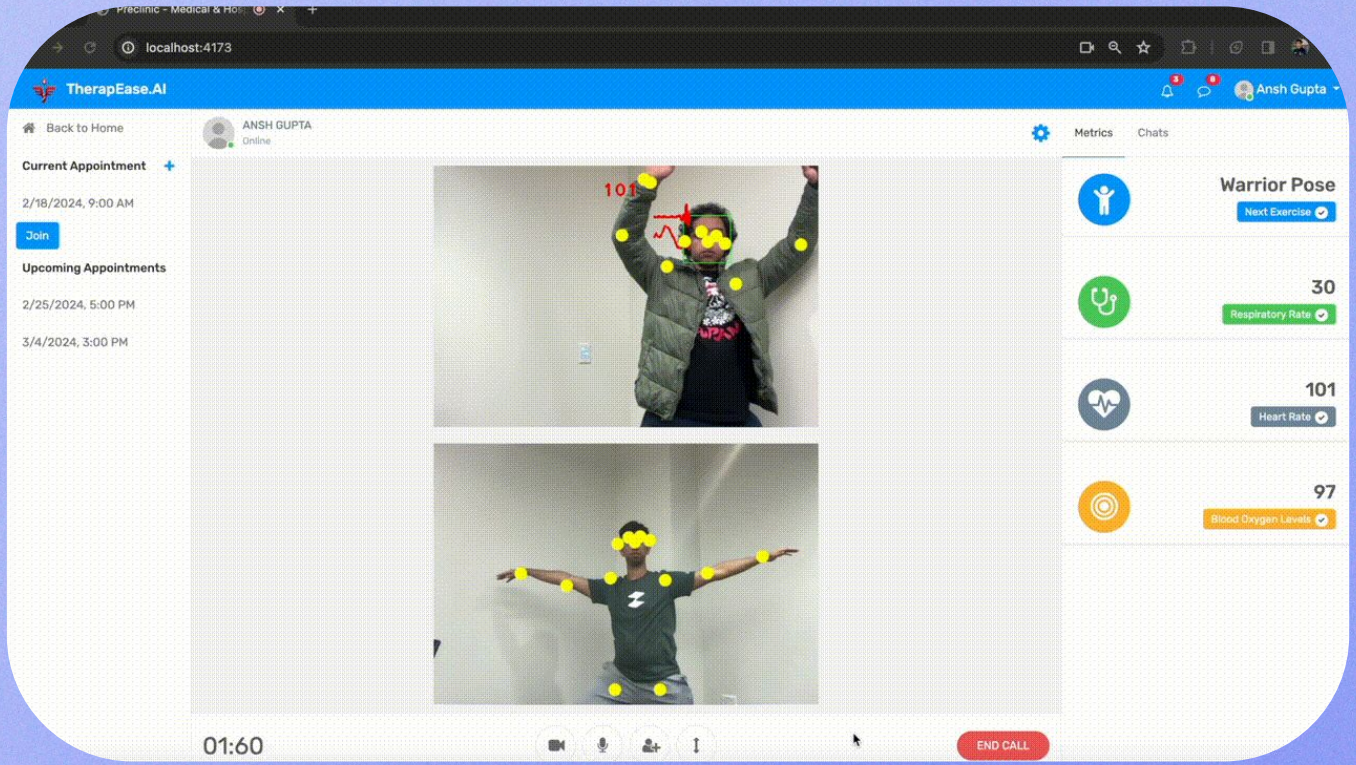
TherapEase.ai

Adarsh Ambati, Ansh Gupta, Aditya Iyengar

Inspiration

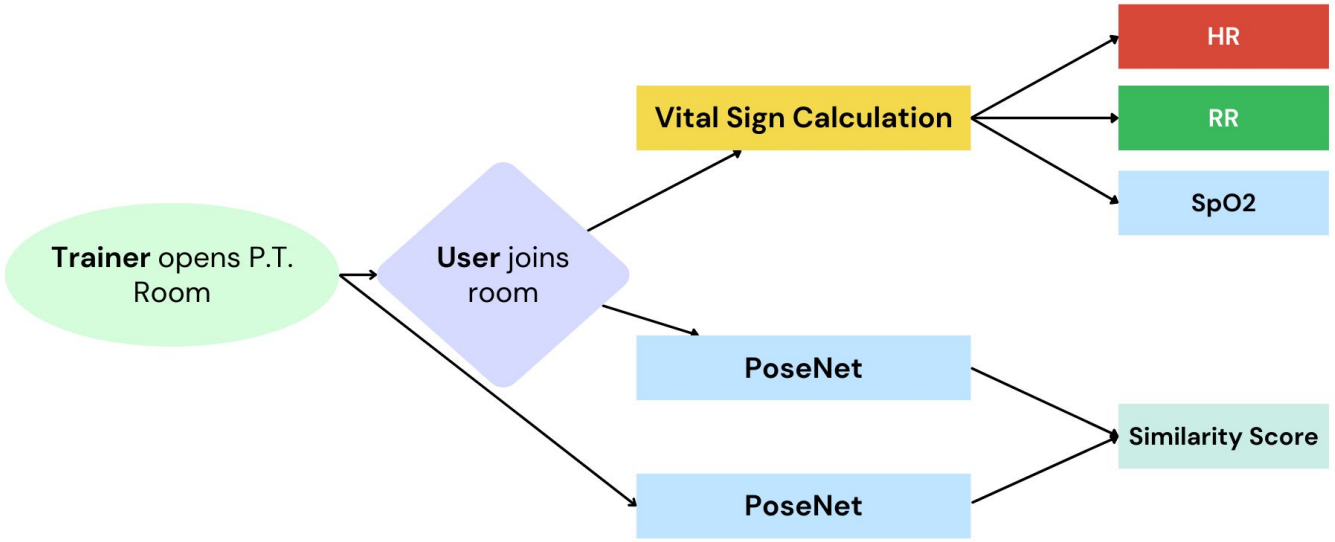
- Experience with PT
  - Lack of control
  - Expensive
  - Inaccessible

