

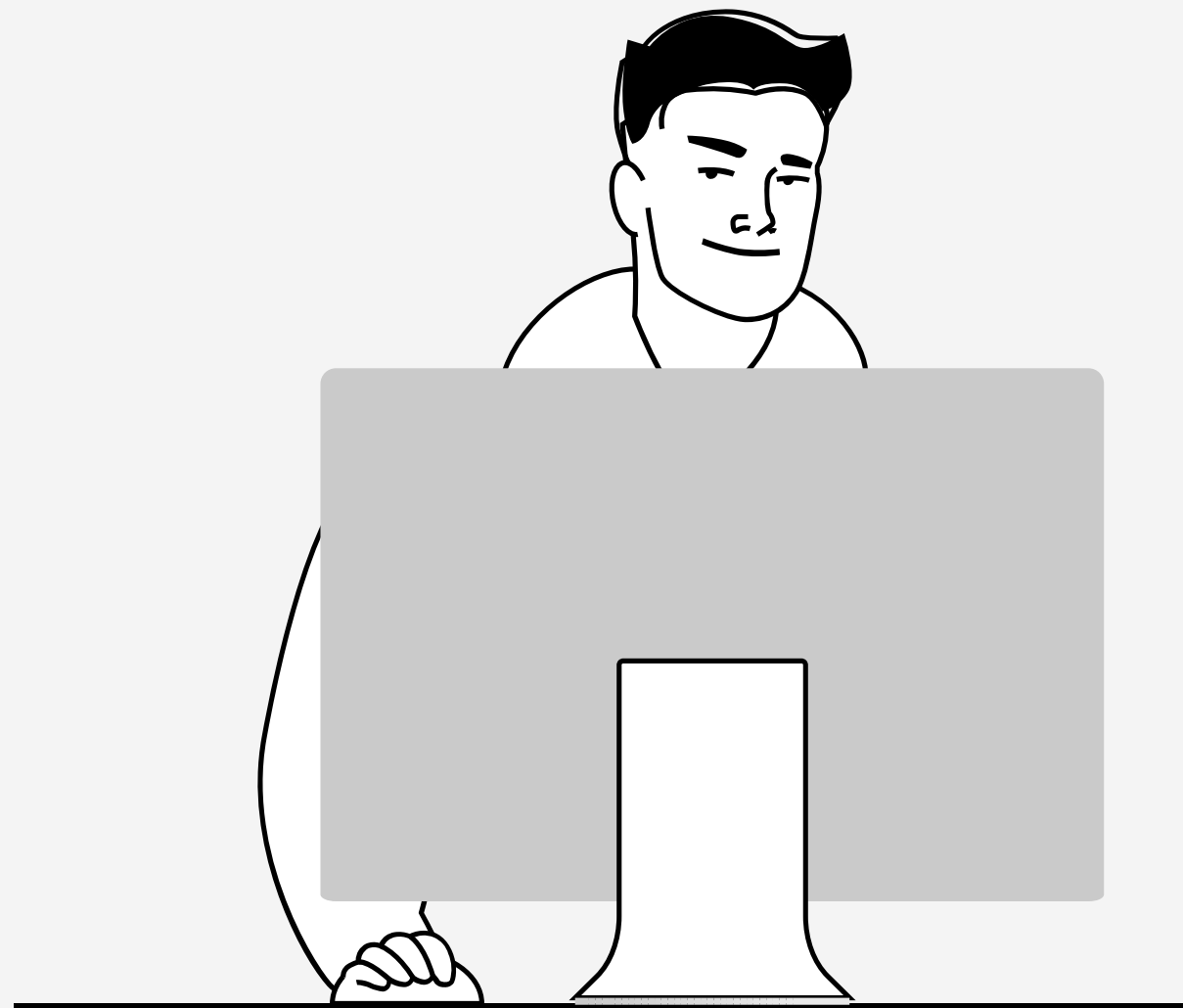
HandRehab-RPS

Make hand rehabilitation training easier



Team2

Meet Our Team



LIU Muzhou

Software Engineer

Back-end development

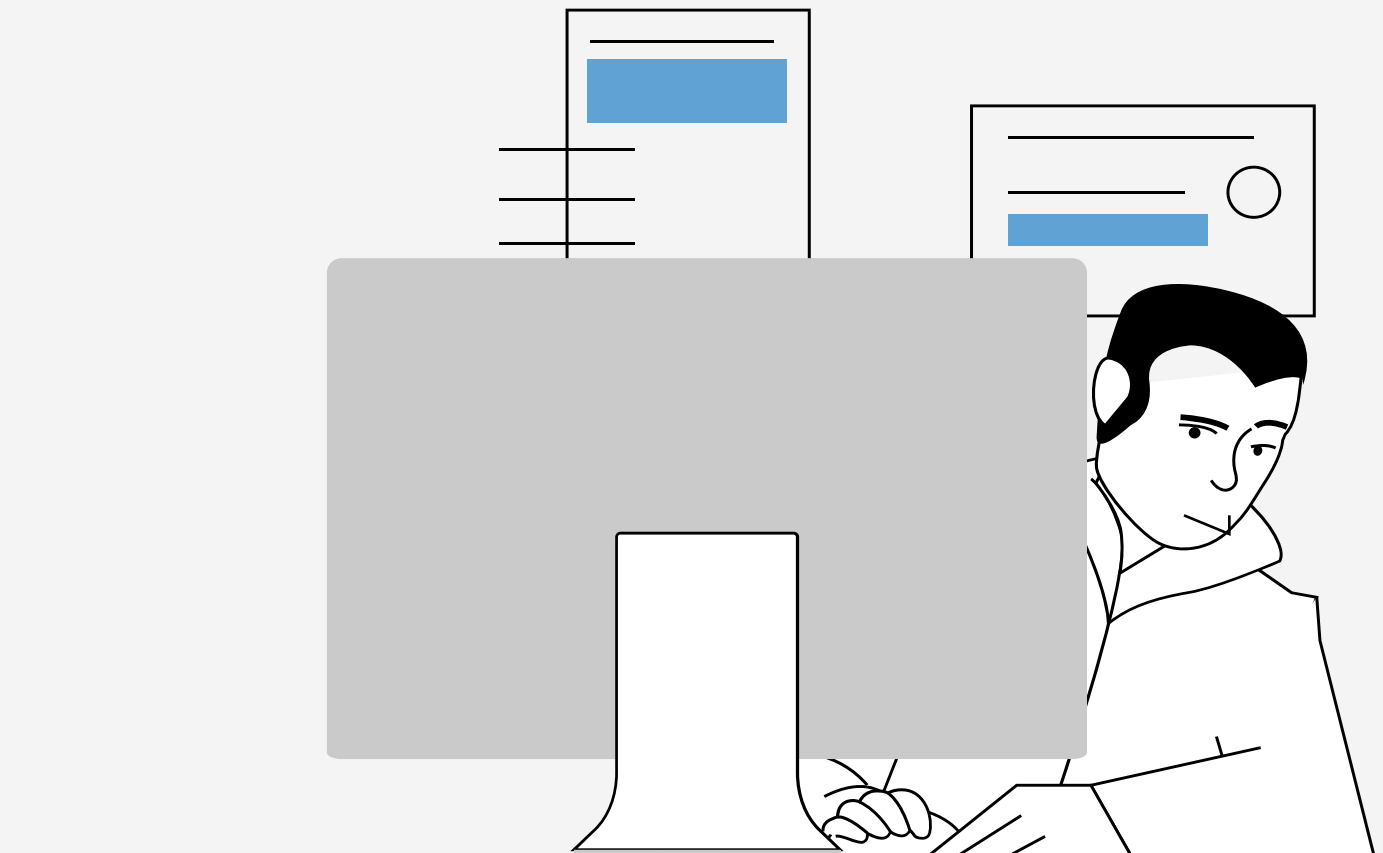


Zhang Haoran

Product Designer

UI/UX Design

Game design



DONG Qianbin

Back-end development

Front-end development

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project design: core feature and scope

Game mechanic and psychology consideration

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Project Description

A gesture-based hand therapy game that turns repetitive rehab into fun, structured, and data-informed training—using just a webcam.

