



# TherapEase.ai

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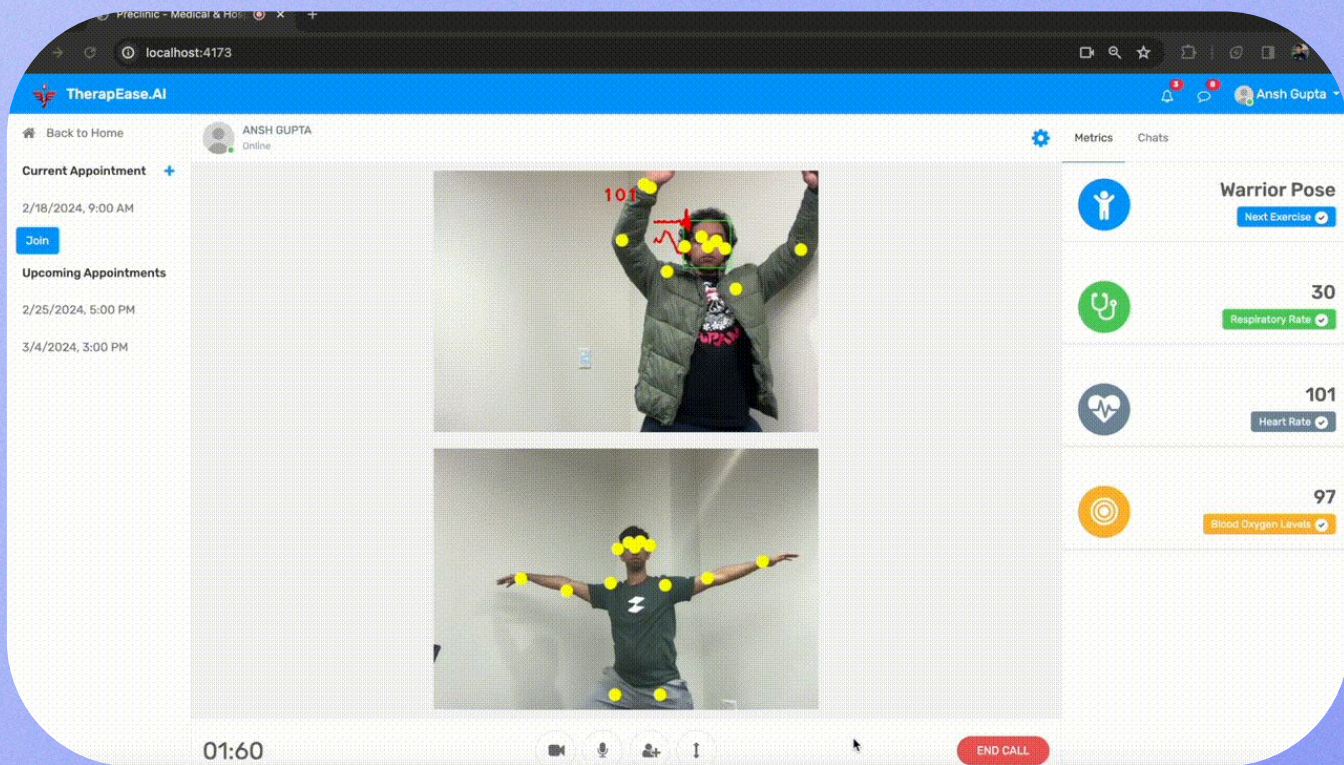


# Inspiration

- Experience with PT
  - Lack of control
  - Expensive
  - Inaccessible
- Vitals sensing restricts mobility



