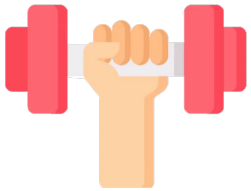


dumbl.

kal se gym

kal se pakka

arre kal se pakka pakka

67% of people never use their gym membership.

https://www.bloomberg.com/news/articles/2019-01-16/here-s-how-quickly-people-ditch-weight-loss-resolutions

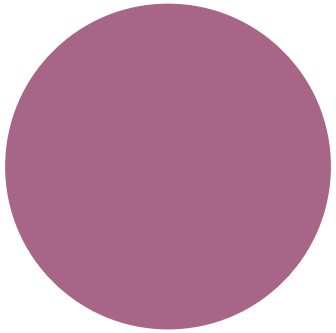
*new year effect

Mumbai and Bangalore gyms see upto 25% increase in revenue in January*...

...which goes down in the next months

https://timesofindia.indiatimes.com/life-style/health-fitness/fitness/spike-in-gym-memberships-as-mumbaikars-make-new-year-resolutions-to-stay-fit/articleshow/80152756.cms

no spotting bull***t allowed

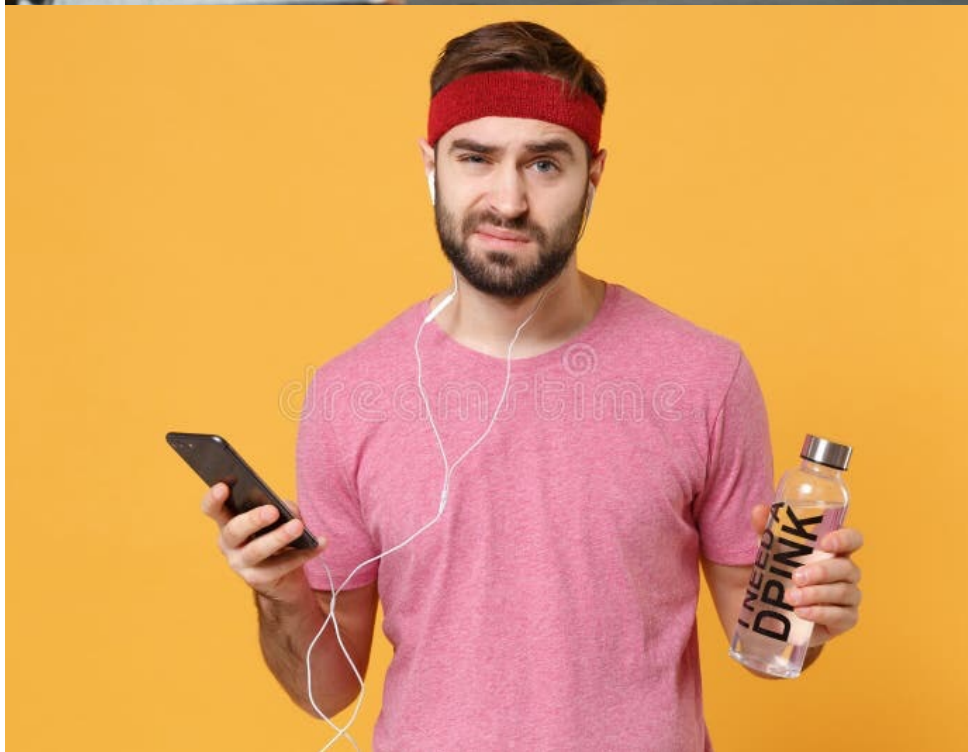


consistency

that’s where we come in.

Current State

- Personalized guidance from human trainers is highly effective but often inaccessible due to high costs.
- Many current AI fitness apps offer only static or "one-size-fits-all" plans.
- These solutions fail to adapt in real-time to a user's physiological state, such as fatigue or improper exercise form, limiting both safety and effectiveness.