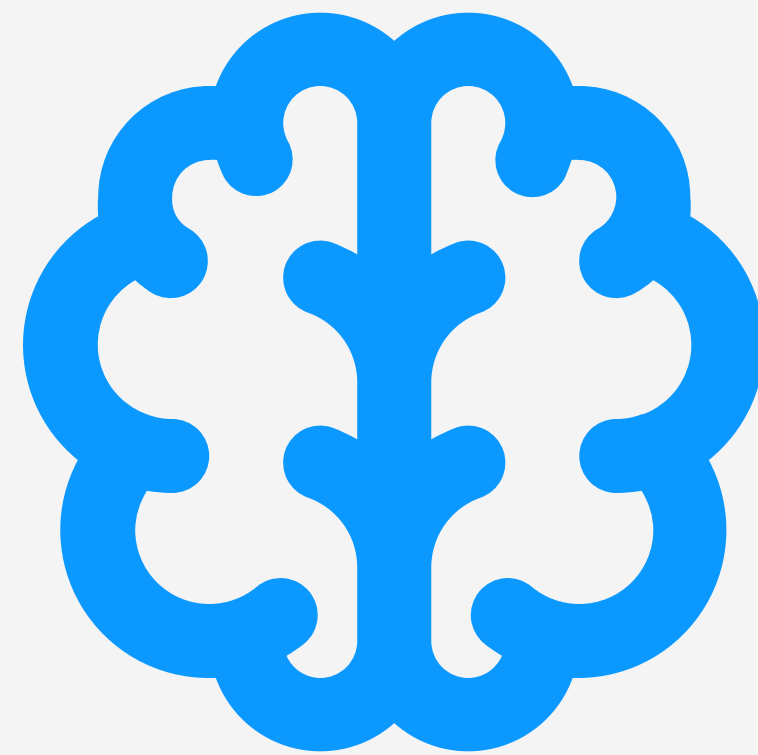
Background Research

Why Hand Rehab **Matters**



Sports

25%



Stroke

20–25%



Carpal tunnel syndrome

80%



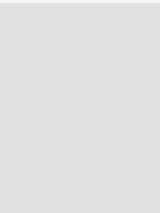
Background Research

Traditional Rehab Challenges

Low Continuity

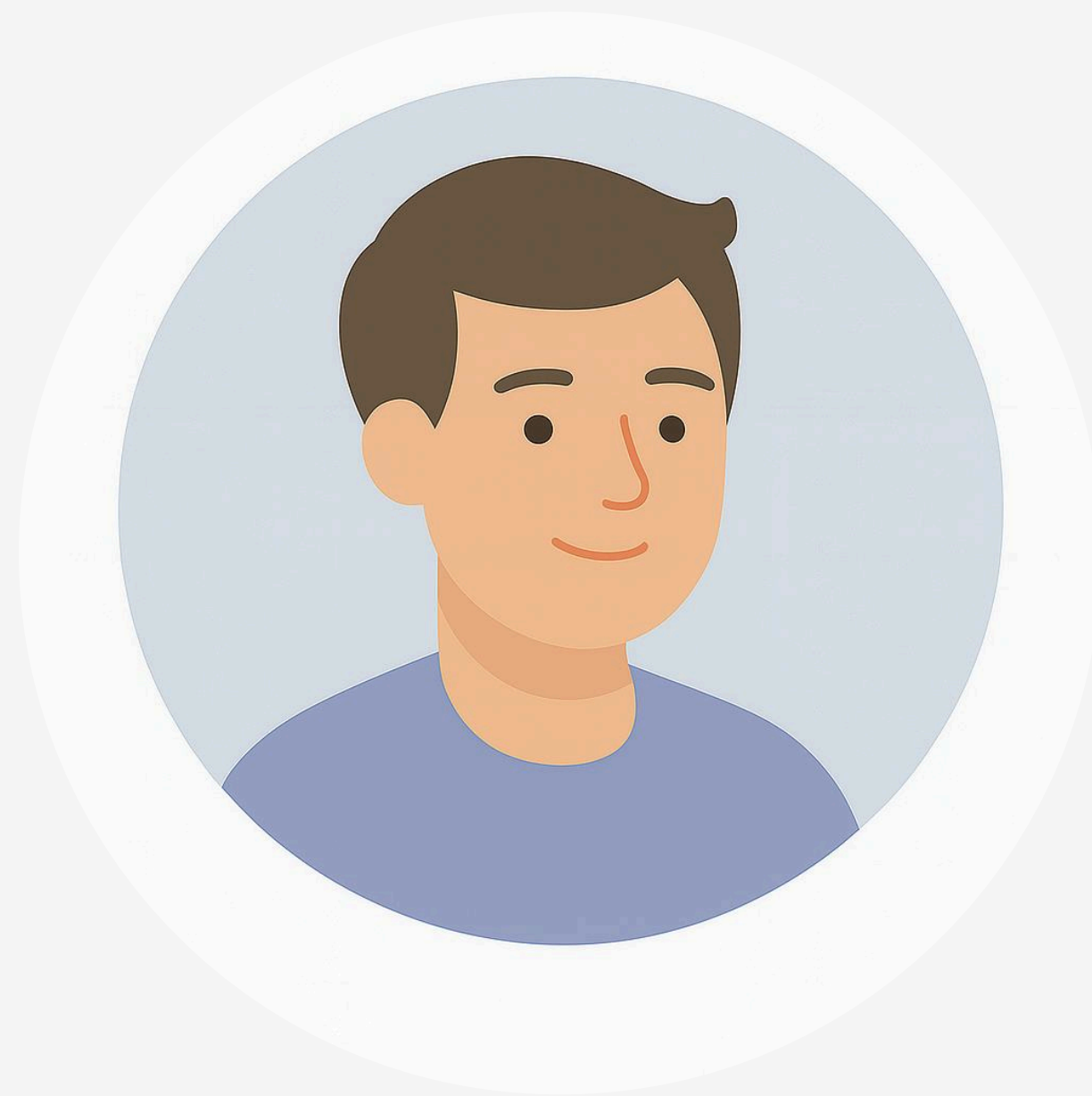
Low Adherence

Inequitable Access



User Research

Target User & Pain points



- **Exercises are repetitive and boring**
- **Difficult to maintain training regularly**
- **Users don't know if they're doing the gesture correctly**
- **Training feels meaningless when results are unclear**
- **Many rehab tools require hardware or complex setup**
- **High cost for therapists' guidance**

