



SMO-KARE

SMO-KARE DEA



TRACK

TRACK your motion
& collect raw-data
with Wearable Device



SEND

SEND your data
to the phone



PROCESS

PROCESS raw-data
with a various tools
Obtain useful information

SMO-KARE

until Midterm



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with **SMART PHONE**



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SMO-KARE

Final Term



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SMO-KARE

Final term



TRACK

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SEND

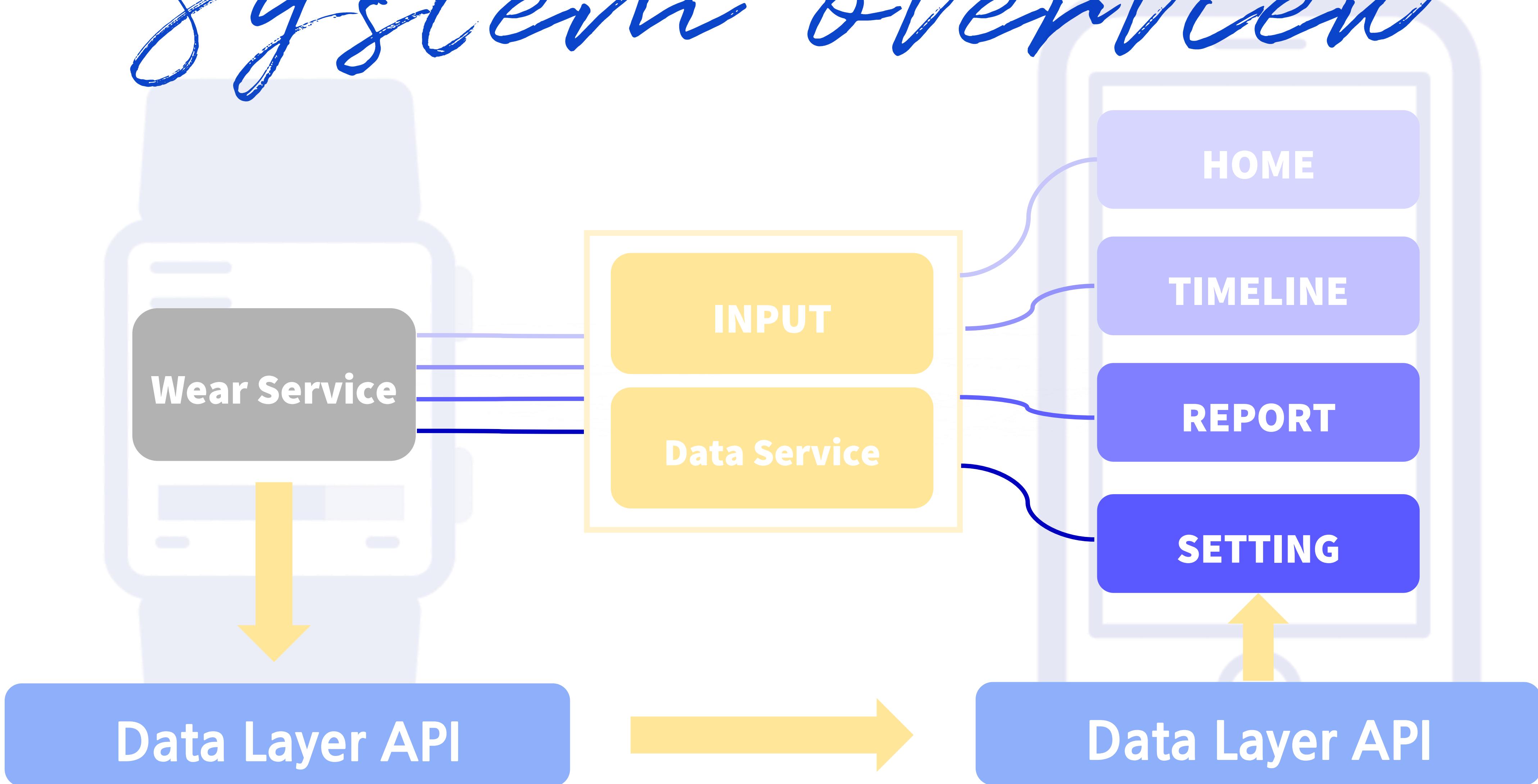
SEND your data
to the phone

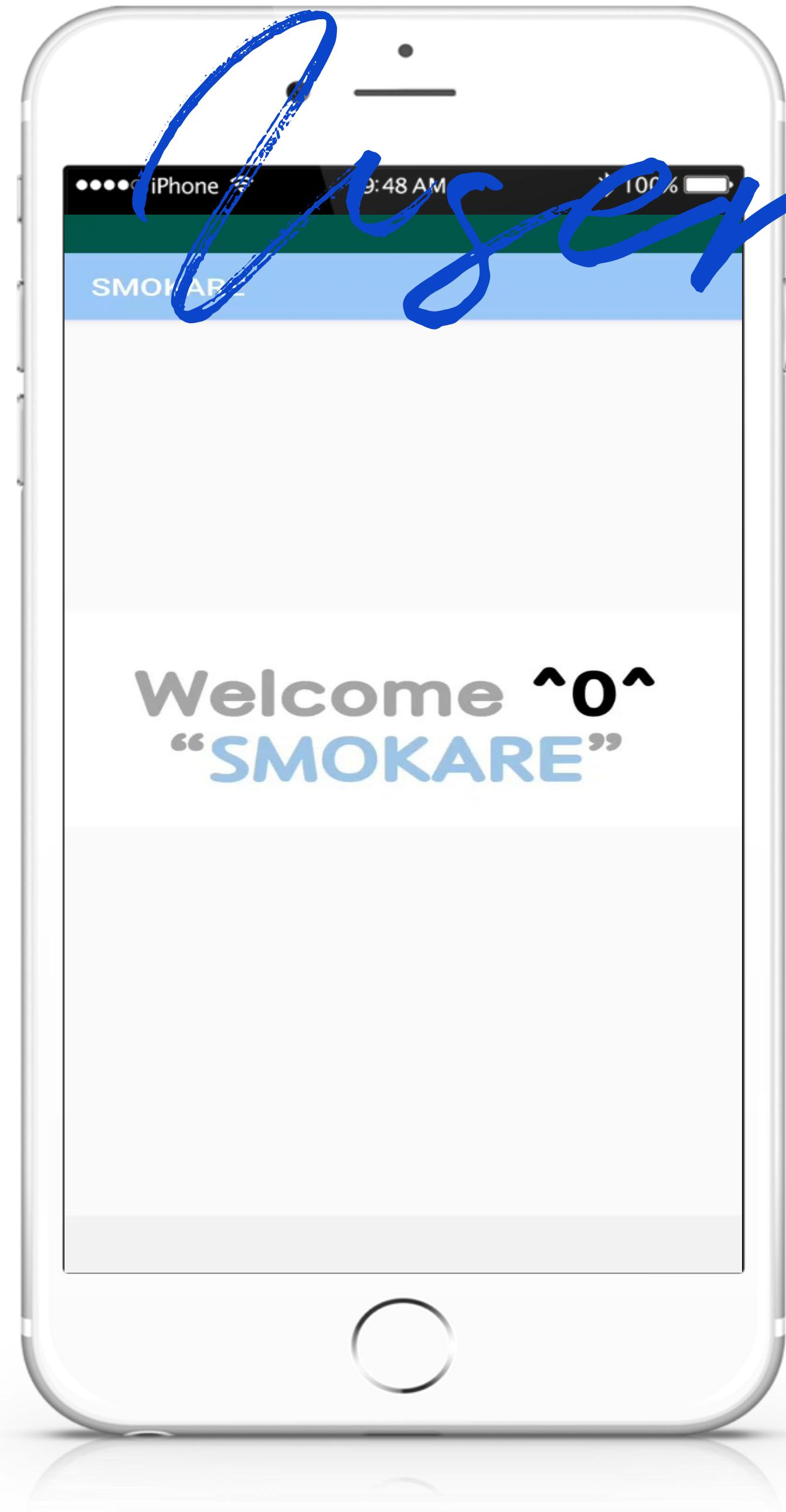


PROCESS

PROCESS raw-data
with a various tools
Obtain useful information

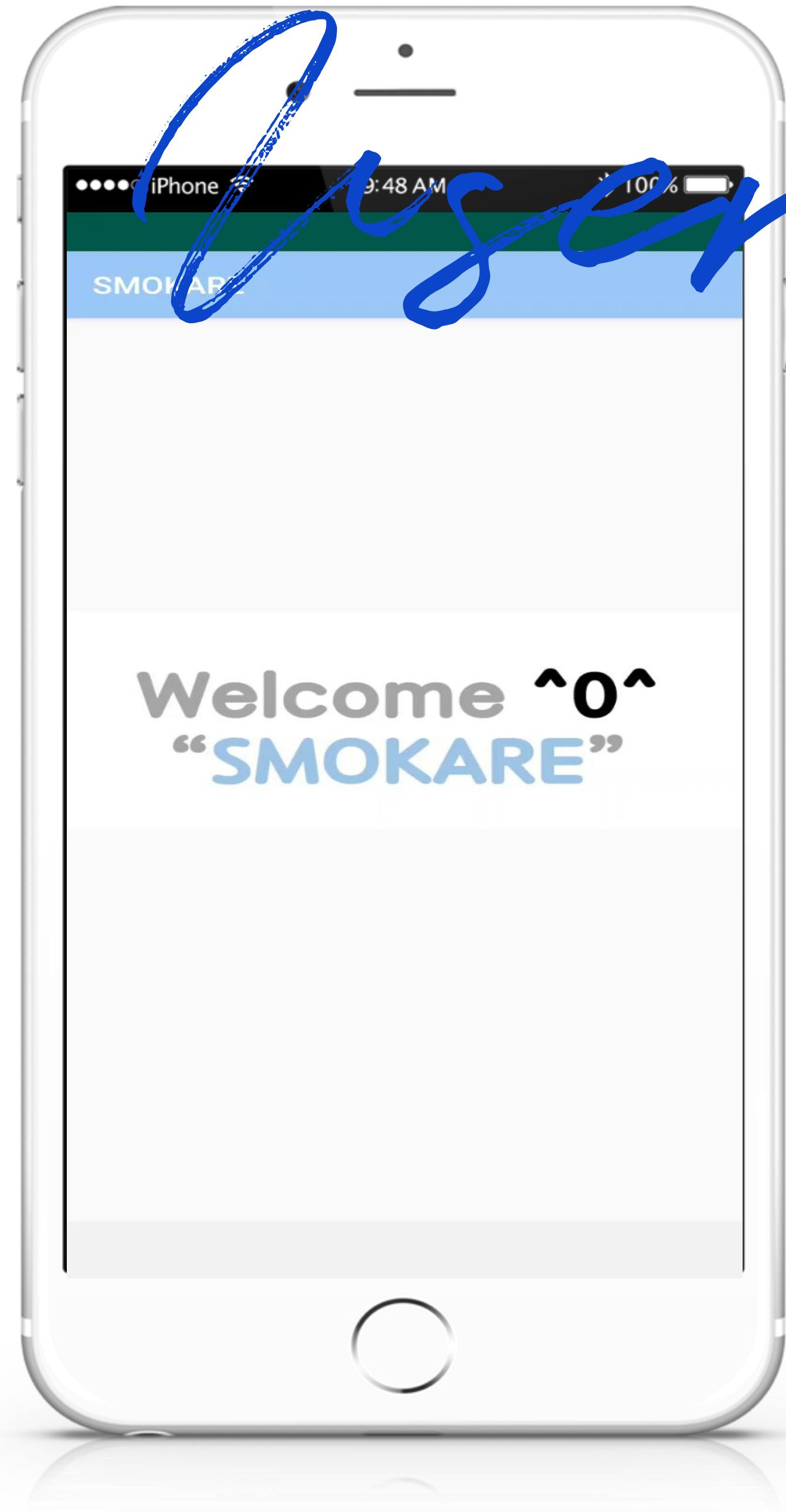
System overview





Augen scenario

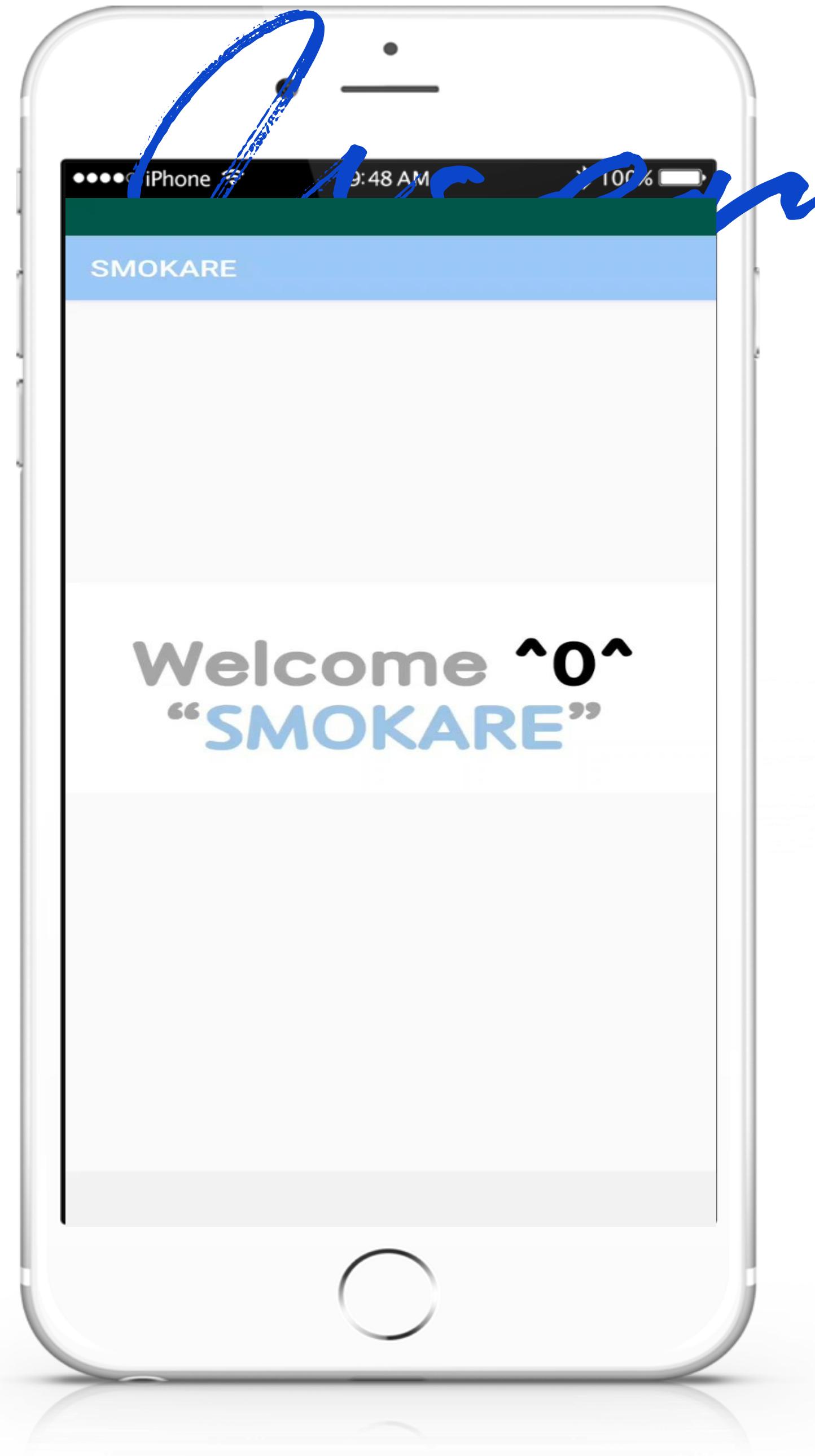
- First Download the app
 - •After ‘welcome page’ for 2 seconds