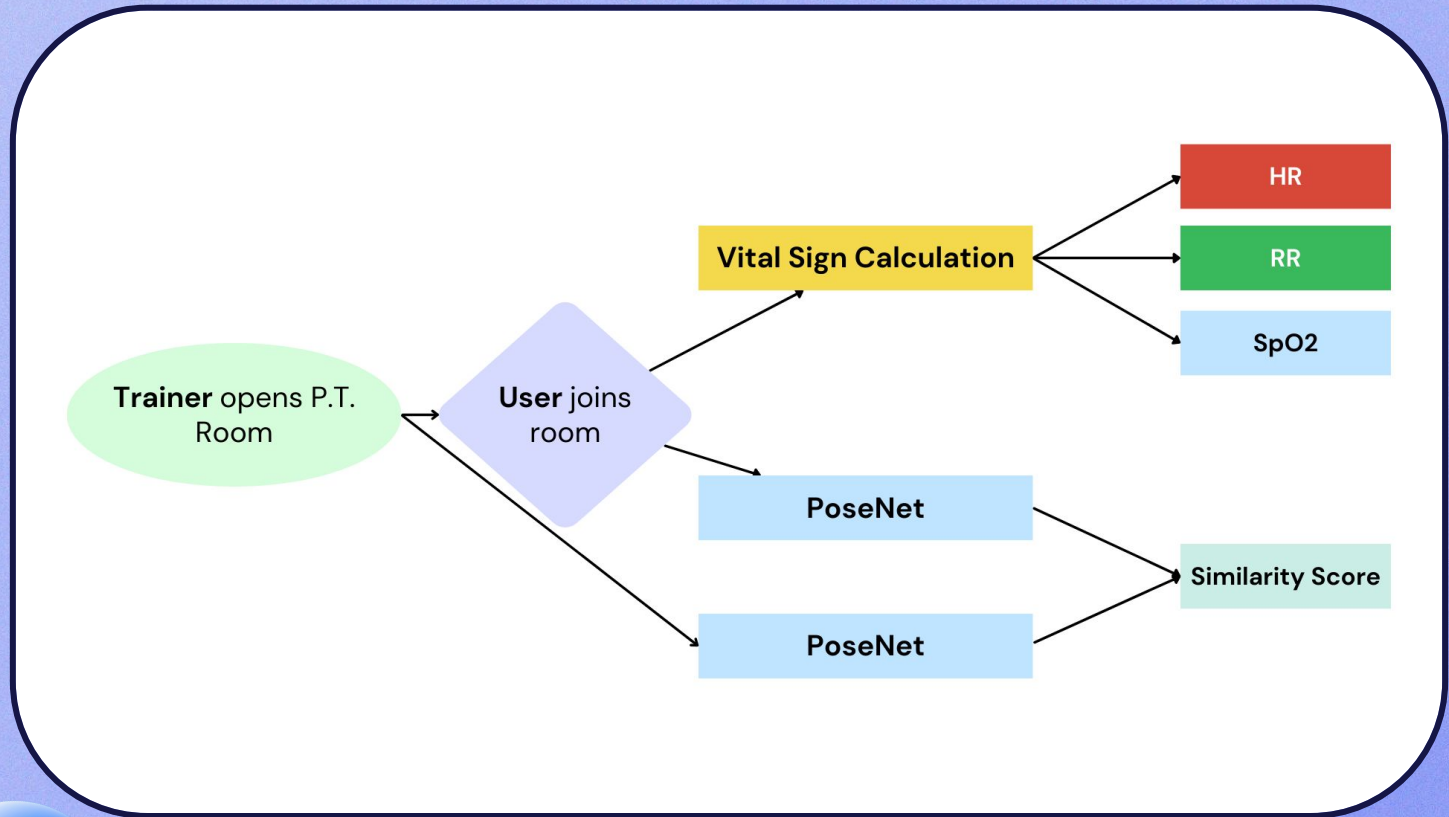




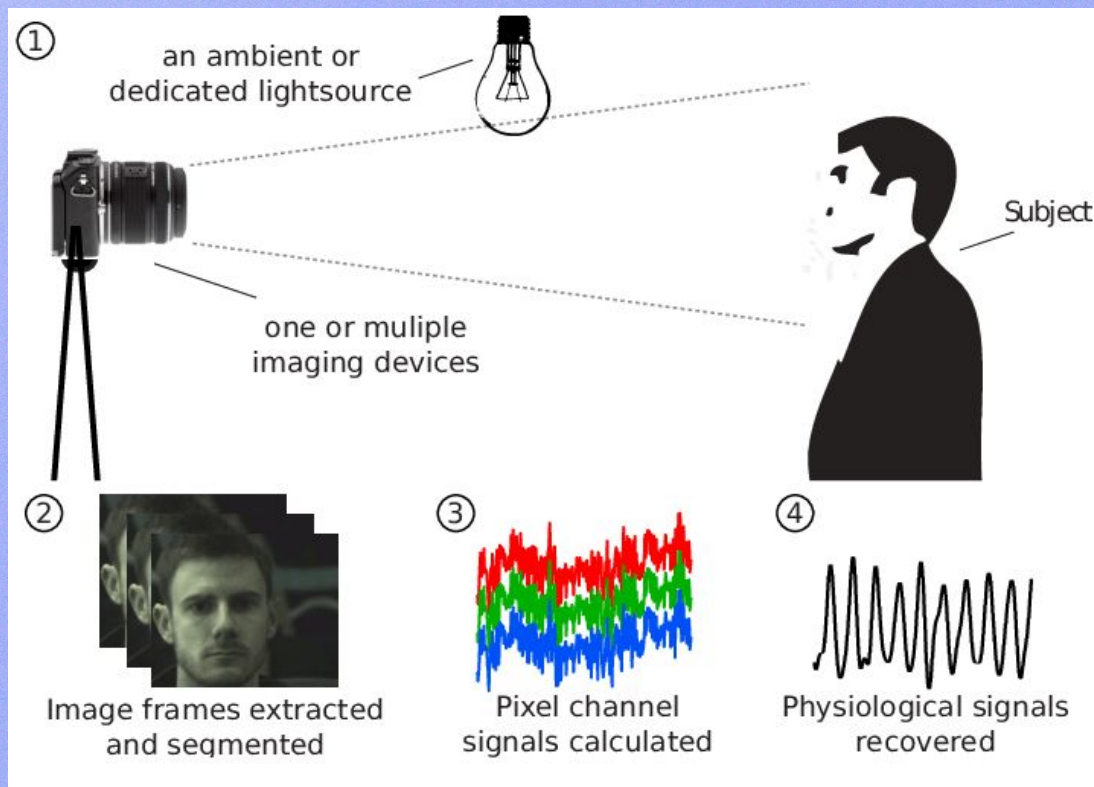




# User Flow



# Remote Photoplethysmography: HR, RR, SpO<sub>2</sub>



A survey of remote optical photoplethysmographic imaging methods - Scientific Figure on ResearchGate.  
Available from:  
[https://www.researchgate.net/figure/Schematic-of-remote-photoplethysmographic-PPG-imaging-using-a-digital-camera-1\\_fig1\\_308747669](https://www.researchgate.net/figure/Schematic-of-remote-photoplethysmographic-PPG-imaging-using-a-digital-camera-1_fig1_308747669) [accessed 18 Feb, 2024]



# Pose Detection

- Uses the TensorFlow.js PoseNet Library for real-time detection of position.
- Computes **Weighted Distance** between Instructor and Student Poses
  - Through repeated testing, we designed custom weights to best determine pose similarity





# Intel's Prediction Guard as Assistant Trainer

The screenshot displays the TherapEase.AI web application running in a Google Chrome browser on a Mac. The interface is divided into several sections:

