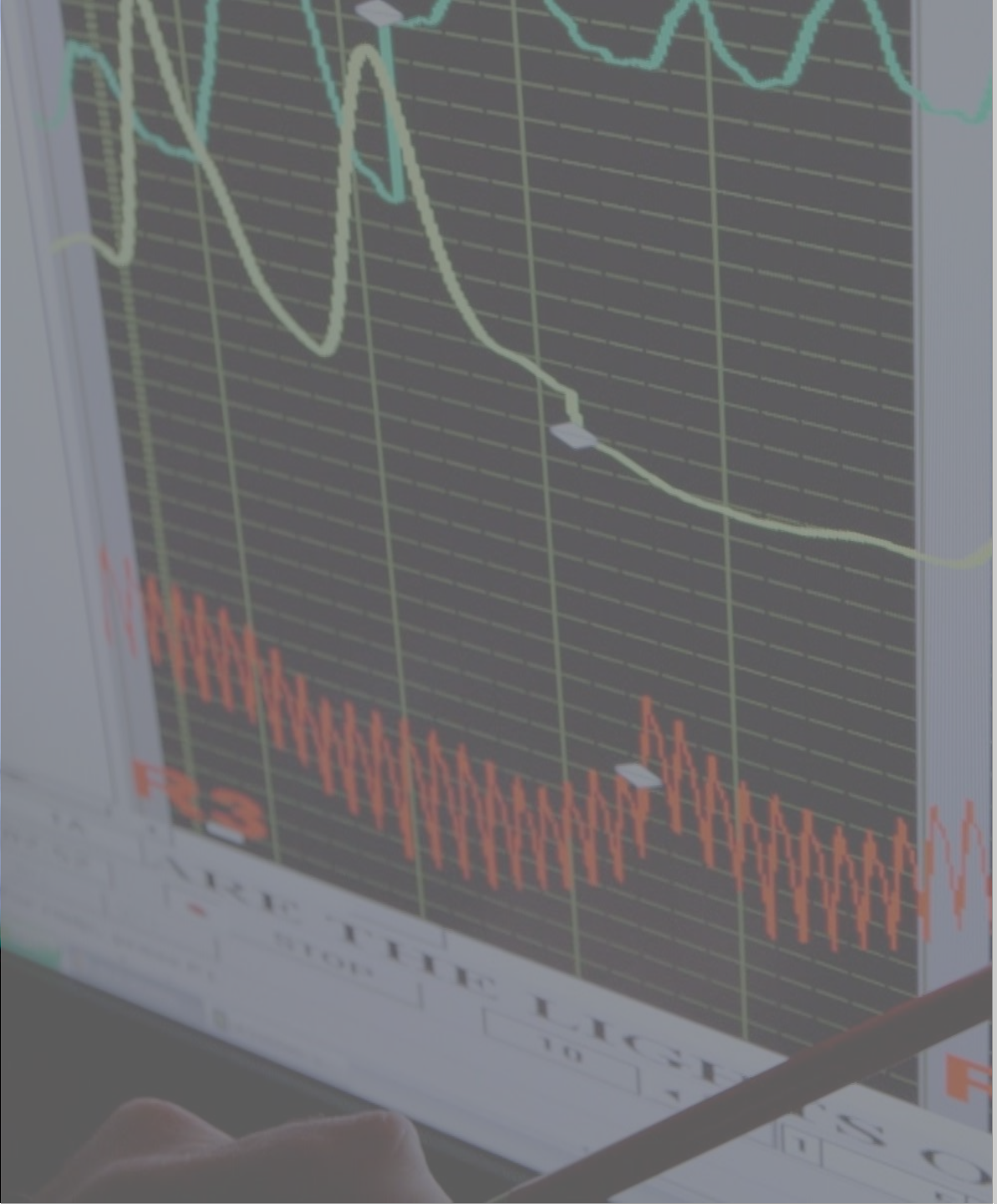
Basic Mobile Lab 2 -

ECG Lie Detector

정민호 양윤성 강형철 엄현호 서원형



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양윤성
Overall Function
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강형철
UI Development
Design

HardWare

정민호
BT Connection
Arduino

Back-End

엄현호
Back-End
Development

서원형
Back-End
Development

1. INTRODUCTION – Motivation?

Just show ECG Chart is too normal..

What can we do with ECG kit?
What can we make with ECG Kit ???

How about make some TOY with ECG Kit?

TOY? Then…
What about making a Lie Detector using some ECG data?

1. INTRODUCTION – About Implementation?

Then, the Problem is…

What Criteria should we make for Lie detection?

