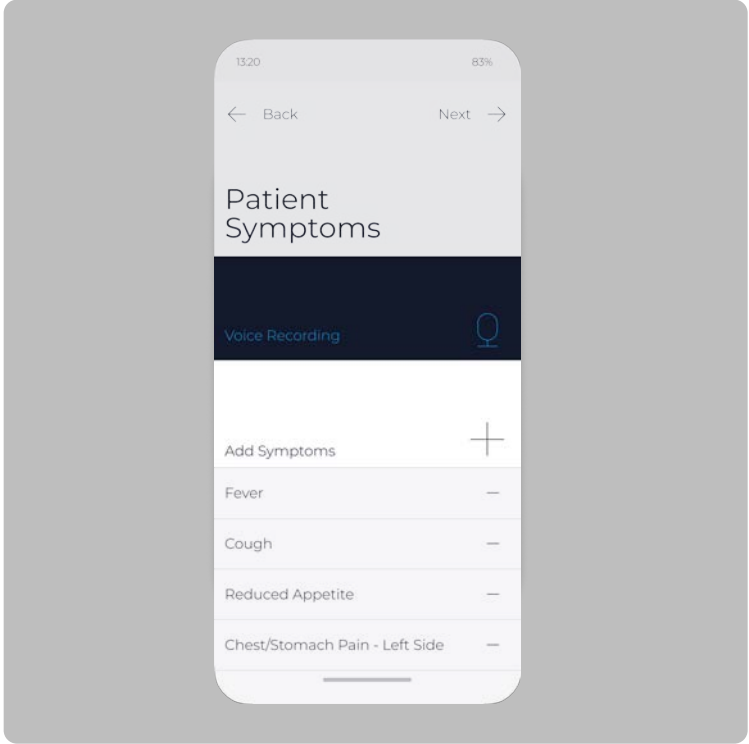
Enabling accurate and controlled ultrasound movement.