- Vitals sensing restricts mobility

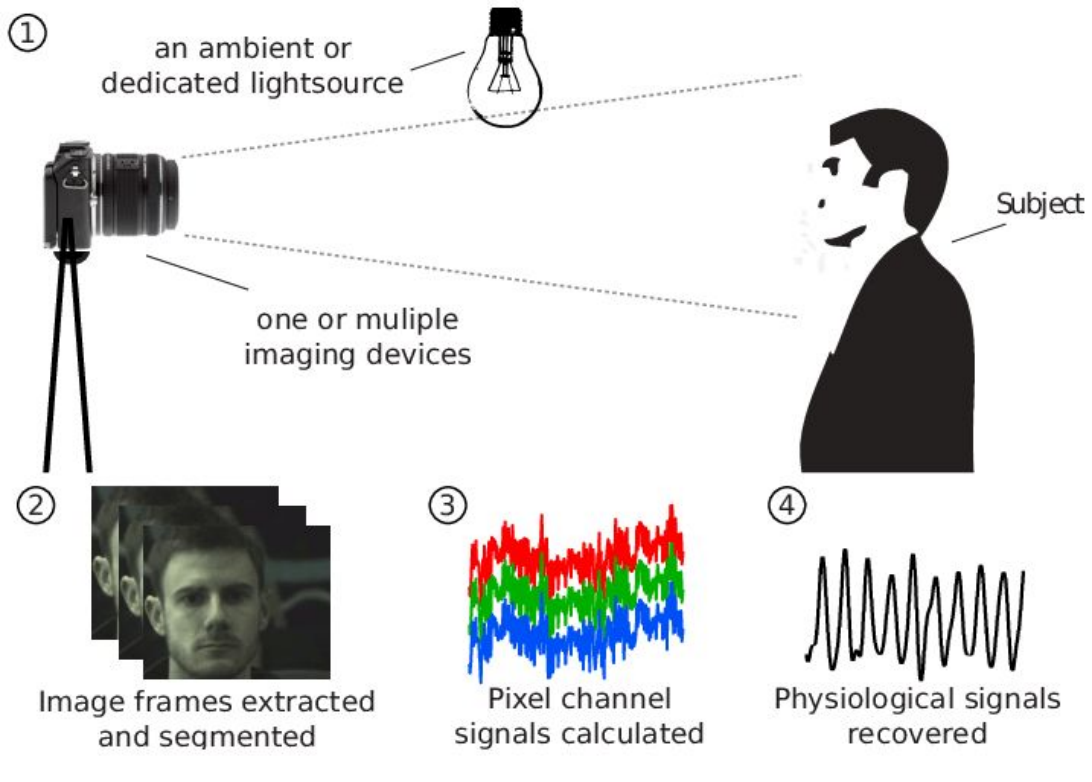

localhost:4173
TherapEase.AI
Ansh Gupta
Back to Home
ANSH GUPTA
Online
Metrics
Chats
Current Appointment
2/18/2024, 9:00 AM
Join
Upcoming Appointments
2/25/2024, 5:00 PM
3/4/2024, 3:00 PM
101
Warrior Pose
Next Exercise
30
Respiratory Rate
101
Heart Rate
97
Blood Oxygen Levels
01:60
END CALL


Warrior Pose
02:07

User Flow


Trainer opens P.T. Room
User joins room
Vital Sign Calculation
HR
RR
SpO2
PoseNet
PoseNet
Similarity Score