 - •‘Info Page‘ in which user write down info about user.
 - •This info will be used in other page.



User scenario

- Main PAGE

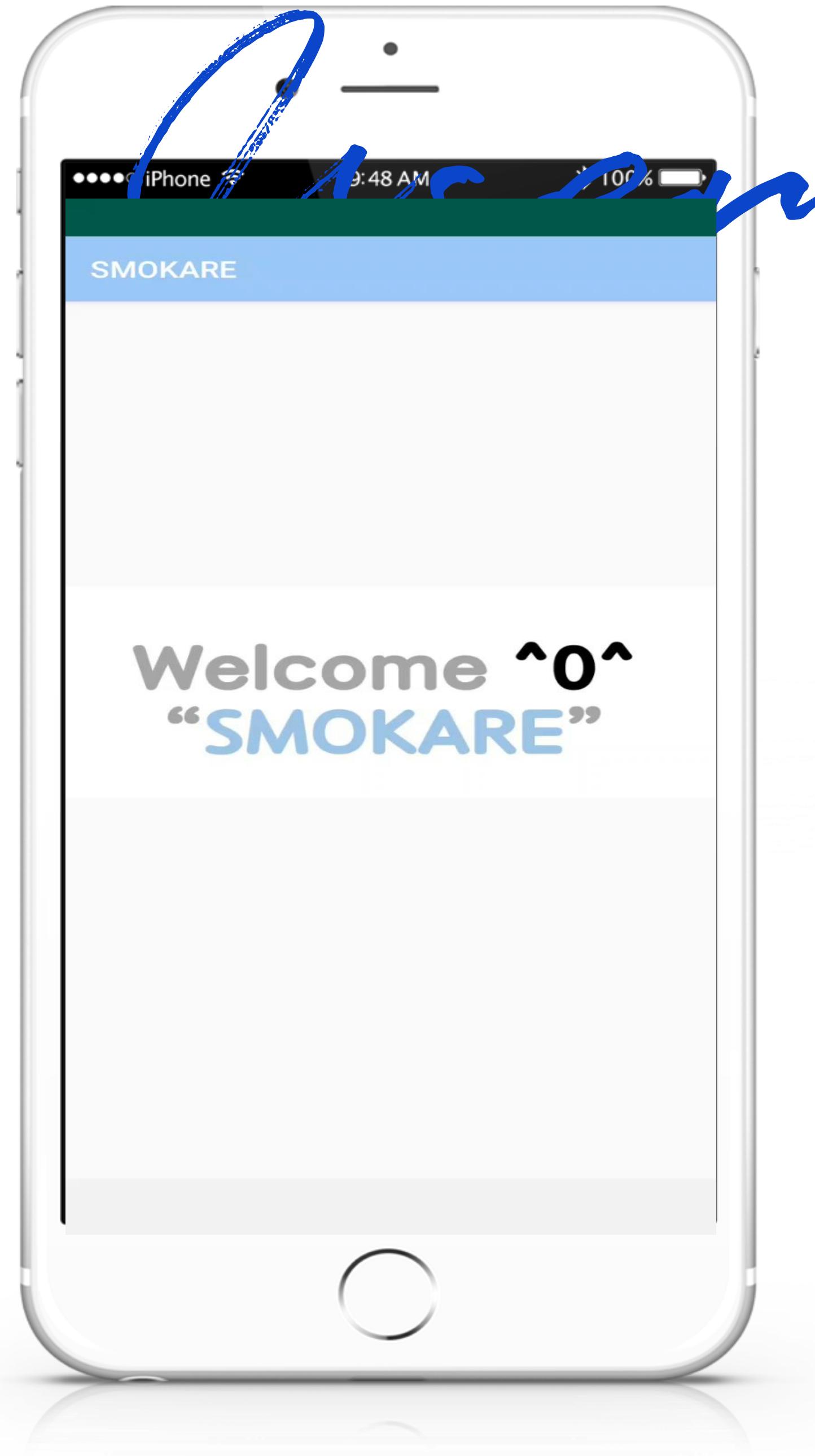
- •HOME tab in the bottom, would be main page of app
- •User can add their own smoking information with the button
- •Below, there are several information about:
Today's total cigarettes/This week's total cigarettes,
And the time since the last smoking