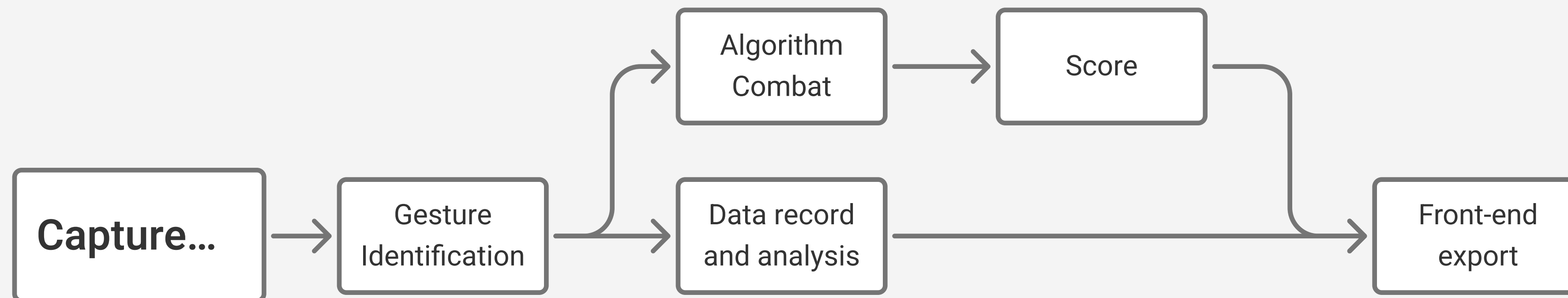
User Research

Target User: Clinicians/ therapists doctors

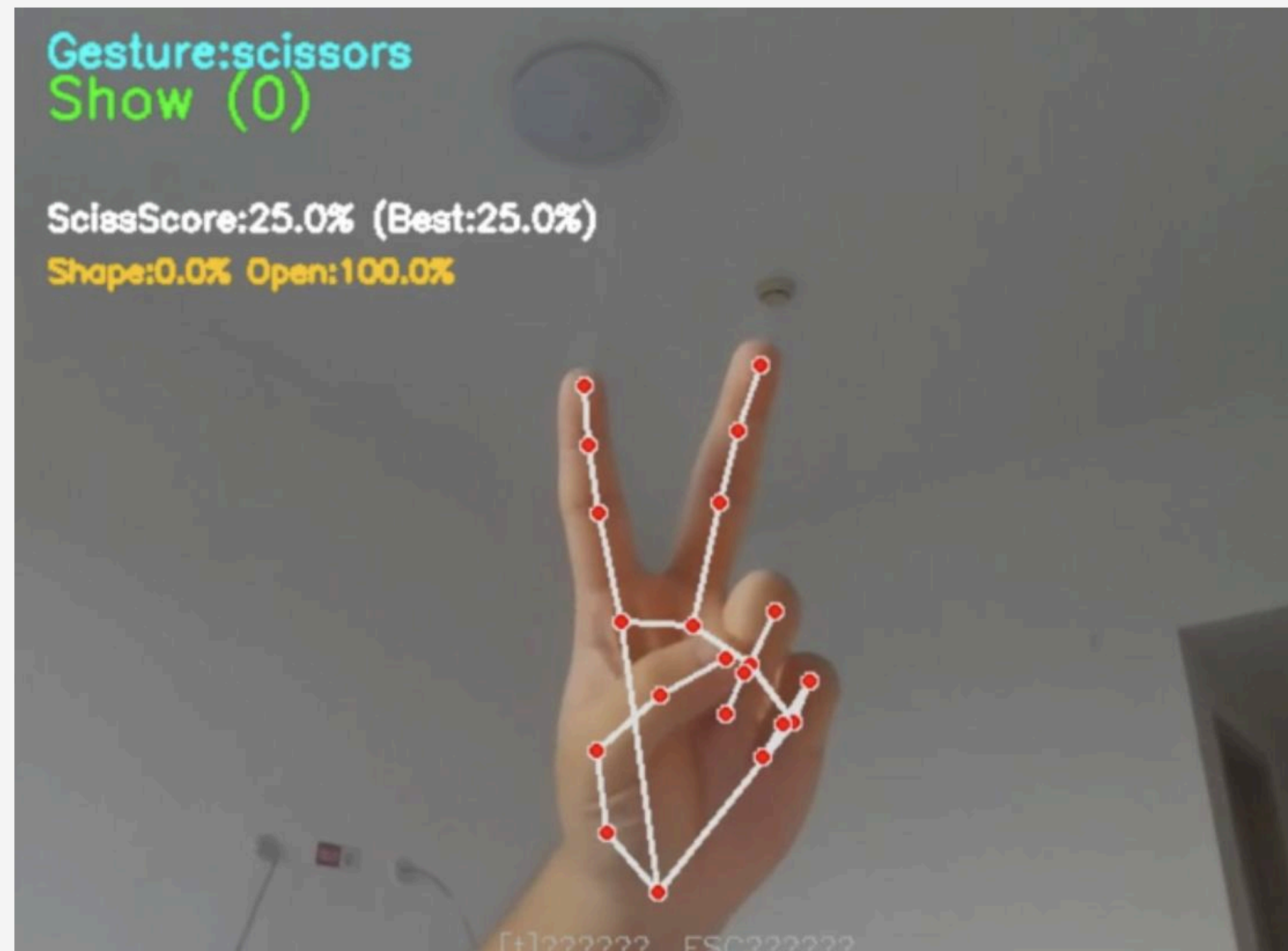


Cannot assess patient behavior outside the clinic
Feedback and documentation are time-consuming
Cannot adjust based on real performance data

Project design



Real-time hand gesture recognition



Single player vs Computer/ Player VS Player

Game Mode

Choose the Mode

- ☒ Local vs AI
- ☐ Host (Net)
- ☐ Client (Net)

Connect/Start



Training metrics tracking

Capture and summarize hand gesture frames,
**Accuracy, Pain score, Reaction time, ROM(Range
of motion)**