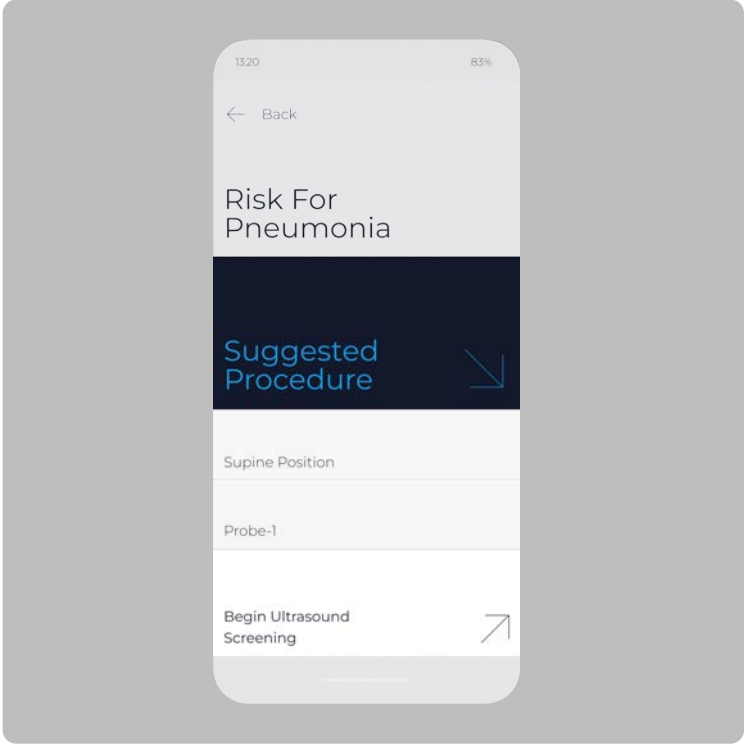
Assisted Workflow



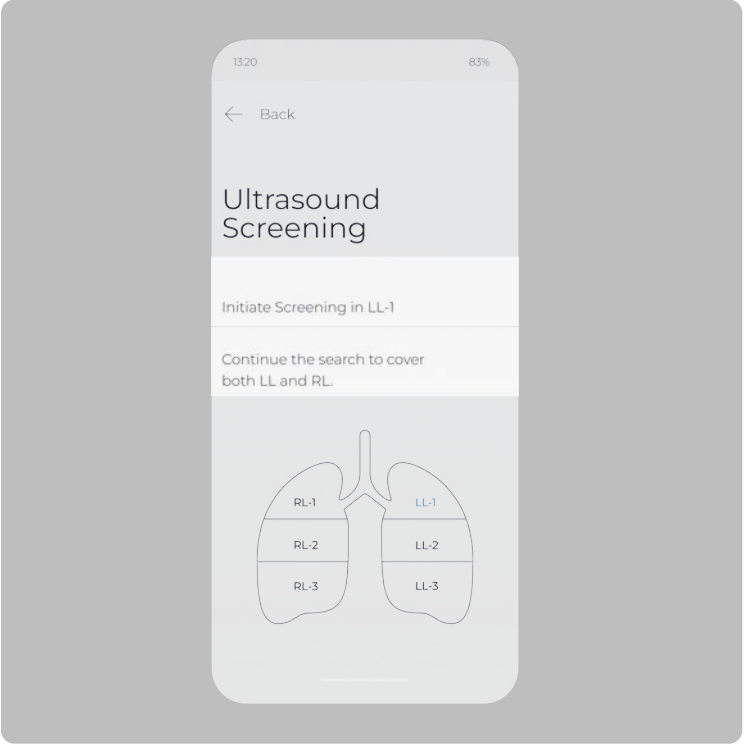
New Patient



Symptoms



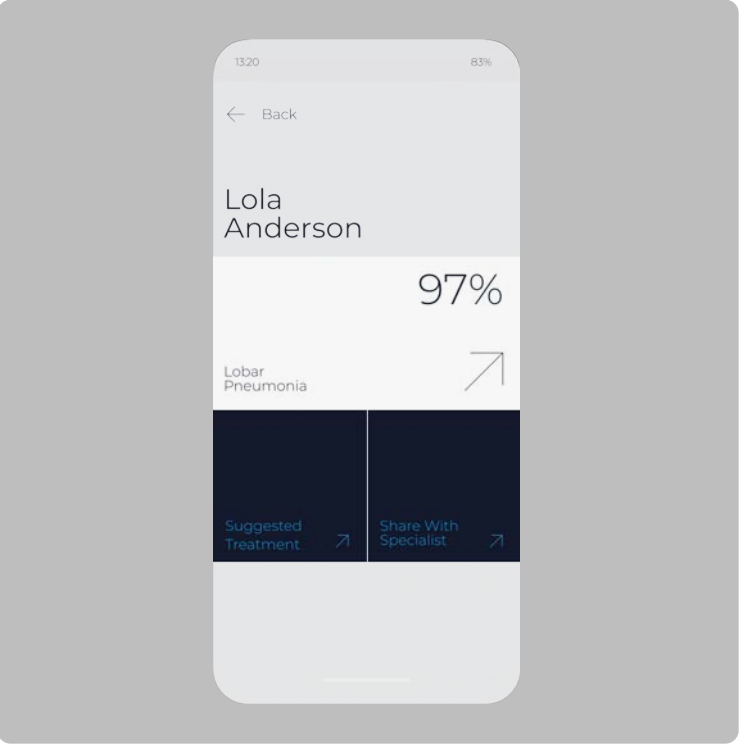
Suggested Procedure



Ultrasound Screening Support



Guided with Movement and Light



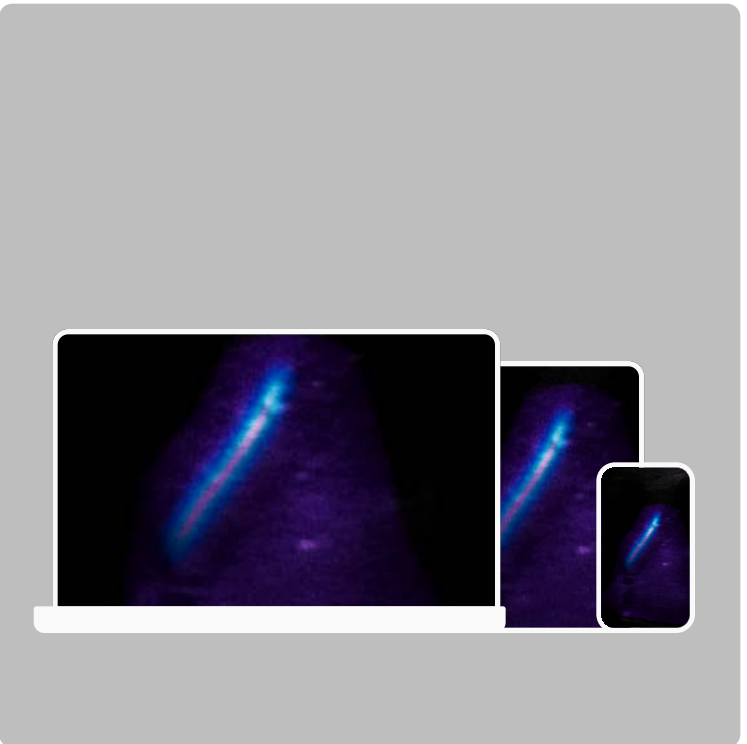
Share Findings with Specialist

Start the diagnostic process by inputting key patient details such as name, age, and gender.

As you delve into discussing symptoms, the AI steps in to not only assist in recognizing and documenting these symptoms but also to streamline the information-gathering process.

Choose the specific area for ultrasound screening, and let the interface be your guide, ensuring a smooth and intuitive experience.

The AI establish a preliminary score based on its findings. This pre-score serves as a proactive tool, allowing you to share comprehensive insights with specialists, if needed, ultimately facilitating a more informed and collaborative approach to patient care.



Realtime AI Feedback



Secondly, the robot is attached to the wrist band.

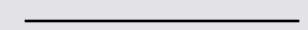
Thirdly, the user turns on the robot by pressing once on the action button on the back.

The wrist band is first placed on the arm of the user.