Remote Photoplethysmography: HR, RR, SpO2



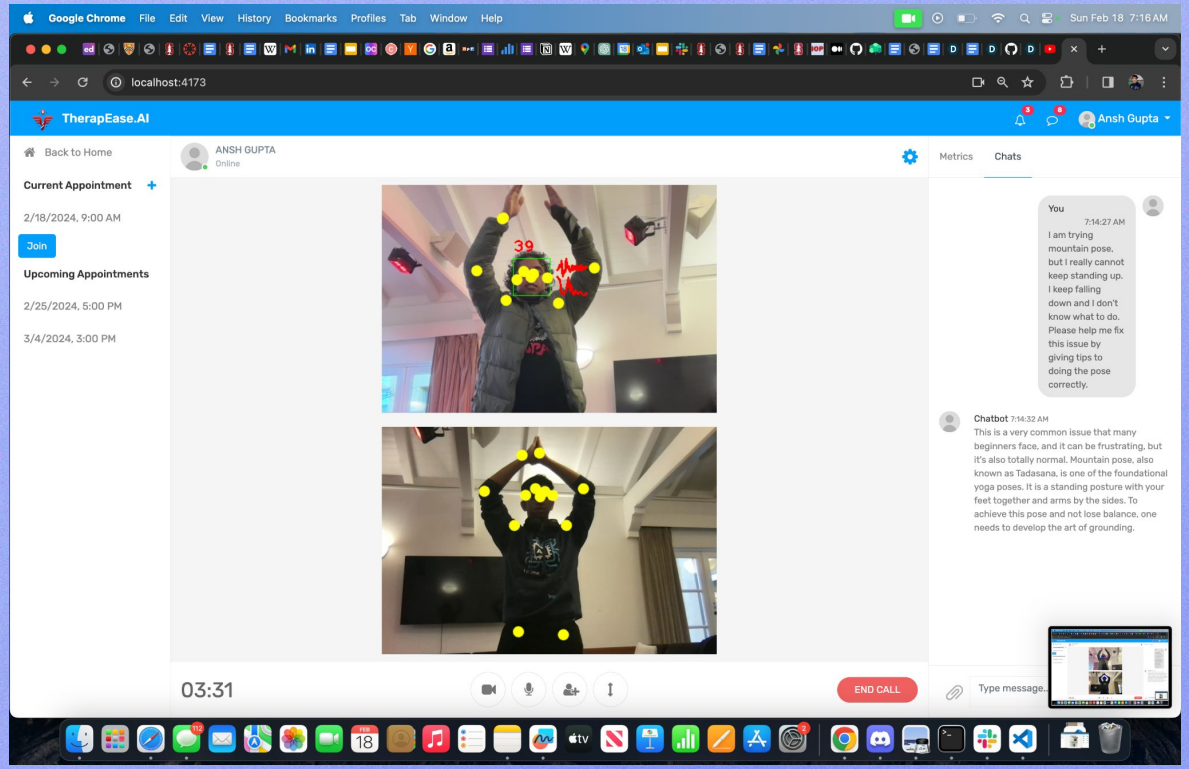
A survey of remote optical photoplethysmographic imaging methods - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Schematic-of-remote-photoplethysmographic-PPG-imaging-using-a-digital-cameras-1_fig1_308747669 [accessed 18 Feb, 2024]

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



Applications

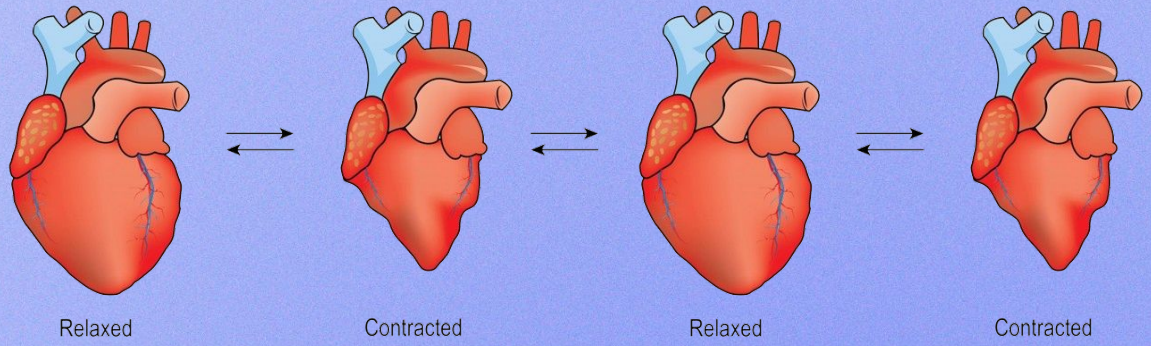
- Geriatric Patients
- Remote Physical Therapy for People in Acccidents
- First Responder Medical Aid
  - Contagion or Hazard Protection
- Enhance Remote Physical Activity

Future Development

- Peak Enhancement for Respiratory Rate and SpO2
- Blood Pressure Contactless Detection
- Multi-channel video Calling
- Increasing Security

Thank you!

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:

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

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].