Round 7

Score: 8

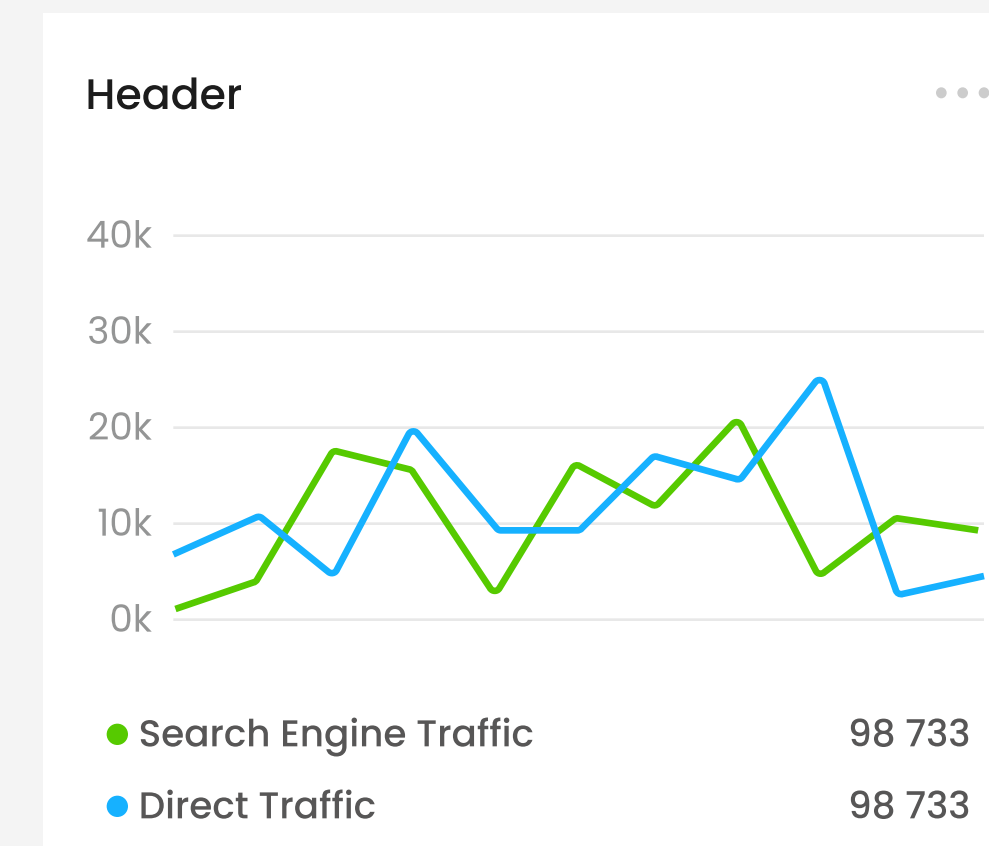
Last Result: Lose

Last Best Total: 25.0%

Press ENTER to start

Press ESC to quit

Historical data visualization





Game Mechanic

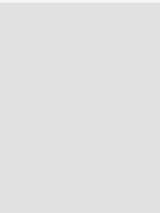
Turn-based game loop

Selective gamemode

Computer opponent & Strategic variants

Multimodal Feedback System

Motion Quality Scoring





Turn-based game loop

```
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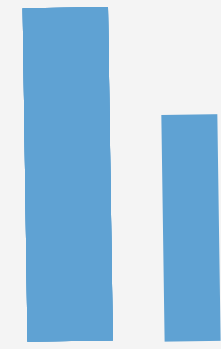
Short feedback loops increase motivation through frequent, clear reinforcement.