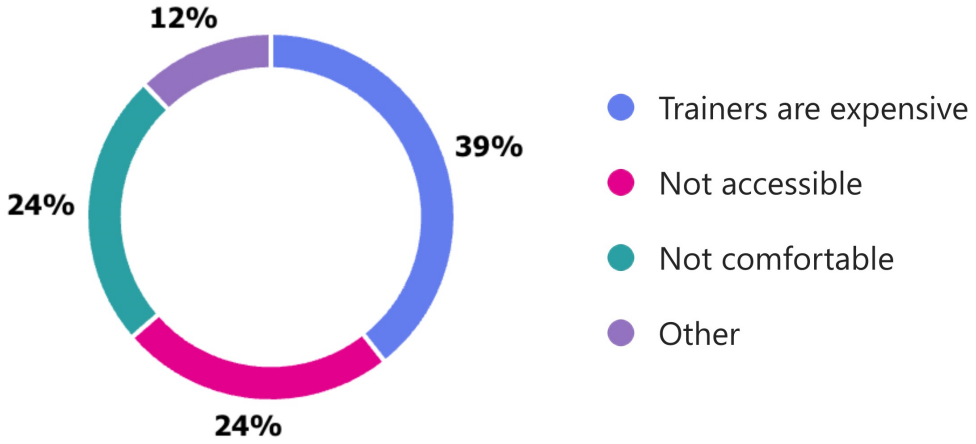


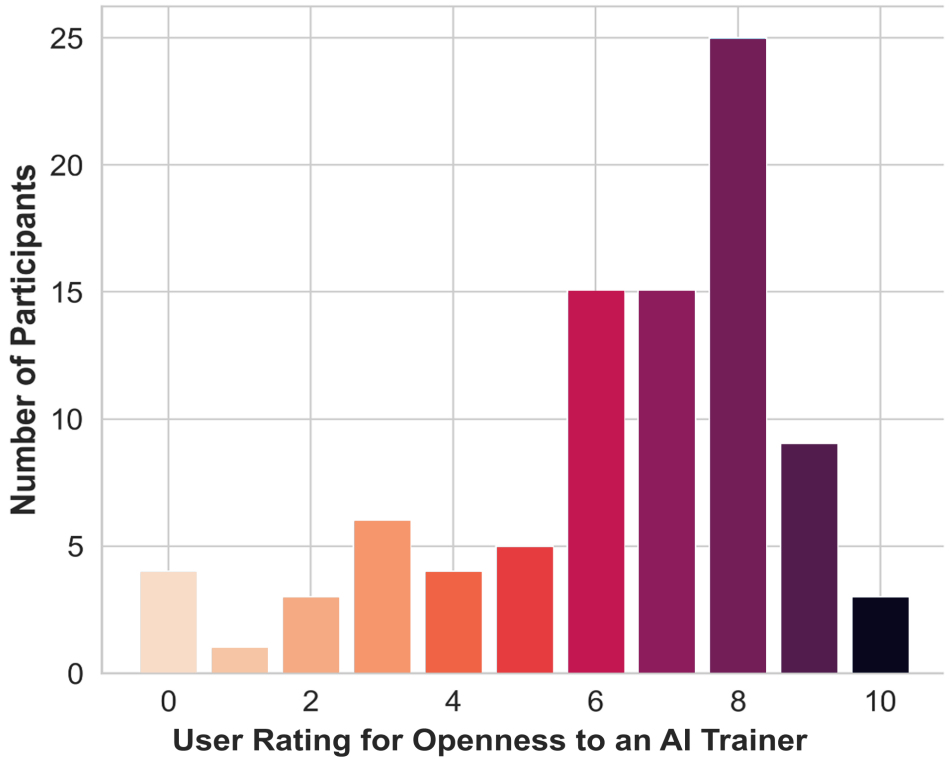
Problem Statement

How can individuals receive **safe**, **effective**, and **personalized** fitness guidance that **adapts** to their real-time physiological needs, without facing the **high costs** of human trainers or the limitations of static, "one-size-fits-all" applications?

Formative Study

- **Major Barriers:** The most cited challenges were a lack of motivation, inadequate knowledge of proper technique, and time management.
- **Guidance Gap:** Only 22% of participants consulted trainers, while others cited high cost as the primary barrier.
- **AI Skepticism:** A significant portion (42%) were skeptical of AI coaches, fearing a lack of reliability and the loss of the "human element".





Literature Survey

Current Approaches & Limitations

	Multi-modal Sensing	Adaptive Fitness Models	Form & Posture Correction
Focus	How data is collected	How plans are generated	Real-time visual feedback
Current State	Successfully fuses IMU, Camera, and HR data for activity recognition (e.g., 93% accuracy in 12 different exercises).	AI generates workout plans based on static user data (BMI, Body type, Preferences) or gamified elements.	High accuracy using Computer Vision (YOLOv7, MediaPipe) to detect joint angle deviations.
Limitations	• Focused on post-workout review rather than real-time interventions • Often tested only in controlled lab settings	• Static (pre-workout) rather than dynamic (during workout) • Relies heavily on unreliable self-reported data	• Single modality • Ignores physiological state (fatigue/HR) • Often restricted to specific exercises (e.g., yoga, lifting)
Citations	Guo et al. (2017), Smolyak et al. (2018), Chowdhury et al. (2019), Wilk et al. (2021)	Martin-Niedecken et al. (2019), Mohan et al. (2020), Mokmin (2020), Ilukpitiya et al. (2024)	Hannan et al. (2021), Thoutam et al. (2022), Kotte et al. (2023), Bagga & Yang (2024)

Overall, current solutions are fragmented. They either track metrics *without* coaching, correct forms *without* knowing fatigue levels, or plan workouts *without* real-time sensing.