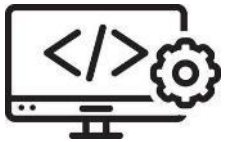
Real Lie Detector uses complicated criteria for making judgement for a lie…
but? We have only few and limited device so…

1. INTRODUCTION – About Implementation?

Our Application's Criteria for detecting lie is…

Average Heartbeat(BPM)

1. INTRODUCTION – About Implementation?



Develop with…

ANDROID STUDIO / Java

FireBase

For Front-End…

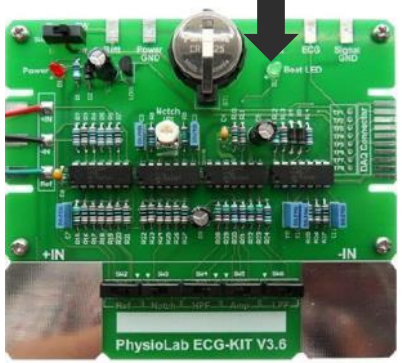
For Back-End Development

CONTENTS

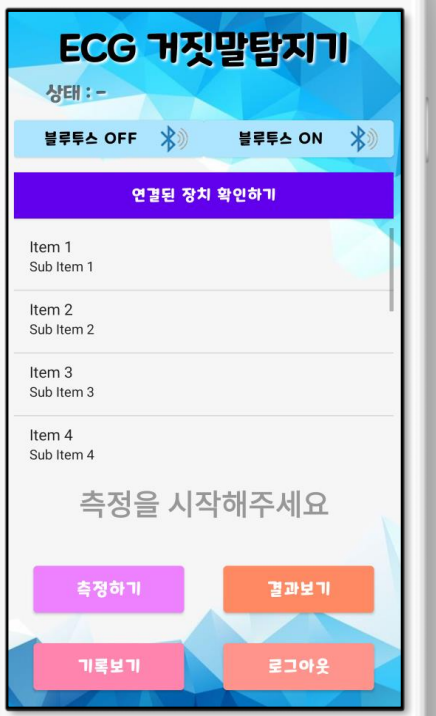
2. Overall Structure & Feature

⟨Application⟩
Transmit “Send” Sign
⟨Arduino⟩
Transmit ECG Data

⟨⟨ Hardware ⟩⟩



⟨⟨ Mobile Phone ⟩⟩



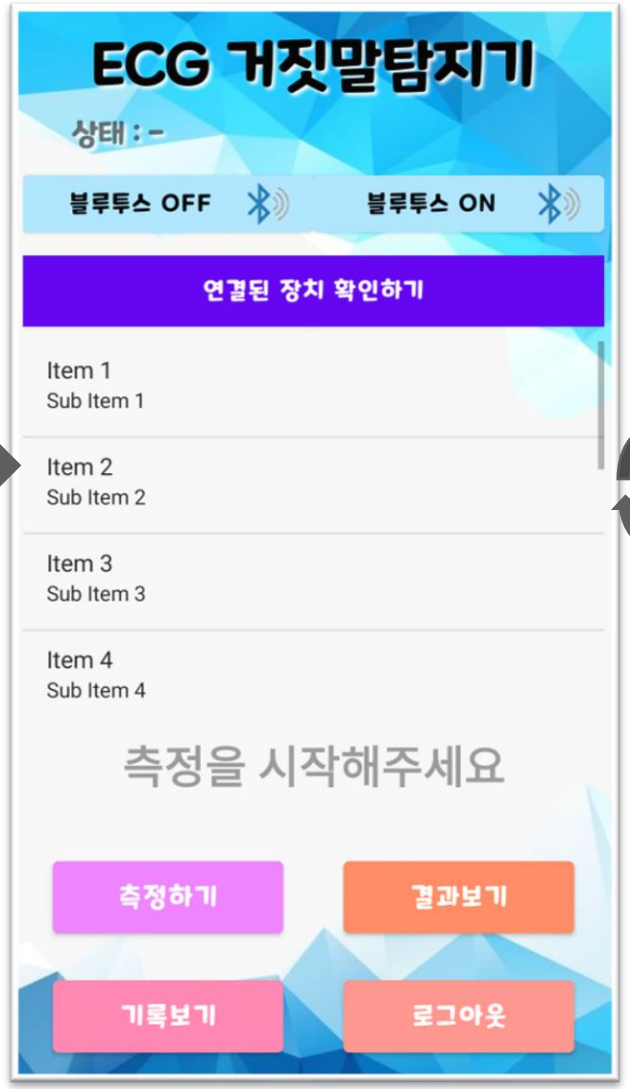
ECG Data
User Identification

⟨⟨ Server ⟩⟩

2. Overall Structure & Feature

Application Starts Here!!