- Header:** Includes the Google Chrome menu, browser tabs, and the address bar showing `localhost:4173`. The application header features the TherapEase.AI logo, a user profile for "ANSH GUPTA" (Online), and navigation links for "Metrics" and "Chats".
- Left Sidebar:**
  - Back to Home:** A button with a house icon.
  - Current Appointment:** Shows an appointment for "2/18/2024, 9:00 AM" with a "Join" button.
  - Upcoming Appointments:** Lists two future appointments: "2/25/2024, 5:00 PM" and "3/4/2024, 3:00 PM".
- Main Video Area:** Contains two stacked video feeds of a person performing a yoga pose (Mountain Pose). Yellow dots are overlaid on the video to track body landmarks. A red heart icon and the number "39" are visible in the top video frame. Below the videos is a timer showing "03:31" and a row of icons for video, microphone, and other controls.
- Right Chat Panel:**
  - You:** A message from the user stating: "I am trying mountain pose, but I really cannot keep standing up. I keep falling down and I don't know what to do. Please help me fix this issue by giving tips to doing the pose correctly."
  - Chatbot:** A response from the AI assistant: "This is a very common issue that many beginners face, and it can be frustrating, but it's also totally normal. Mountain pose, also known as Tadasana, is one of the foundational yoga poses. It is a standing posture with your feet together and arms by the sides. To achieve this pose and not lose balance, one needs to develop the art of grounding."
- Bottom Bar:** Features a red "END CALL" button, a "Type message" input field, and a small thumbnail of the current video feed.

The bottom of the screen shows the Mac OS taskbar with various application icons.



## Applications

- Geriatric Patients
- Remote Physical Therapy for People in Accidents
- First Responder Medical Aid
  - Contagion or Hazard Protection
- Enhance Remote Physical Activity

## Future Development

- Peak Enhancement for Respiratory Rate and SpO<sub>2</sub>
- Blood Pressure Contactless Detection
- Multi-channel video Calling
- Increasing Security



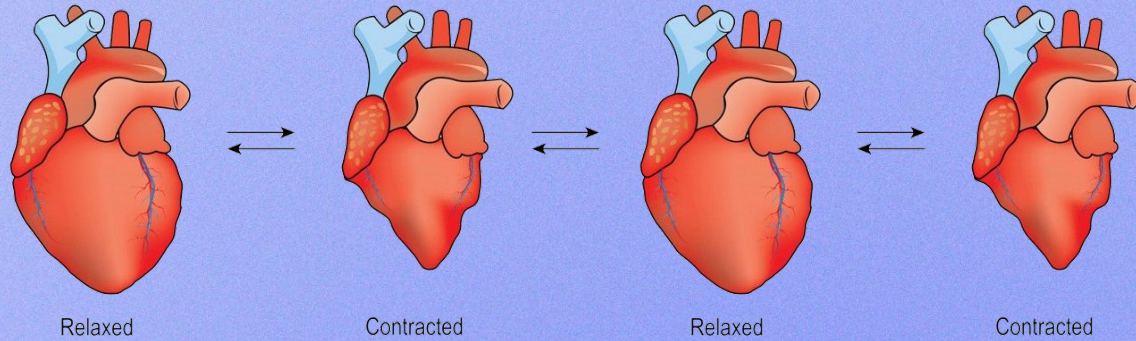
The background is a solid light blue. In the top-left corner, there is a large, thick, blue and white 3D ring-like shape. In the top-right corner, there is a small sphere with a blue-to-purple gradient. In the bottom-left corner, there is another sphere with a purple-to-blue gradient. In the bottom-right corner, there is a thick, wavy blue line. The text "Thank you!" is centered in a bold, dark blue font, with a thin horizontal line underneath it.

**Thank you!**

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# More on rPPG: HR



**Green Light Absorption Composite Wave + FFT = Heart Rate**



# More on rPPG: RR and SpO2

- Respiratory Rate is calculated in the same way as Heart Rate, but in the Red Light Spectrum.
  - A bandpass filter is also applied after the FFT to exclude the dominant signal of Heart Rate
- SpO2 Formula:

$$SpO_{2CCM} = A - B \frac{AC_{RED} / DC_{RED}}{AC_{BLUE} / DC_{BLUE}} \quad (9)$$

Here,  $AC_{RED}$  and  $AC_{BLUE}$  represent the standard deviation of the red and blue channels respectively.  $DC_{RED}$  and  $DC_{BLUE}$  represent the mean of the red and blue channels respectively, with fixed coefficients  $A = 125$  and  $B = 26$  based on the empirical evaluation [4].