Current Landscape

User Apps

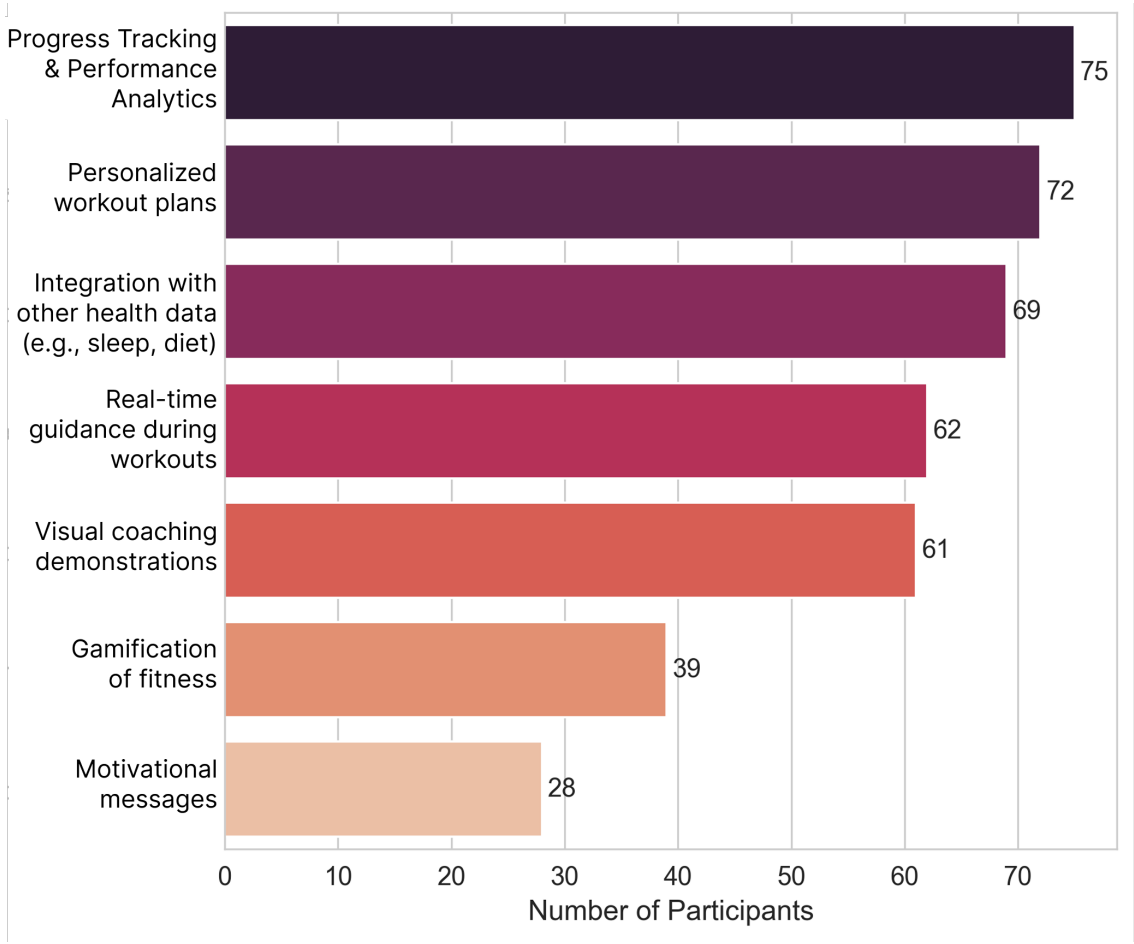
Application	Primary Focus	Key Differentiator	AI & Personalization Strategy	Hardware/Wearable Integration
Peloton	Instructor-Led Focused Fitness Classes	High-production content, charismatic instructors, and premium brand.	AI for personalized plans, performance estimates, and real-time form correction ("Peloton IQ").	Deeply integrated with proprietary Peloton bikes, treads, and rowers.
Nike Training Club (NTC)	General Fitness & Workout Library	Completely free access to a vast, high-quality workout library.	Adaptive workout plans based on user goals and feedback (less data-driven than others).	Syncs with Apple Watch and Google Fit for basic workout tracking.
Fitbit (Google)	Holistic Wellness & Habit Tracking	Deep integration with its own wearable hardware and holistic data synthesis.	Gemini-powered AI health coach for proactive, conversational wellness advice.	Natively integrated with Fitbit trackers and Google Pixel Watch.
Apple Fitness+	On-Demand Workouts & Wearable Integration	Seamless, real-time integration with the Apple Watch and Apple ecosystem.	Curated recommendations and user-built "Custom Plans" (less dynamic AI).	Exclusively and deeply integrated with Apple Watch for real-time metrics.

The Common Limitation: Static Personalization vs. Real-time, Multi-modal Adaptation

User Feature Preferences from

Formative Study

- **Personalization:**
  Majority valued progress tracking and custom workout plans, highlighting a need for tailored, data-driven support.
- **Holistic experience:**
  Strong interest in integrating other health data (e.g., sleep, diet), indicating preference for a unified fitness ecosystem.
- **Real-time, actionable feedback:**
  Many participants wanted real-time guidance and visual coaching to support correct technique and engagement during workouts.
- **Motivational features are secondary:**
  Gamification and motivational messages ranked lower, showing users prioritize intelligent support over playful elements.



Dataset and Concept Validation

Datasets & Participants

- **25 participants** (14 male / 11 female), aged 18–30 (M = 20.64, SD = 3.02)
- Diverse body types & fitness levels (equal split between regular gym-goers and beginners)
- **Measures:**

  SEES (Subjective Exercise Evaluation Scale) recorded at 5 checkpoints: Start, Post-Cardio, Post-Strength, Post-Balance, Post-Flexibility

  PACES (Physical Activity Enjoyment Scale) post-session comparison between Control & System.

Movement Capture

Multi-modal sensing

Exercise: Bicep Curls with 5 Kgs
Progress: 7/12 Reps done
Heart Rate: 128 BPM
Fatigue via Speech: True

Inferences

💪 Upper Arm is Loose
🤦 User is getting more tired
⌛ Only 5 reps left!

Study Design

11 participants (6 female, 5 male), aged 18-21

Design Strategy

- **Type:** Task-based Usability and System Validation
- **Method:** Observation of user interaction + system log analysis
- **Participant Goal:** Complete one full ‘hands-free’ workout session using voice commands and receiving AI feedback

Choose any 3 exercises of their choice or pick a preset workout routine.