on scenario

- Setting TAB

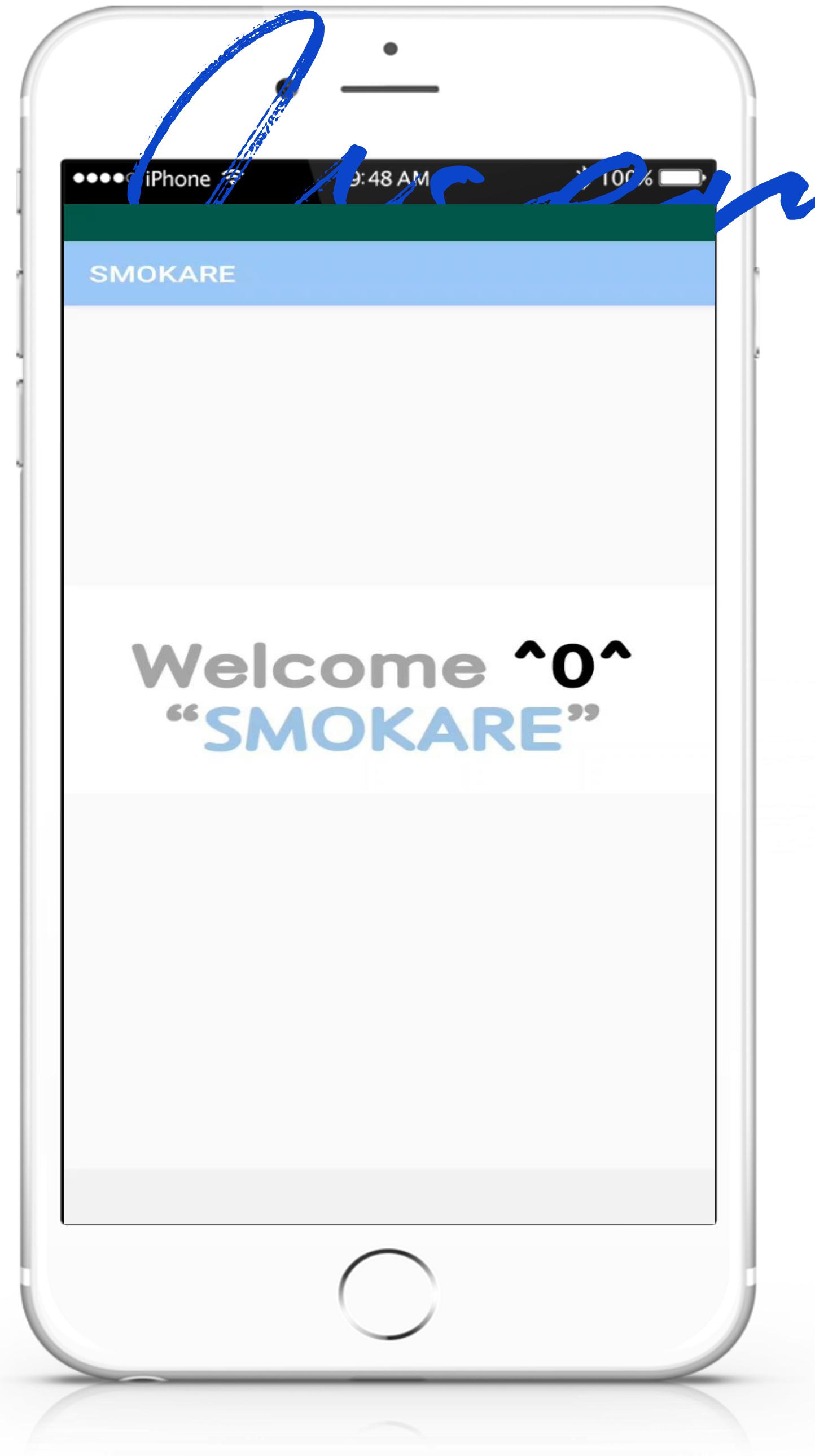
- •Since you initially entered information about the user, when you start the app, you'll be taken directly to the home screen.
- •Setting shows the user information.



on scenario

- Timeline TAB

- • After adding some records, we can use this TAB
- • The user can check the smoking history at a glance while viewing the statistics on his smoking history.
- • Below mushroom will give you comments according to your smoking history.



You are on scenario

- Report TAB

- •The user can set a smoking cessation goal on this page.
- •The progress bar tells you how much you have reached your smoking cessation goal.
- •Underneath it are real-time savings, extended life, depending on the time you quit.

KEY challenges & solutions

KEY CHALLENGES

- **METHOD of processing the raw-data**
- **COMMUNICATION between smartphone and smartwatch**
- **REAL-TIME processing on 24 hours**



KEY challenges & solutions

■ **METHOD of processing the raw-data**

1. Use ACCELEROMETER, MAGNETIC_FIELD sensor to calculate roll, pitch angle
2. Examine the roll, pitch angle whether they are in ‘dragging angle range’
3. In order to recognize smoking one cigarette,
a person has to drag at least seven times in 4 minutes