Computer opponent & Strategic variants

Player competes against computer with dynamic difficulty

PVP mode using matching mechanism to match opponent at a comparable level



Selective gamemode

Time-based:

The training ends after playing for a fixed duration

Game-based:

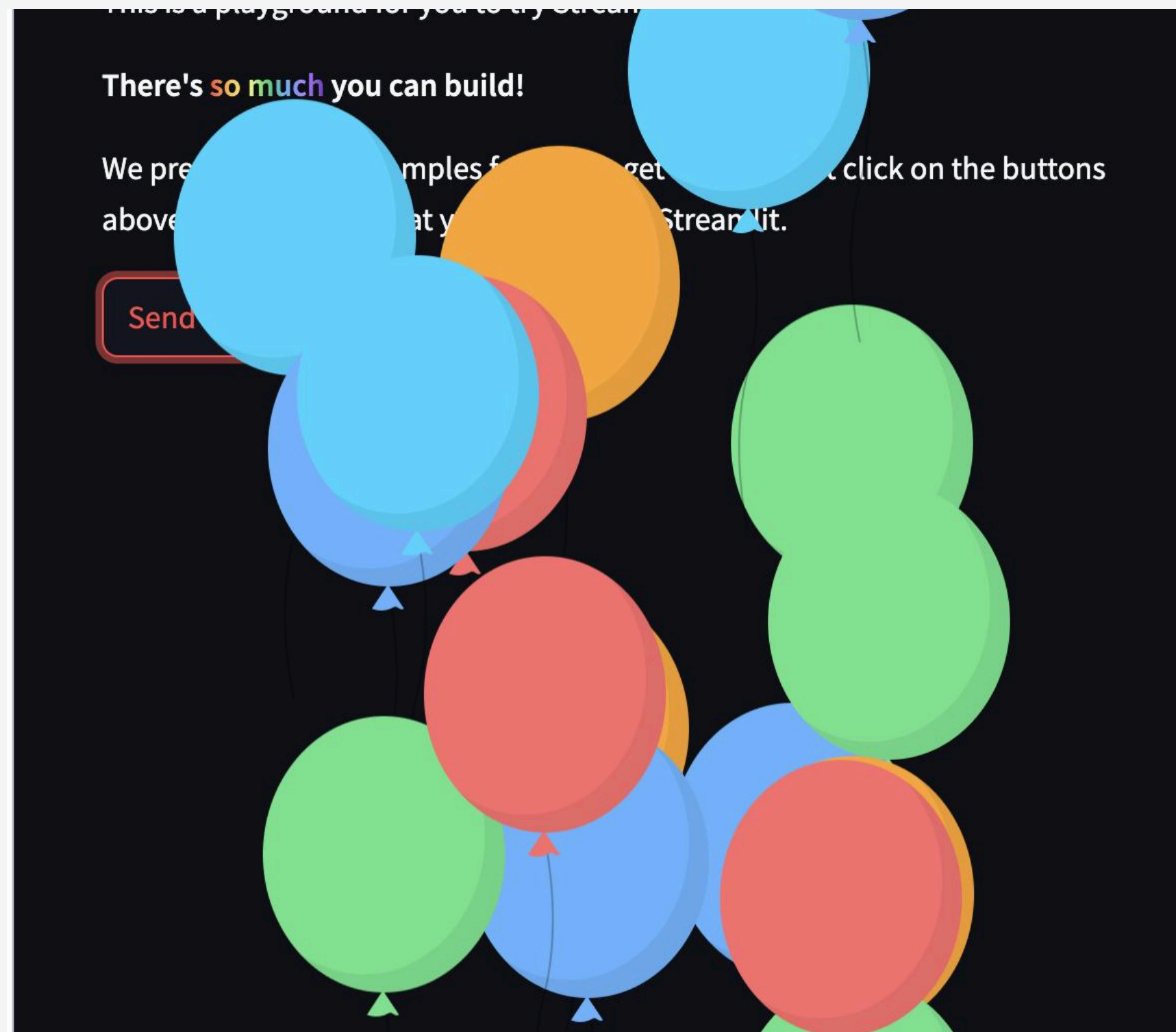
The training ends after winning a fixed number of games

The gesture accuracy have higher score weight in this mode

Choice-based modes give users autonomy, supporting intrinsic motivation and better adherence.



Multimodal Feedback System