Users were then asked to fill a form to assess **System Usability Score (SUS)**

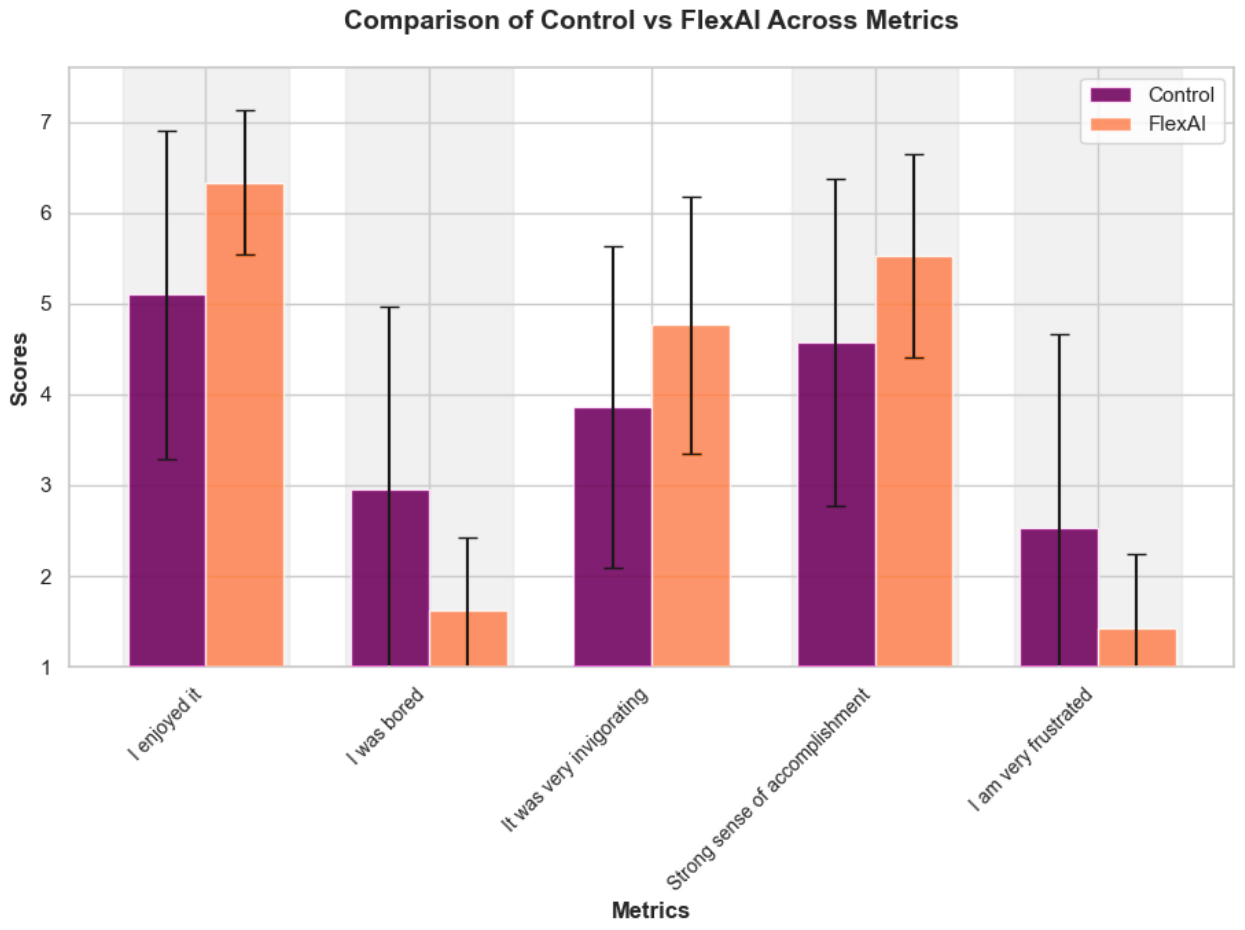
Underlying System

Statistical Analysis

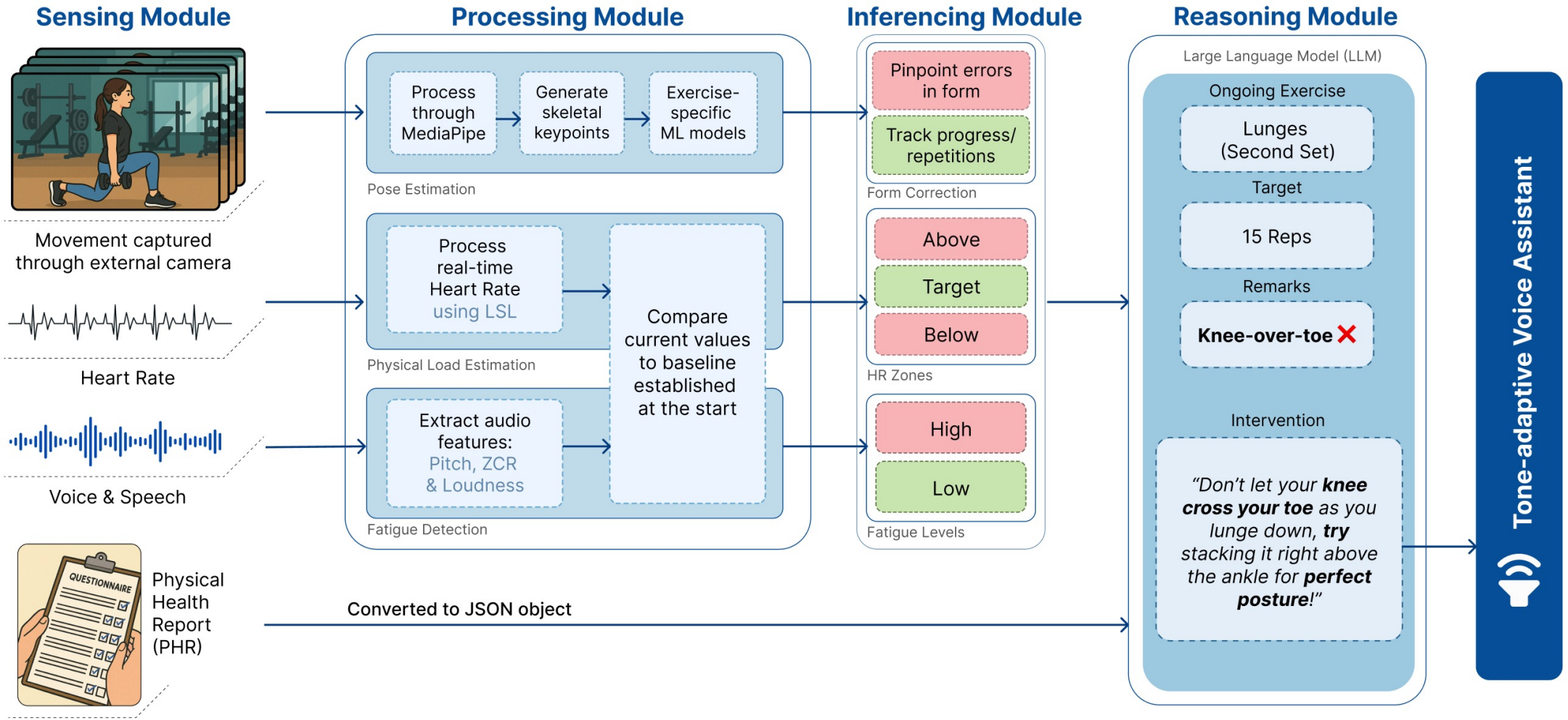
- Wilcoxon Signed-Rank Test (α = 0.05) for SEES and PACES comparisons →
  Non-parametric, robust for n = 25
- Hypothesis: System will yield:
  - ↑ enjoyment, engagement, accomplishment
  - ↓ fatigue, discouragement, boredom