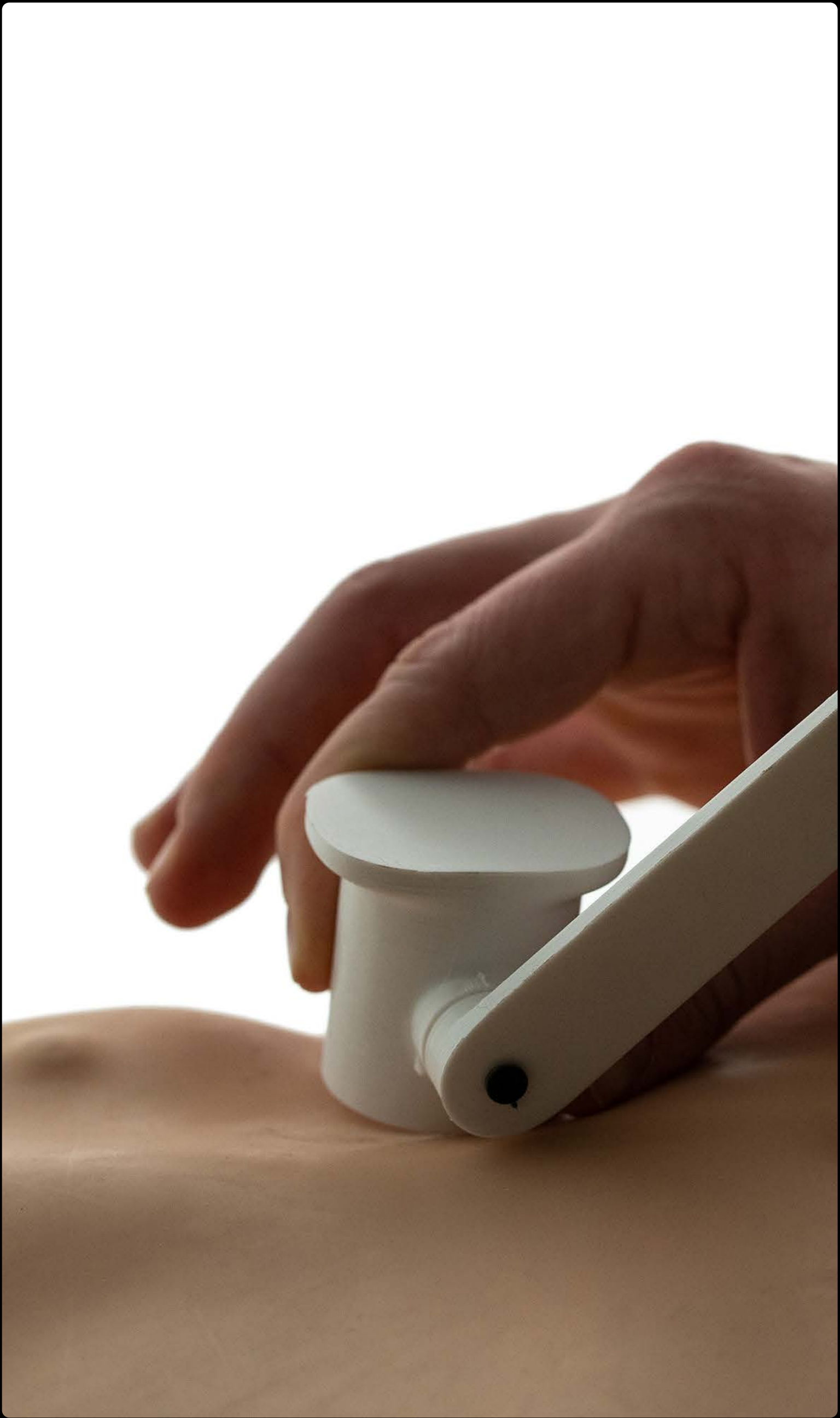