KEY challenges & solutions

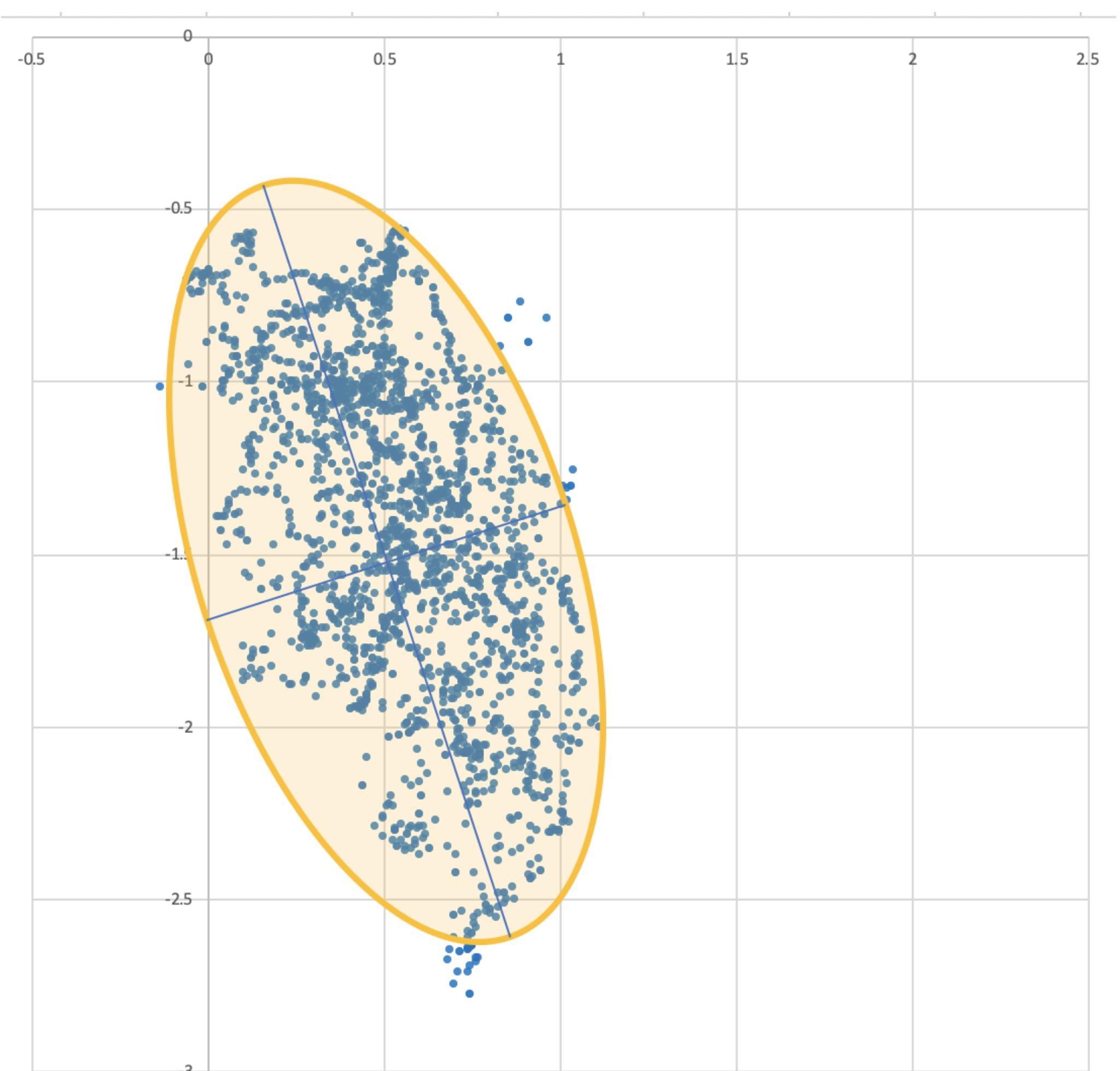
■ **METHOD of processing the raw-data**

2. Examine the roll, pitch angle whether
they are in ‘dragging angle range’

→ 4 trials, overall 16000 pitch & roll data

→ Make the elliptic equation

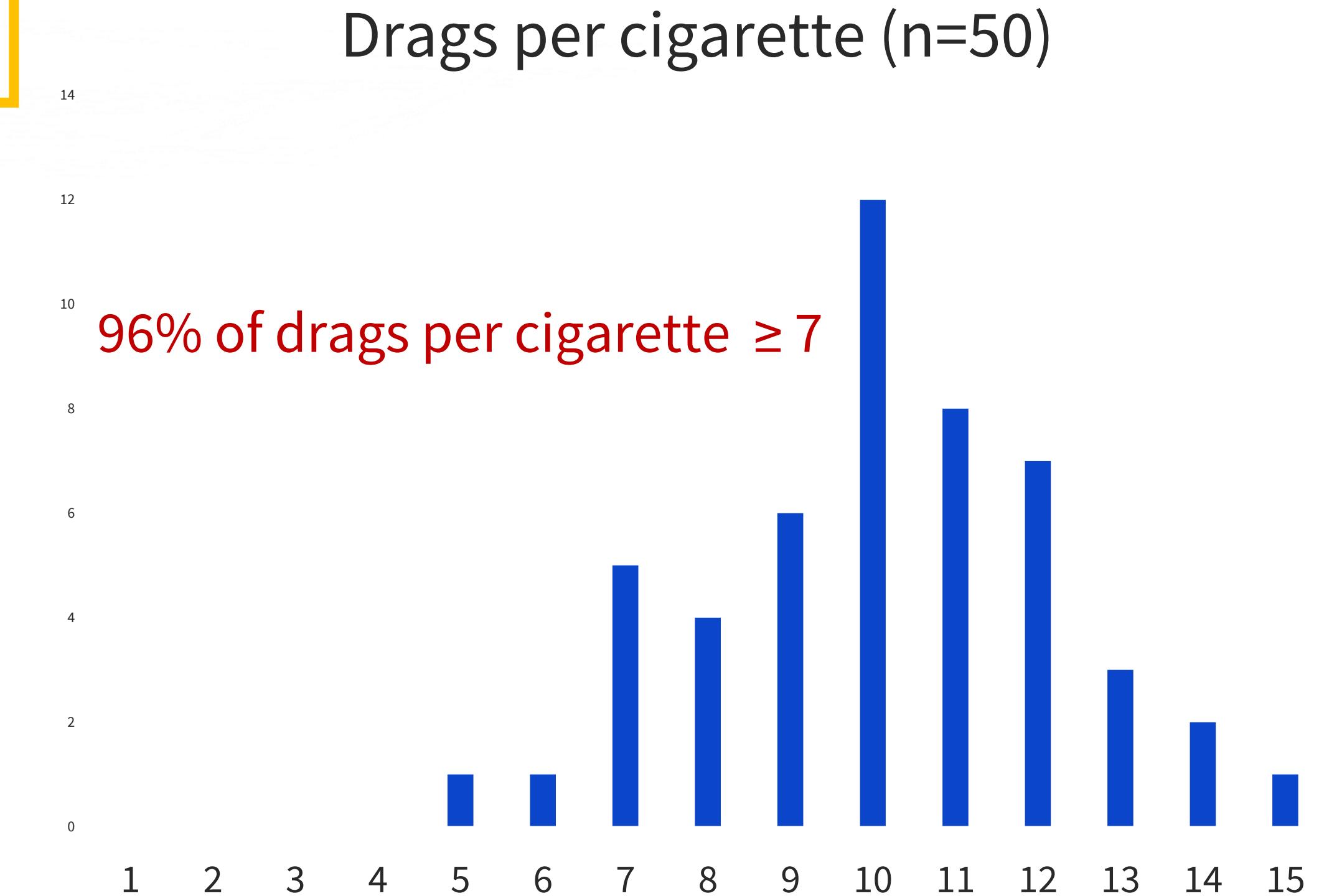