Outcomes

- Positive affective response during & after workouts (SEES)
- Higher overall enjoyment and motivation (PACES)
- Evidence of system's adaptiveness improving user experience



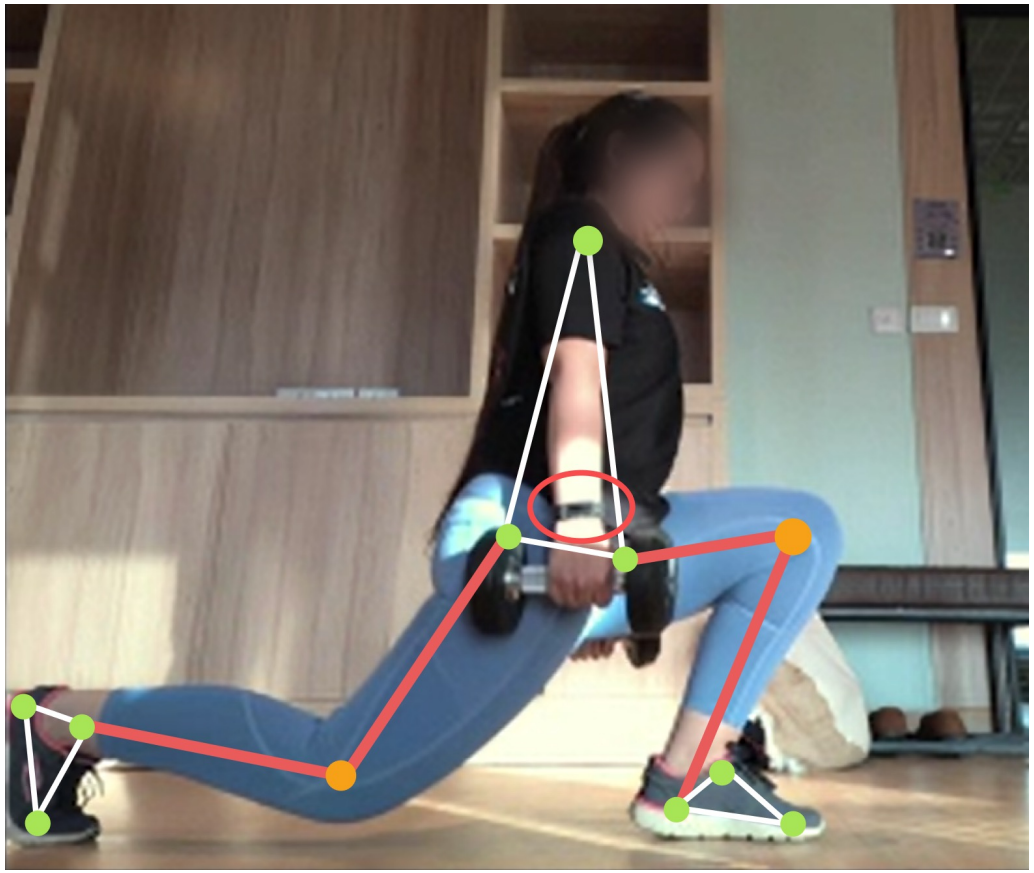
System Pipeline



Our Solution

Application: A user-facing mobile app that acts as a real-time, AI-powered fitness coach.

- **Enhance Safety & Effectiveness:** Provide real-time form correction and intensity adjustments to optimize workouts and prevent injury.
- **Boost Engagement:** Create a more enjoyable and motivating experience, leading to better long-term adherence. Our prior study showed users reported significantly greater enjoyment and a stronger sense of achievement with this approach.
- **Democratize Personal Training:** Make adaptive, high-quality fitness guidance affordable and accessible.