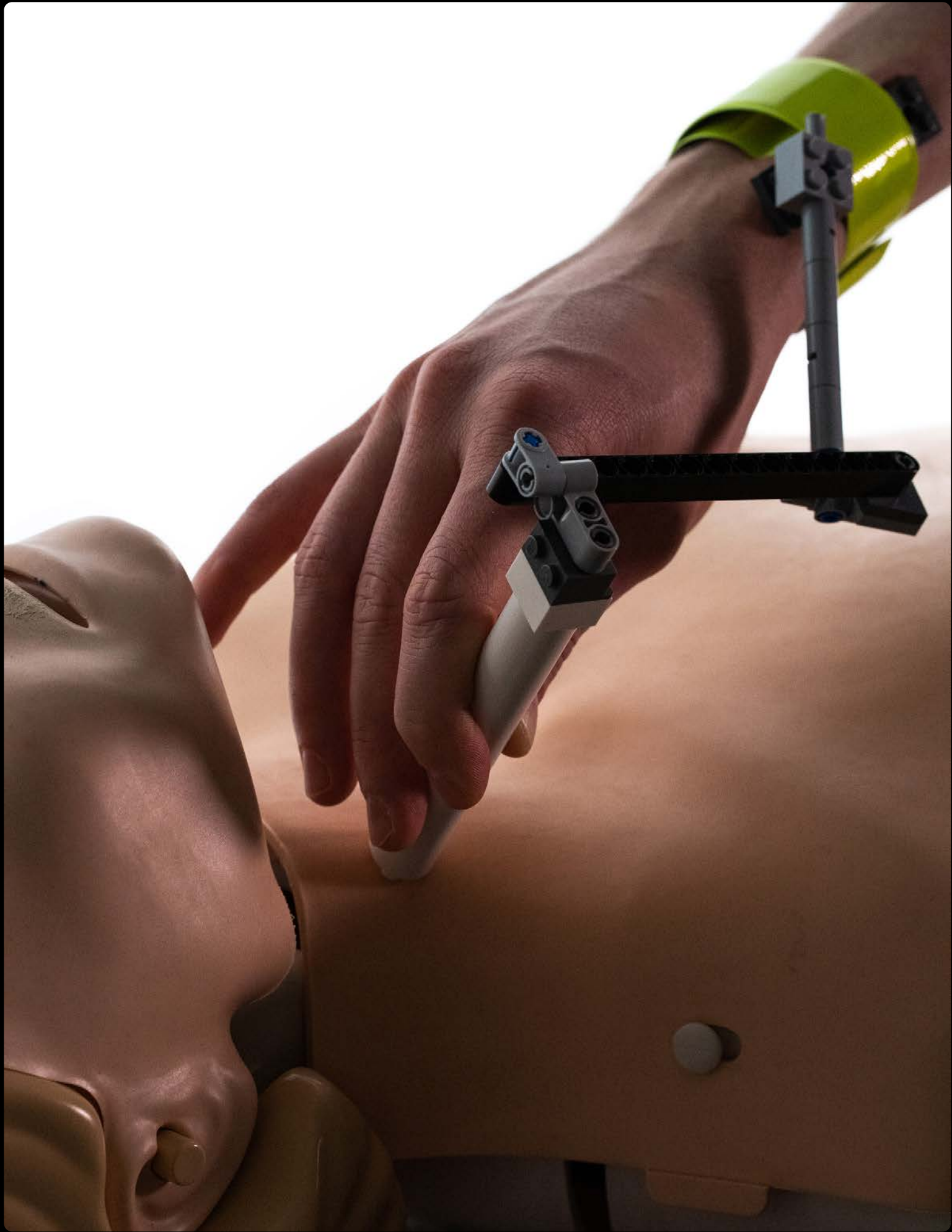