Main Features are here!!



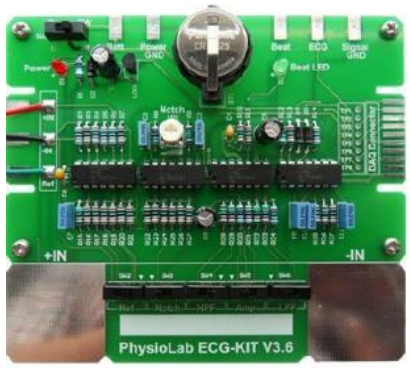
3. Development – Developing Procedure

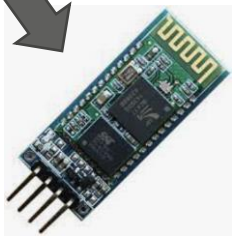
First	H/W Implementation & Bluetooth Connection
Second	Front-End Development
Third	Back-End Development

3. Development – H/W Implementation & BT Connection

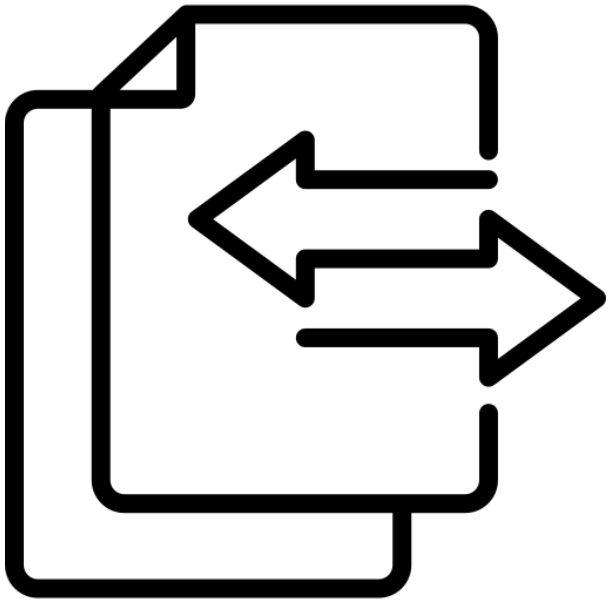
Fetch Data
From ECG Kit

Noise??



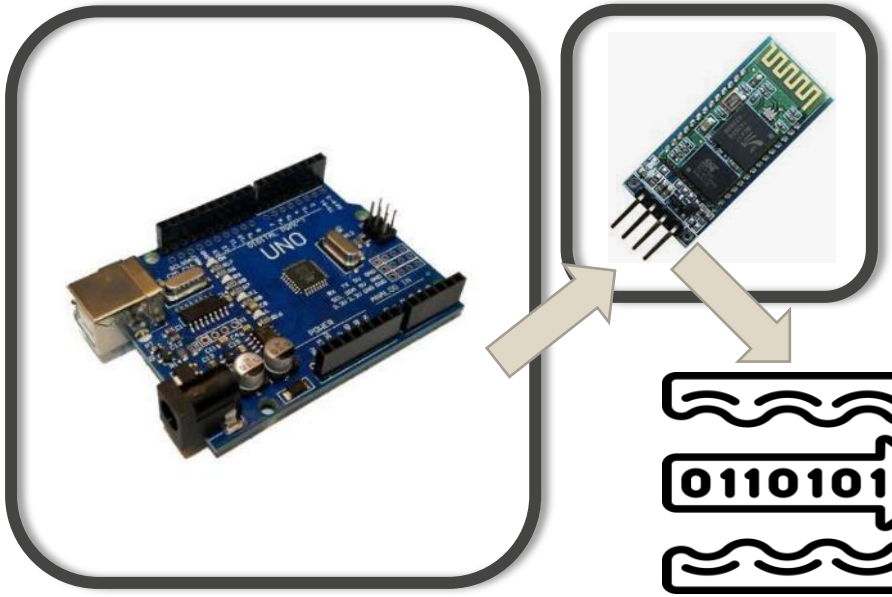


Then How to SEND data to APP??