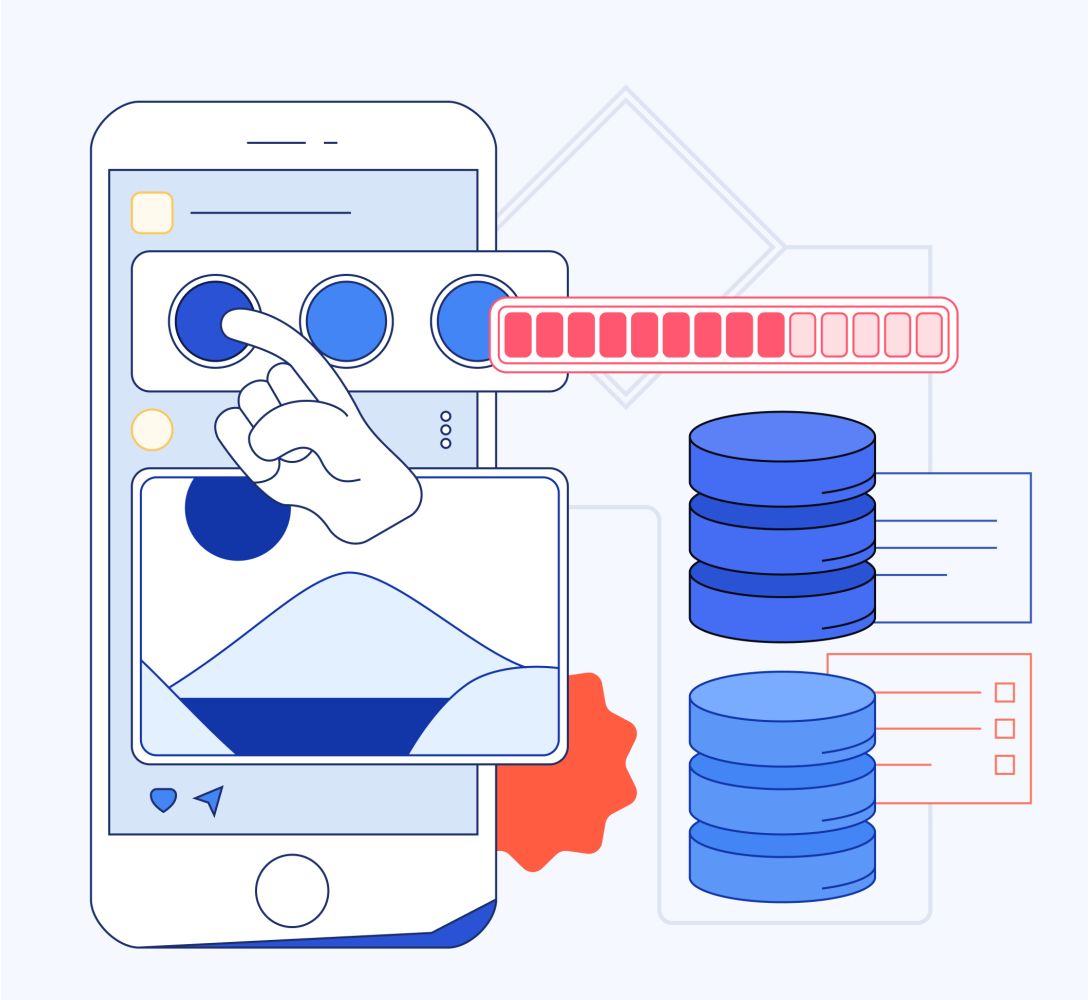
Metrics

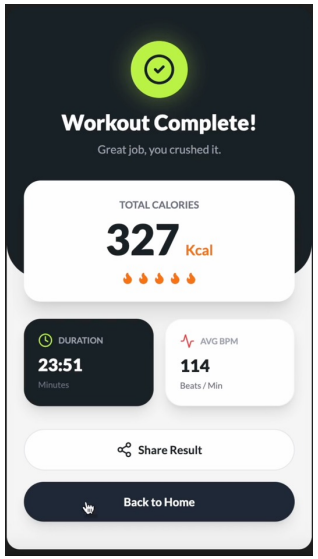
Feedback Latency ~1.27 s

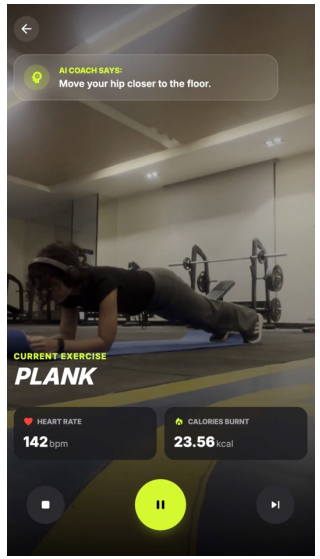
- This is the mean audio guidance latency. The main contributors to this latency are the LLM inference roundtrip (~485 ms) and the TTS audio generation (~785 ms).

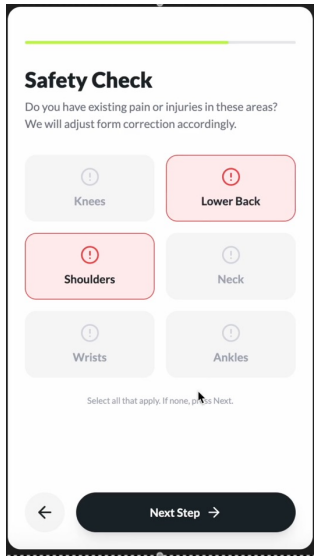
False Positive Rate (Form Correction): 9%

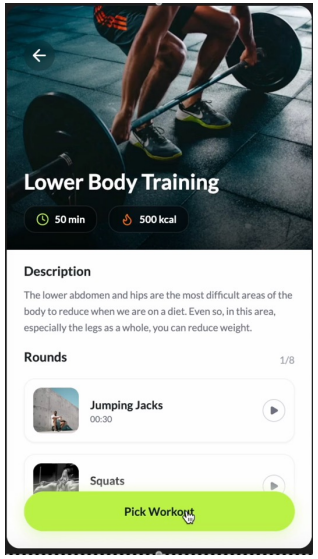
- This indicates how often the AI corrected a user who was actually doing the exercise right. This number needs improving either by improving model performance or using more data.