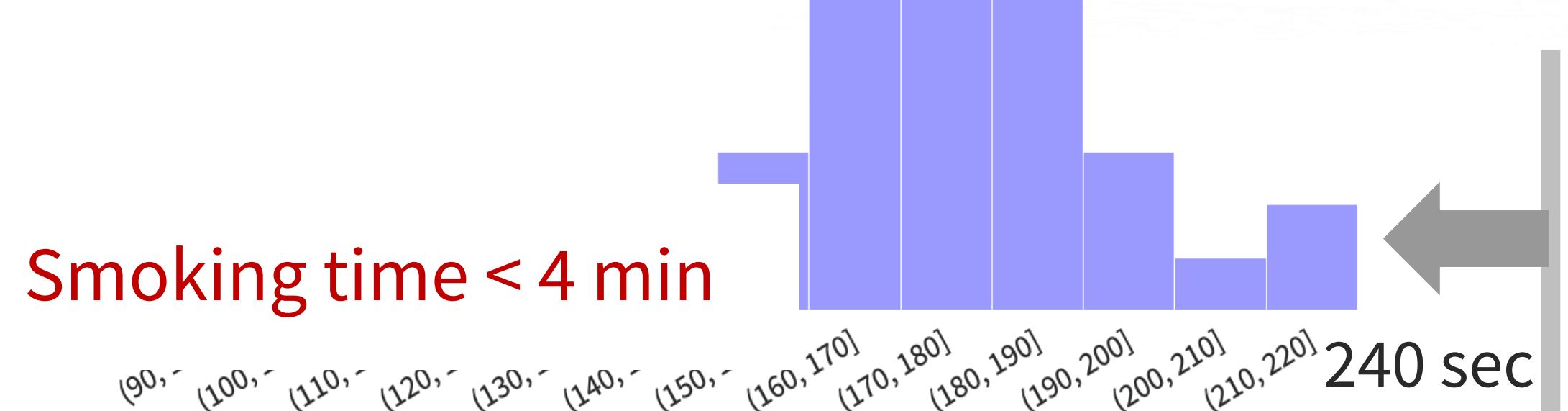
as ‘dragging angle range equation’



KEY challenges & solutions

■ METHOD of processing the raw-data

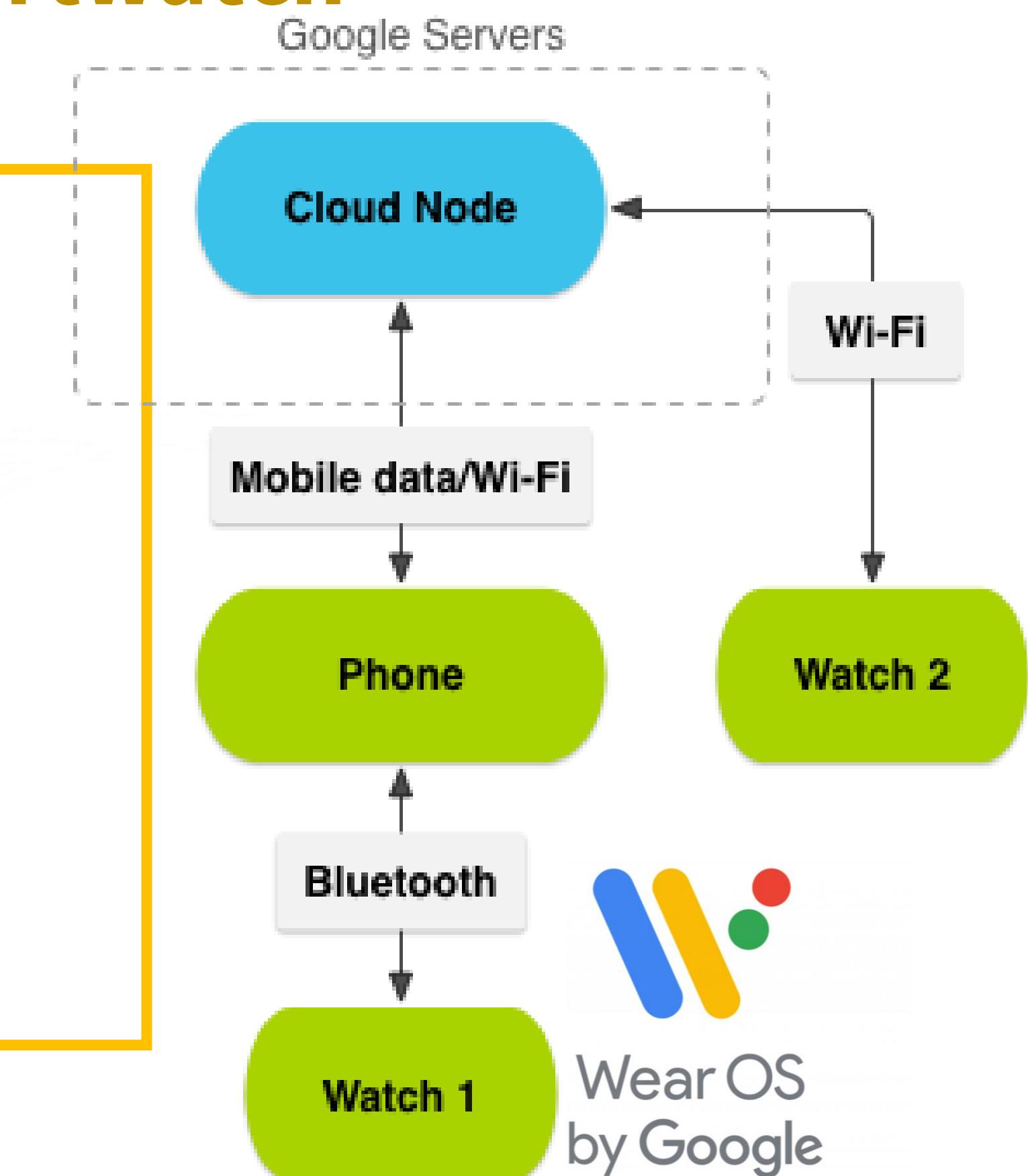
3. In order to recognize smoking one cigarette,
a person has to drag at least seven times in 4 min