Soft transitions on
surfaces close to
the body.



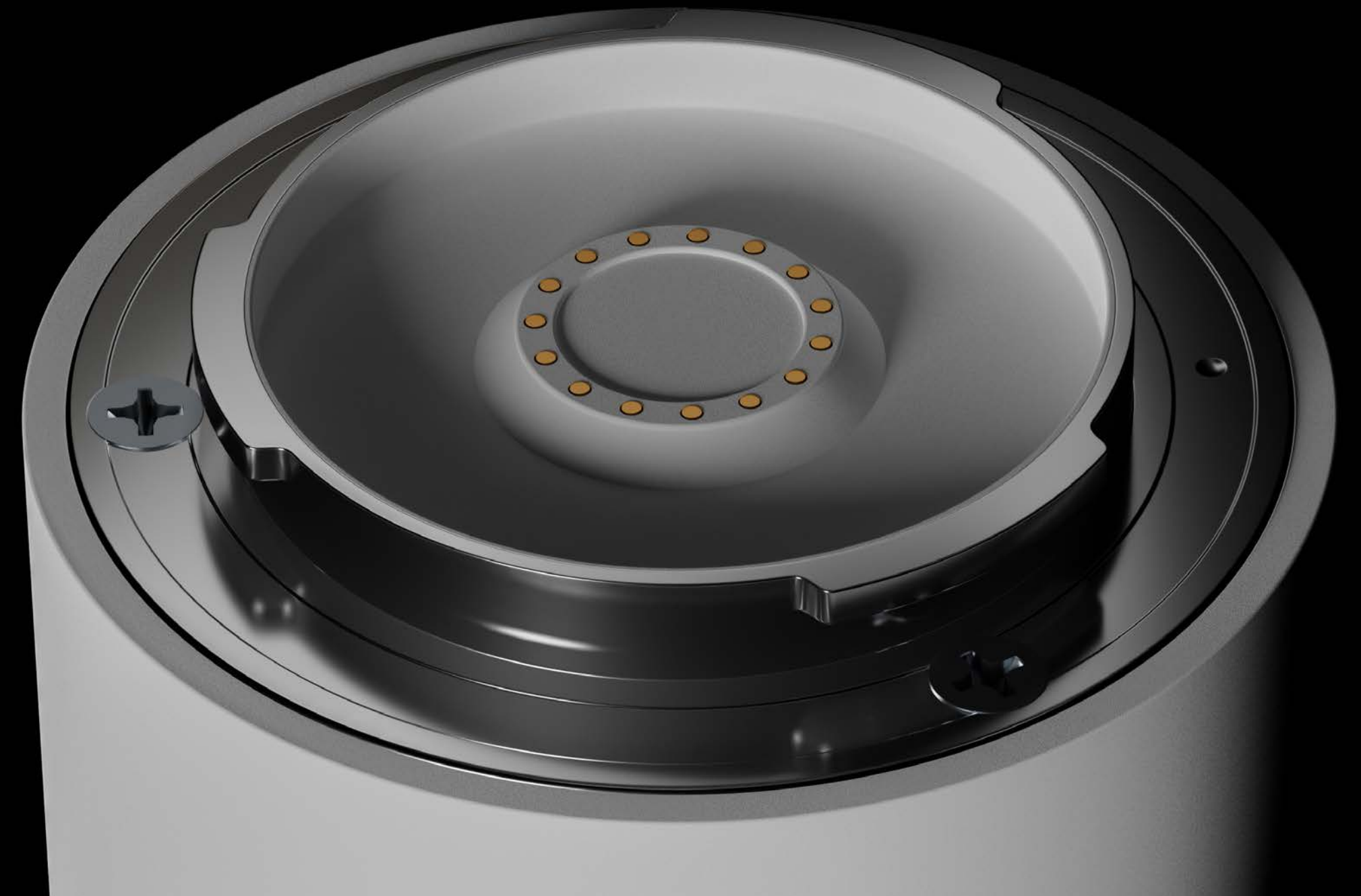
One of the main challenges was to keep a soft transition between the joints and the arm since this device is close to the user's skin. And at the same time keeping the degree of freedom we need to achieve all the movement the end-effectors need to execute.

This was the most intense phase going back and forth with mechanical prototypes and 3D prints.





Intuitive end-effector connections.



The connection is secure and can be operated with one hand. It is similar to the camera's connectors that mechanically lock the two bodies together, providing haptic feedback.



Buttons to release robot.

Velcro.

Added rigidity for band placement.

Battery double functioning as supportive structure for the wrist.

Allowing the skin breath.