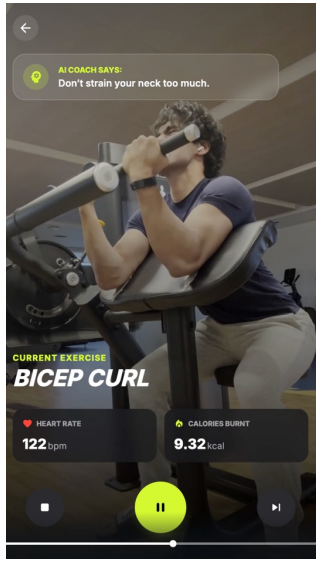


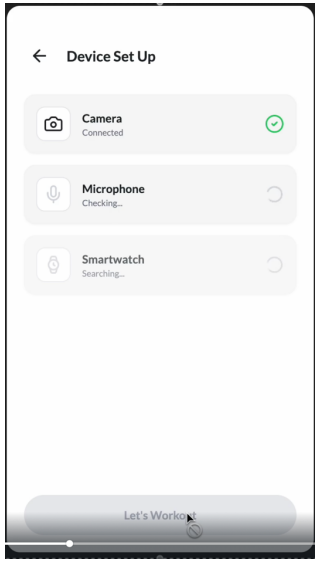

Workout Complete!
Great job, you crushed it.
TOTAL CALORIES
327 Kcal
DURATION
23:51
Minutes
AVG BPM
114
Beats / Min
Share Result
Back to Home


AI COACH SAYS:
Move your hip closer to the floor.
CURRENT EXERCISE
PLANK
HEART RATE
142 bpm
CALORIES BURNT
23.56 kcal


Safety Check
Do you have existing pain or injuries in these areas?
We will adjust form correction accordingly.
Knees
Lower Back
Shoulders
Neck
Wrists
Ankles
Select all that apply. If none, press Next.
Next Step


Lower Body Training
50 min
500 kcal
Description
The lower abdomen and hips are the most difficult areas of the body to reduce when we are on a diet. Even so, in this area, especially the legs as a whole, you can reduce weight.
Rounds
1/8
Jumping Jacks
00:30
Squats
Pick Workout


AI COACH SAYS:
Don't strain your neck too much.
CURRENT EXERCISE
BICEP CURL
HEART RATE
122 bpm
CALORIES BURNT
9.32 kcal


Device Set Up
Camera
Connected
Microphone
Checking...
Smartwatch
Searching...
Let's Workout

Design Philosophy

UI/UX Principles

	Cognitive Load Reduction	Quick Recognition	Accessibility
Principle	Users can't read dense text while moving or holding a plank	During high exertion, the brain processes colors faster than numbers	Controls must be easily accessible while user is sweaty or in motion
Implementation	• Transparent overlay system. • Camera feed (user's form at center stage). • Vital stats (heart rate, reps). pushed to edges • User focuses on body mechanics first.	• Heart rate color-coded (e.g., Green for target, Red for high). • Users assess intensity at a mere glance.	• Critical interactions (e.g., Start, Stop, Next) utilize large touch targets. • Buttons placed in bottom-navigation zone (avoids hard-to-reach corners).
Citations	Vera et al., 2017	Ware et al., 2004	Hoober et al., 2011

Our app's design has tried to focus on the user's convenience and comfort during a workout, ensuring all metrics are easily visible and toggles are easily accessible.