KEY challenges & solutions

■ COMMUNICATION between smartphone and smartwatch

- We use “Data Layer API” of Wear OS using Bluetooth
- Wear OS : Use `Wearable.getDataClient class` to send timestamp information of smoking action
- Phone : Use `DataClient.onDataChangedListener` in the background service



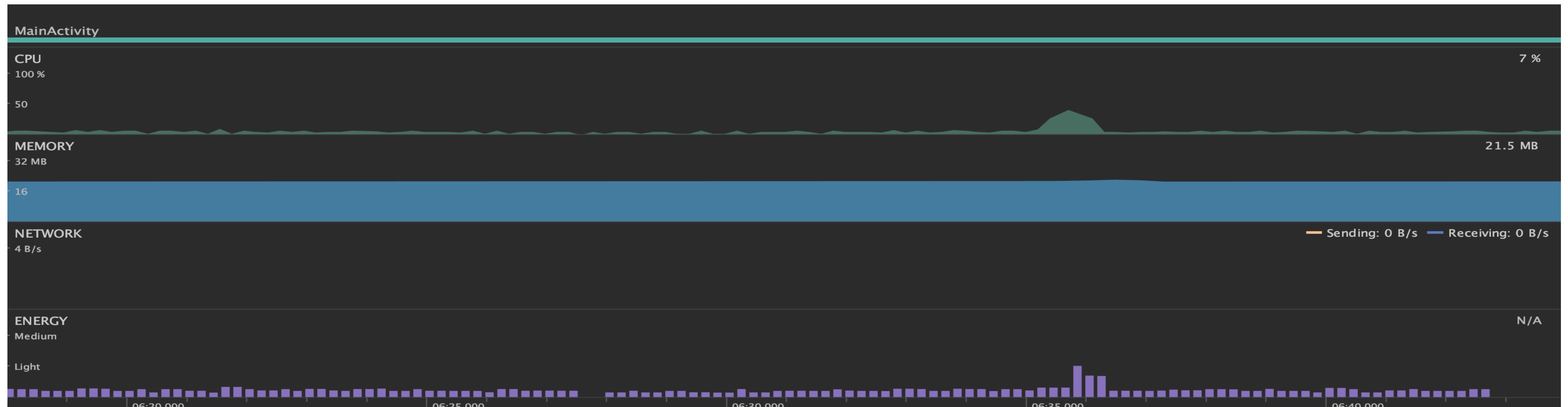
Sample network structure in Wear OS official document

<https://developer.android.com/training/wearables/data-layer>

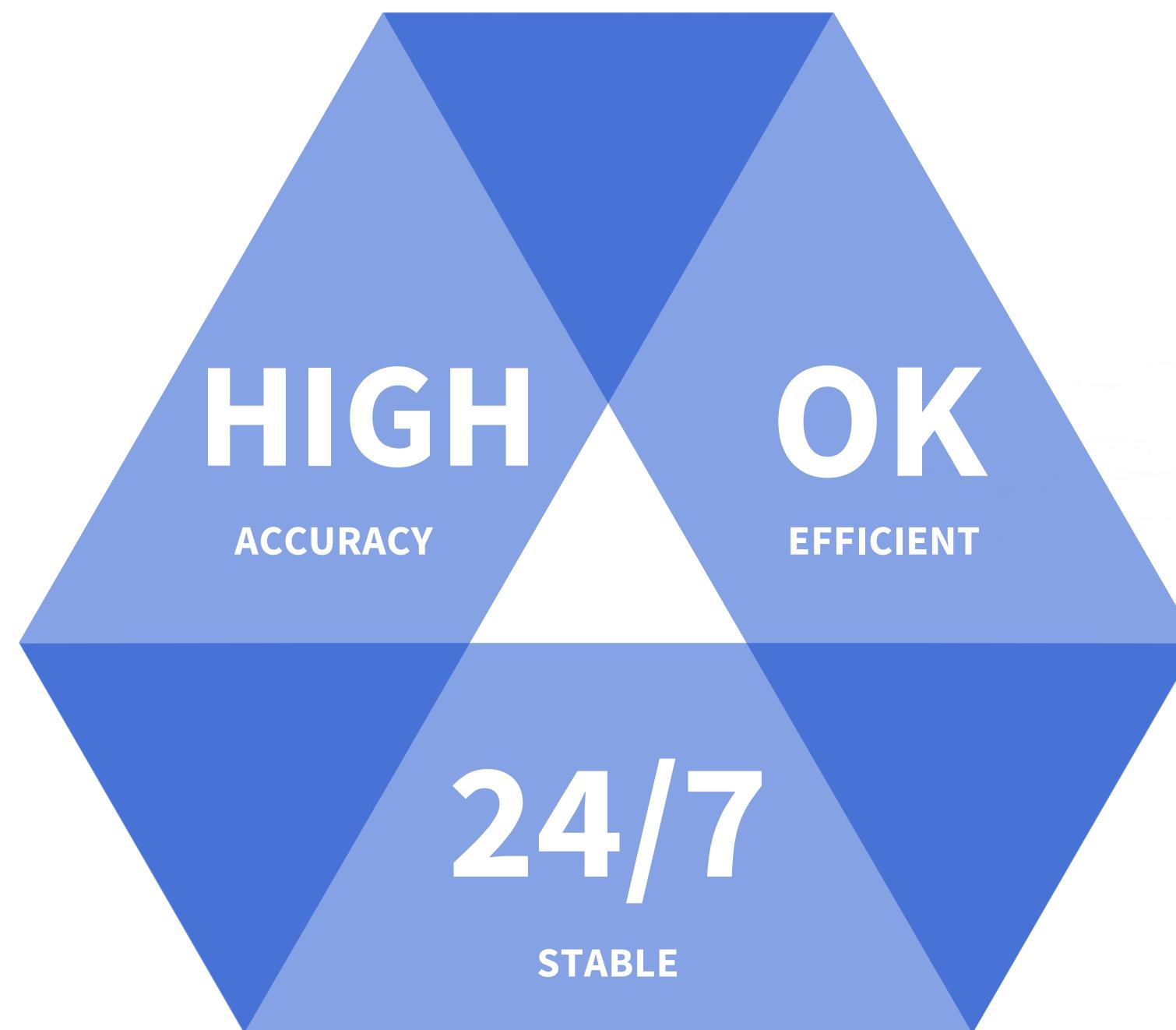
KEY challenges & solutions

REAL-TIME processing on 24 hours

- Use **Foreground Service** to operate detection app continuously in Smartwatch
- It consumes a small mount of energy and resources.
- The watch already use sensors to see whether the user is looking at the screen or not.