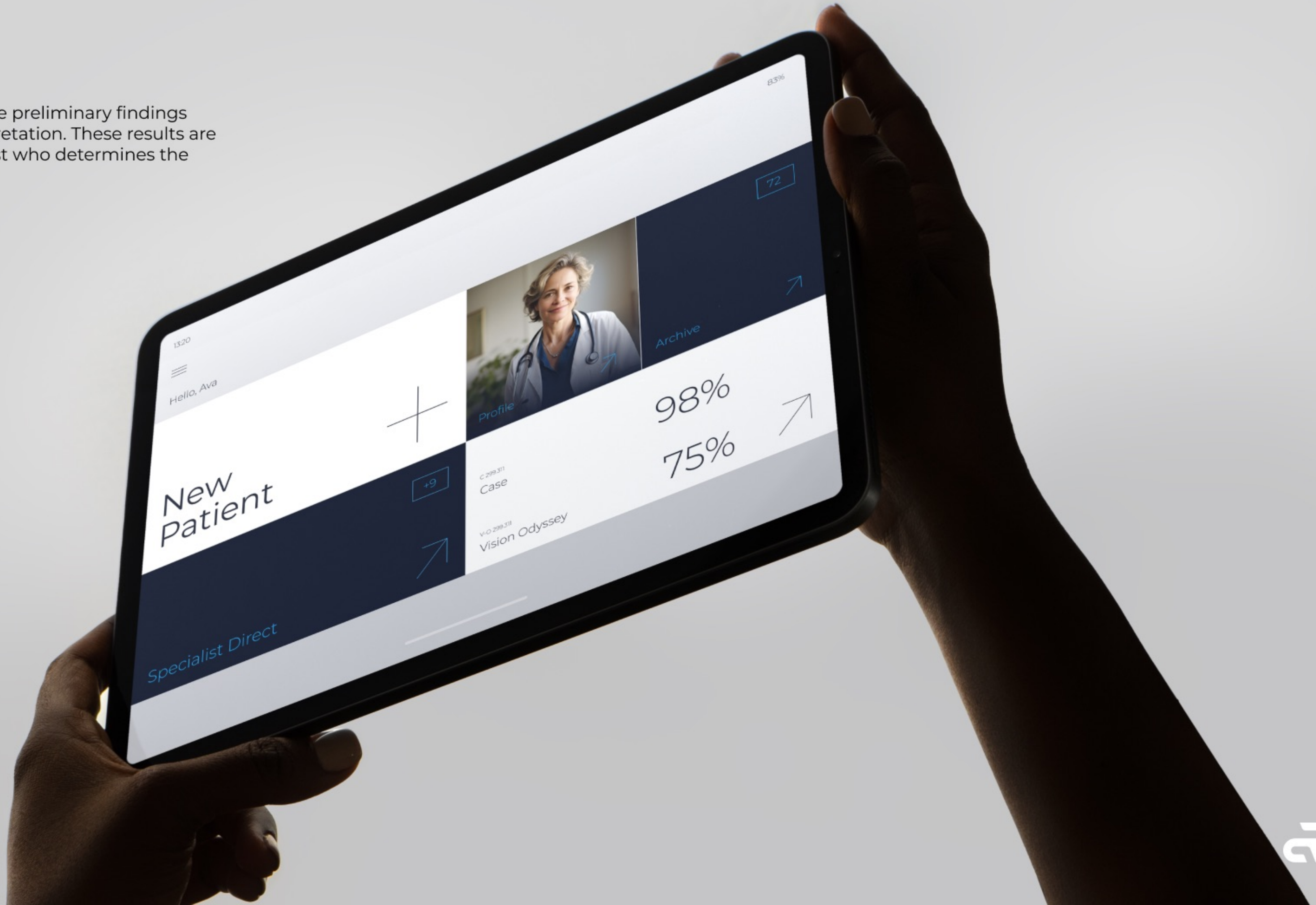




Steel detail allowing the
wristband to fold smoothly.



Ultimately, the user share the preliminary findings obtained from image interpretation. These results are communicated to a specialist who determines the urgency of the case.



It's essential to note that the robot doesn't replace human decision-making; instead, its role is to assist and alleviate healthcare professionals (HCPs) by expediting the diagnosis phase. The final decision rests with the human.

Lola
55.222911

Review Medical History ↗

Connect With General Practitioner ↗

Raw Recording

Abnormality Detected

Dynamic air bronchogram

Consolidated lung

97% Lobar Pneumonia



Wrist band housing.

Battery indication.

HS-Probe

Improved probe contact between small irregular surfaces.