Combining audio + visual + textual feedback reduces cognitive load and improves clarity.

Visualization of progress is key for long-term engagement and motivation.

Motion Quality Scoring

Round 1

completion: 45.29

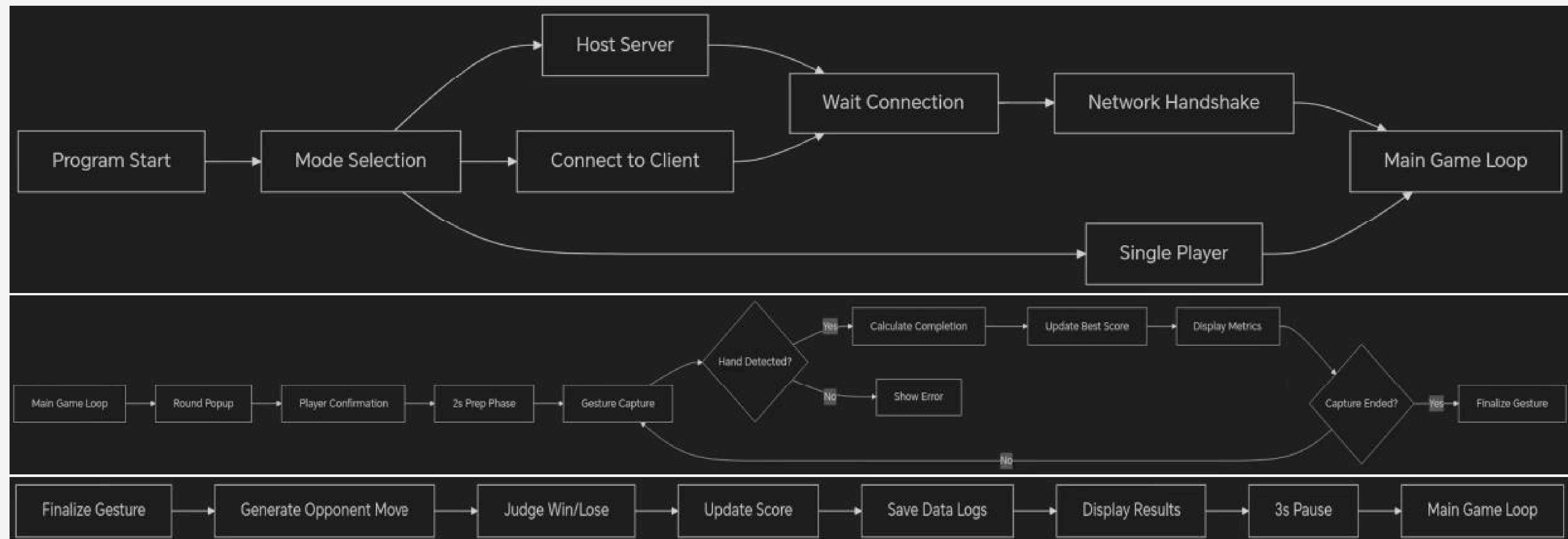
remaining:
0.1s

Back To GameMode

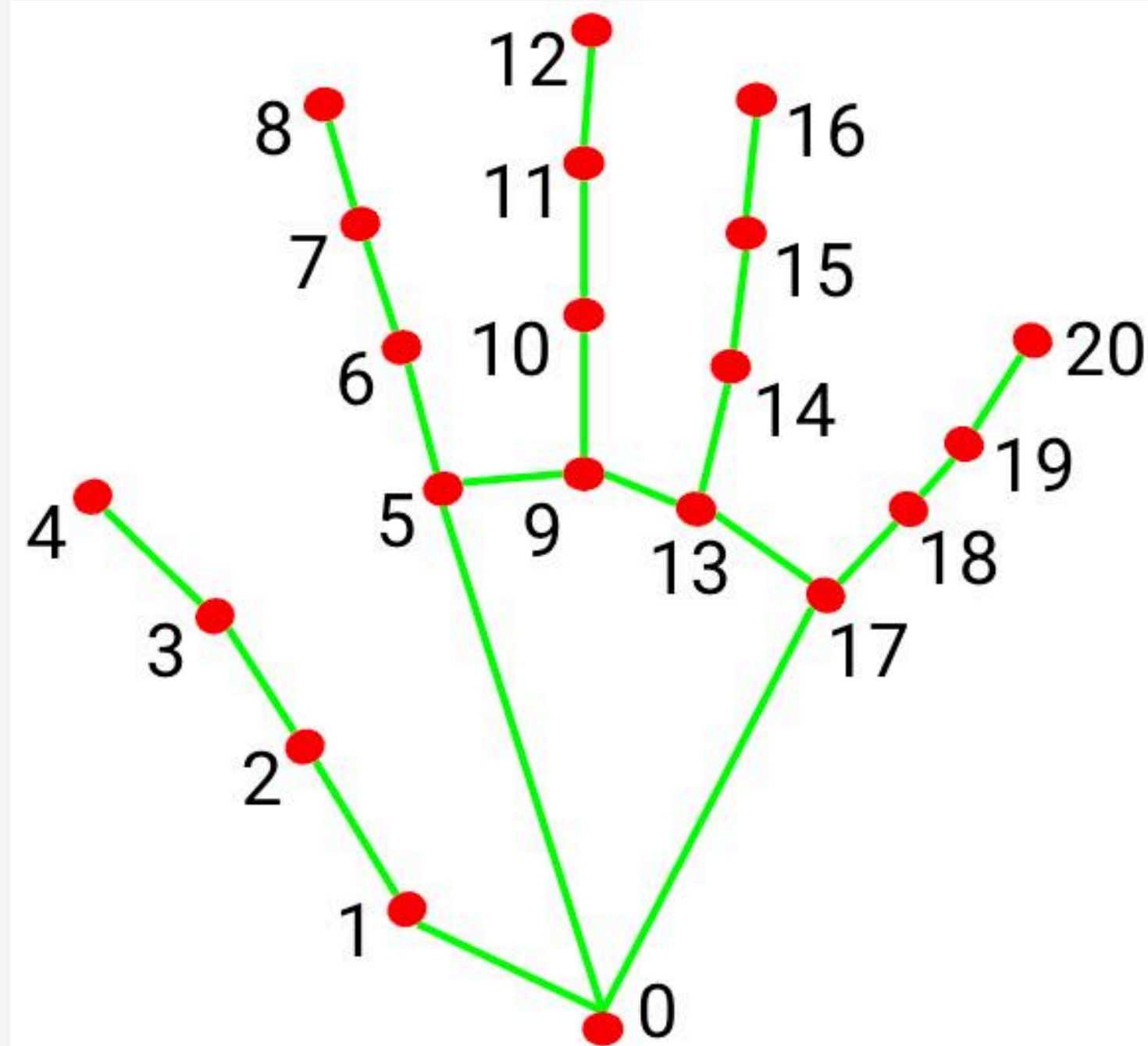
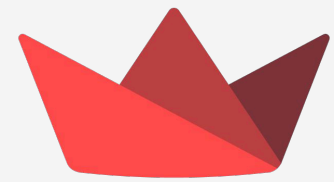
Next Round



Technical implementation



Technical implementation



- 0. WRIST
- 1. THUMB_CMC
- 2. THUMB_MCP
- 3. THUMB_IP
- 4. THUMB_TIP
- 5. INDEX_FINGER_MCP
- 6. INDEX_FINGER_PIP