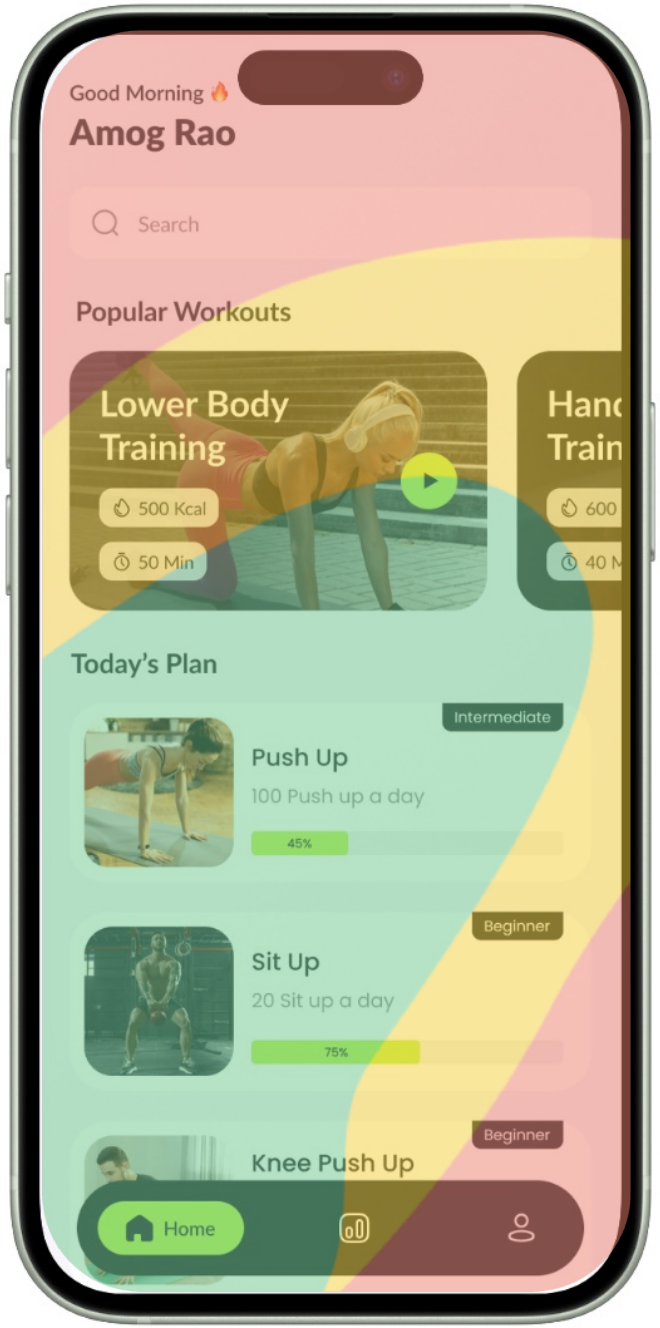
UI/UX Results

System Usability Scale (SUS): 72

- Average for user apps is ~68. Our score indicates above average usability with room for improvement.

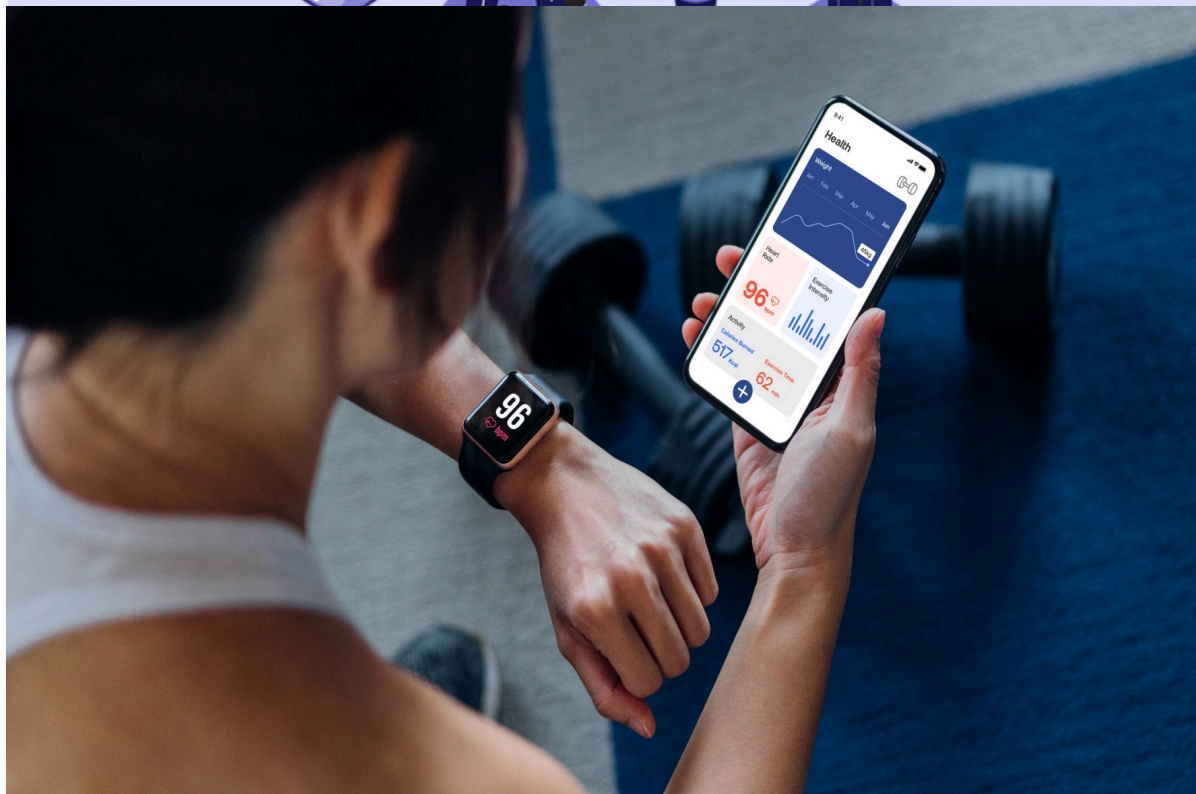
Task Success Rate (Connection & Before Workout Routine):

- No Prompting: 36%
  This number shows us the percentage of users who didn't require any help to start a workout.
- Minimal Prompting: 45%
  This number shows us the percentage of users who required some help with the app.
- Constant Prompting: 18%
  This number shows us the percentage of users who required constant help with understanding how the app functions.



Deployability

- **Latency:** The pipeline operates with low latency suitable for home Wi-Fi, ensuring feedback arrives before the rep is finished.
- **Hardware Independence:** The solution relies on standard smartphones and consumer smartwatches (no particular proprietary hardware needed), making it highly deployable.
- **Scalability Challenge:** Managing real-time inference costs for the LLM as the user base grows (future work should involve optimising token usage).



Value Proposition

₹500 - ₹2000

Per session gym
trainer costs

564,800

Injuries associated with
exercise and equipment

https://injuryfacts.nsc.org/home-and-community/safety-topics/sports-and-recreational-injuries/

~45%

Reduction in boredom
when using **dumbl**

thank you