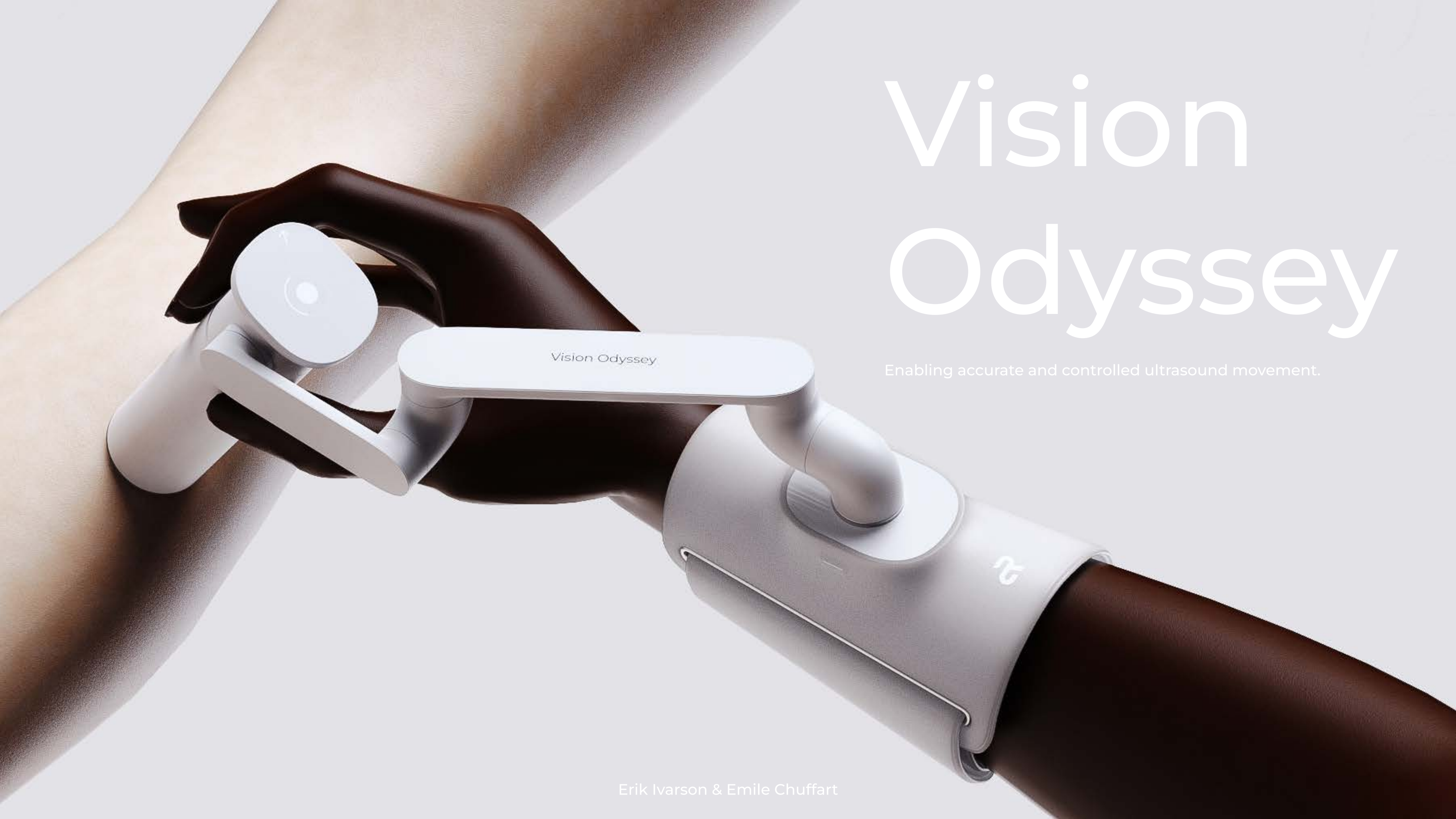
360 probe.





Vision Odyssey

Enabling accurate and controlled ultrasound movement.



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