- 7. INDEX_FINGER_DIP
- 8. INDEX_FINGER_TIP
- 9. MIDDLE_FINGER_MCP
- 10. MIDDLE_FINGER_PIP

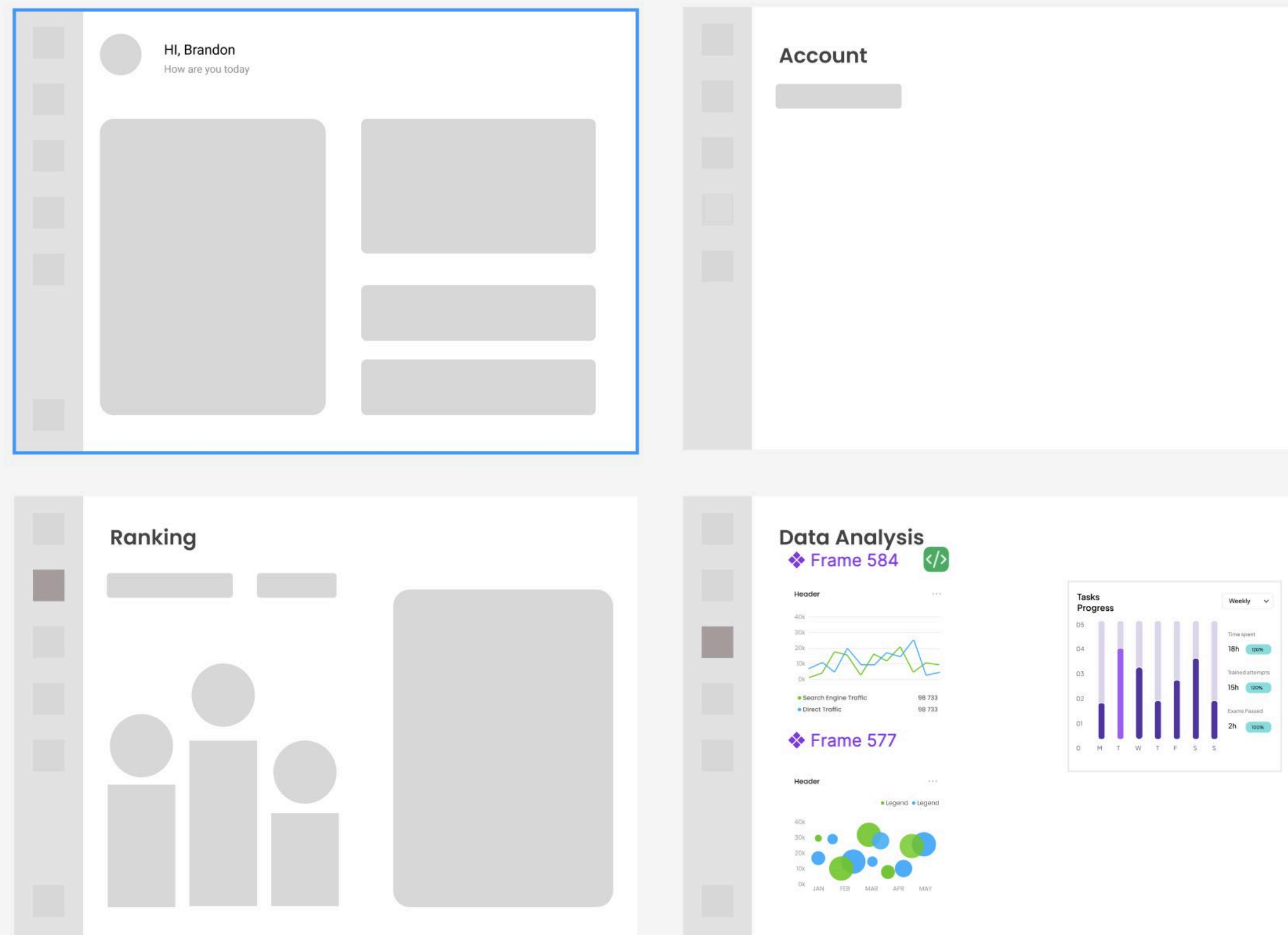
- 11. MIDDLE_FINGER_DIP
- 12. MIDDLE_FINGER_TIP
- 13. RING_FINGER_MCP
- 14. RING_FINGER_PIP
- 15. RING_FINGER_DIP
- 16. RING_FINGER_TIP
- 17. PINKY_MCP
- 18. PINKY_PIP
- 19. PINKY_DIP
- 20. PINKY_TIP

Technical implementation

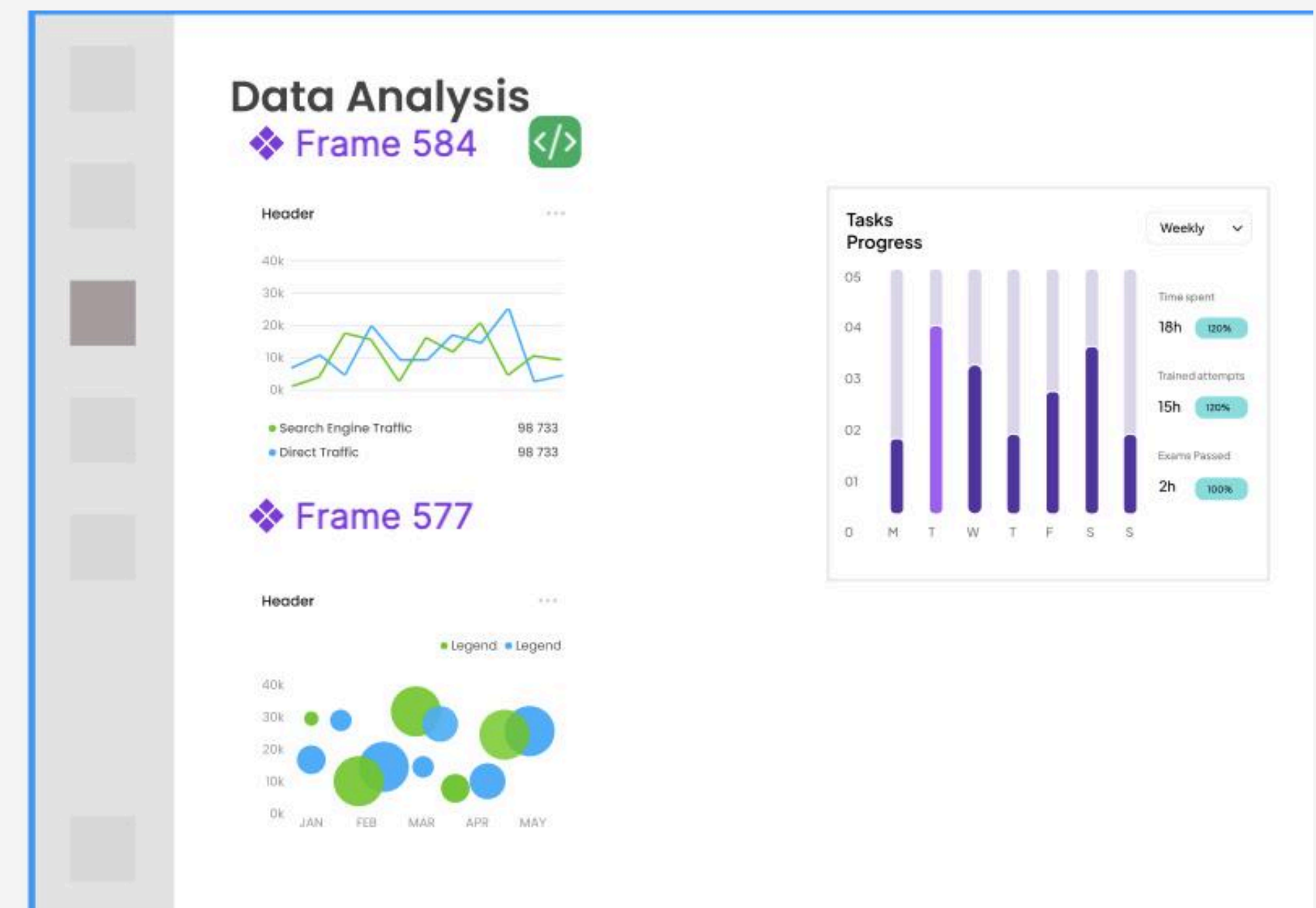


Future development

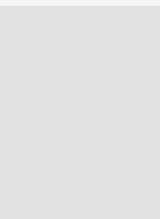
Front end modify



Data analysis and dash board



Usability



Thank you for listening

Q & A