SUCCESS CRITERIA



goals

GOAL 1

Can our app **detect** smoking behavior accurately?

: Yes. We did some experiments to verify our detection model (TBC).

GOAL 2

Can user get **useful information** to quit smoking?

: Yes, as you saw in the UI demo, it provides some useful information to the user.

GOAL 3

Is our app stable during **all the time**?

: It's working well but Not perfectly.

Sometimes the app stops responding.

Demonstration & Verification

GOAL 1

Can our app **detect** smoking behavior accurately?

1. 10 smokers wore the smartwatch and check whether the app detect their smoking motions correctly.
 - 100% success (true positive)
2. 2 non-smokers wore the smartwatch for three hours in daily life (sitting, studying, walking, drinking a soda and eating).
 - 1 detection error (false positive) was occurred.

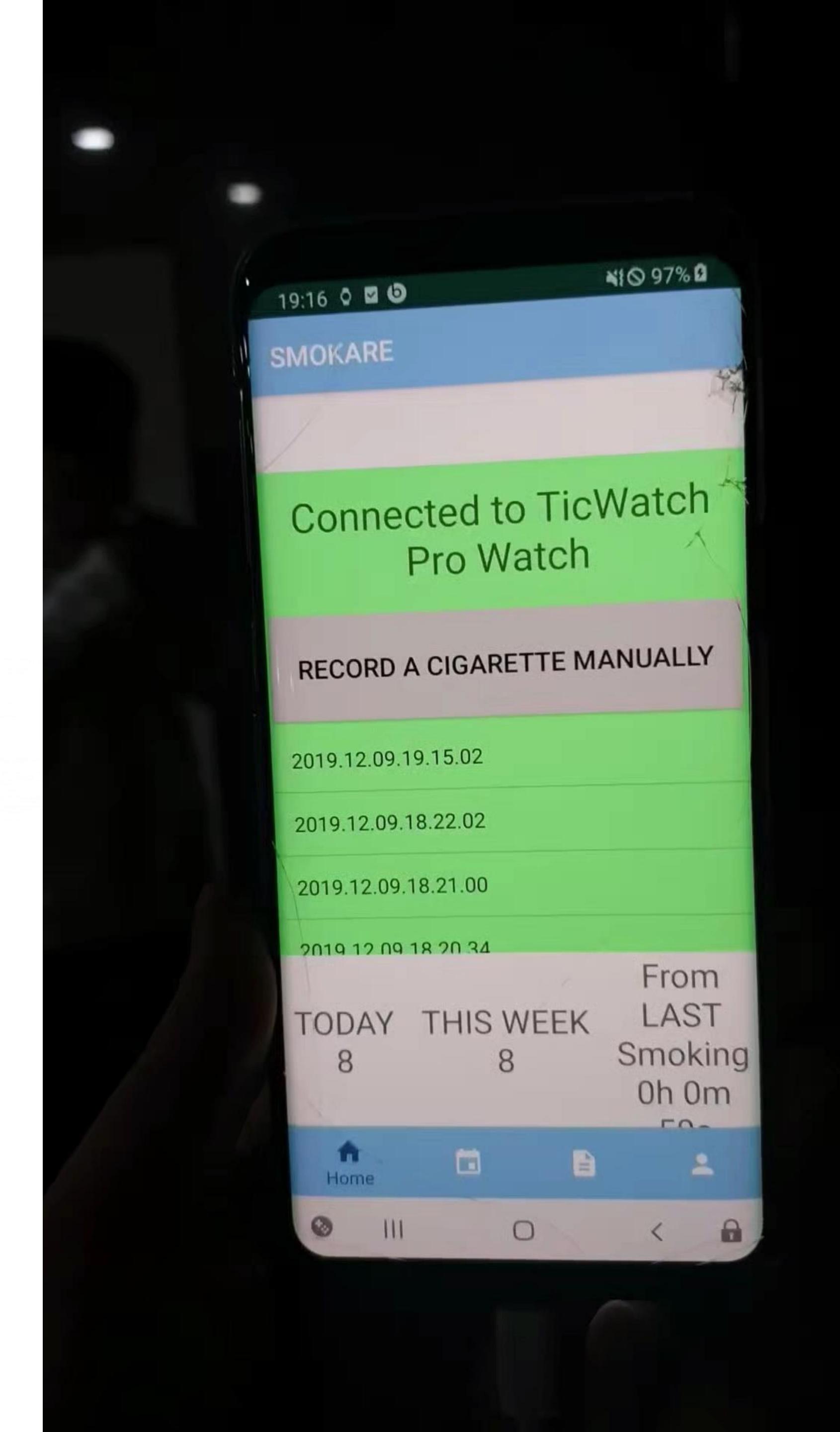
Demonstration & Verification

GOAL 1

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10 smokers wore the smartwatch and check whether the app detect their smoking motions correctly.

- 100% success (true positive).



Timeline

Timeline

Contributions

Contributions

Pair	App		Watch	
Name	Eunman	Kyung-won	Seung-geon	Yujin
System Design	✓□	✓□	✓□	✓□
[App] UI	✓□	✓□		
[App] Function	✓□	✓□		
[Watch] Sensor Data Processing			✓□	✓□
[Watch] Detection			✓□	✓□
[Watch] Background Running			✓□	✓□
Data Transfer from Watch to App	✓□	✓□	✓□	✓□

Lessons Learnt

Lessons

- Fully understanding Android must be preceeded before developing.
- Task distribution should be as independent as possible.

A hand is holding a white rectangular card with the word "THANKS!" printed in bold, black, sans-serif capital letters. The hand is positioned centrally, with the fingers supporting the card from behind. The background is plain white.

THANKS!