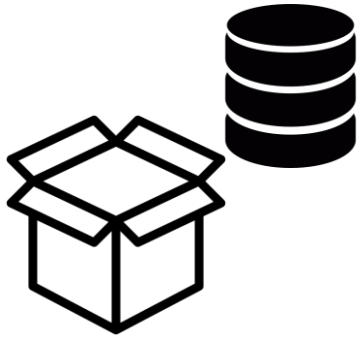


3. Development – H/W Implementation & BT Connection

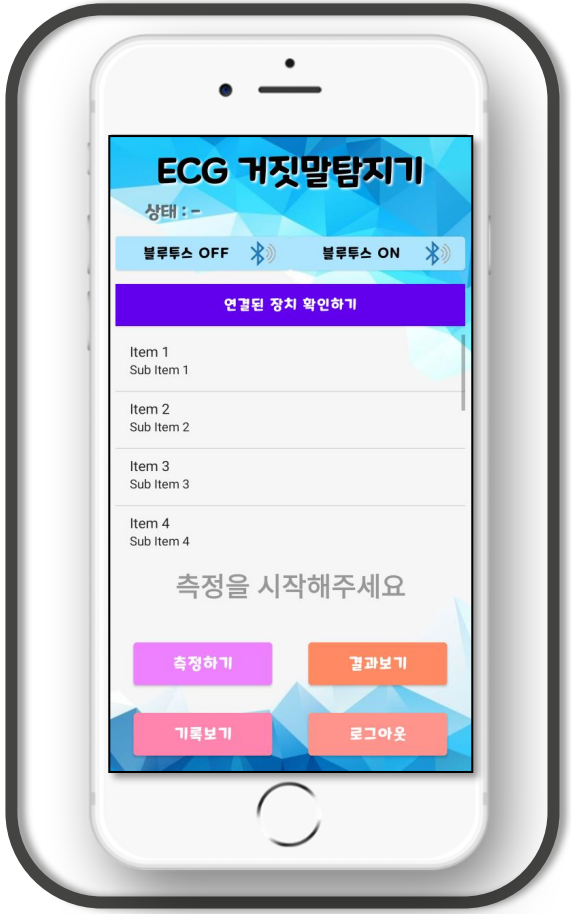
Use ‘Bluetooth’ Class which is provided by Android Studio



Store at **Buffer**
reside in our
“Connection Thread”



If proper order received, then it starts to send Byte stream data to paired device



3. Development – Developing Procedure

First	H/W Implementation & Bluetooth Connection
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3. Development – FrontEnd Development

Overall UI and Functions are
implemented by… Android Studio

3. Development – FrontEnd Development

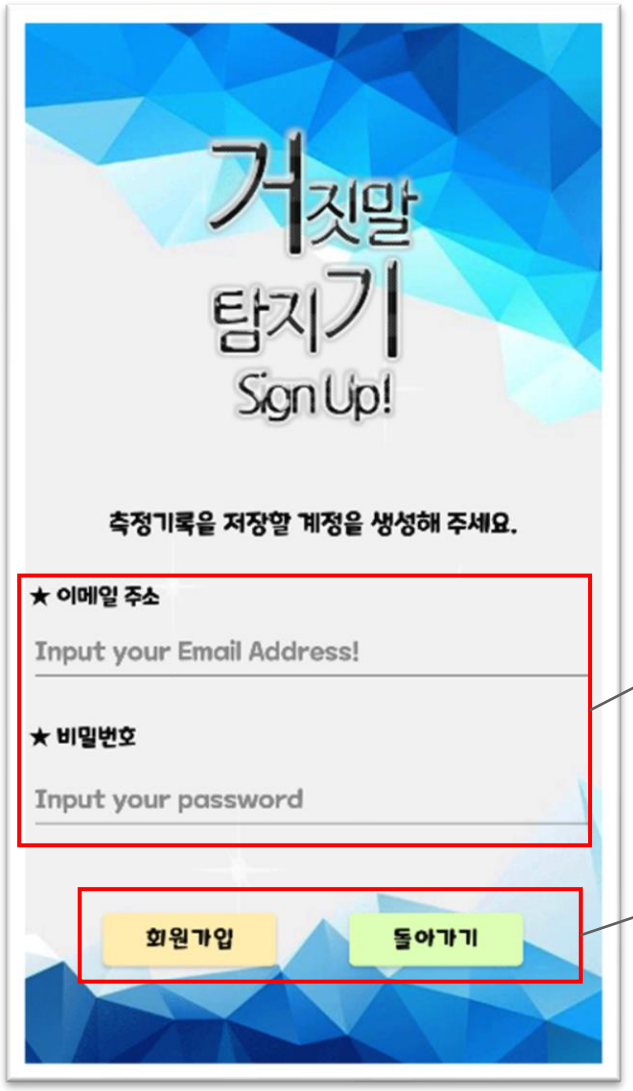
《 Login_Activity.xml 》
Before Test, User have to login to use our application

Widget = ImageView
Title of Our Application

Widget = TextView
TextField for user input(ID & PS)

Widget = Button
Button for SIGNUP and LOGIN

3. Development – FrontEnd Development

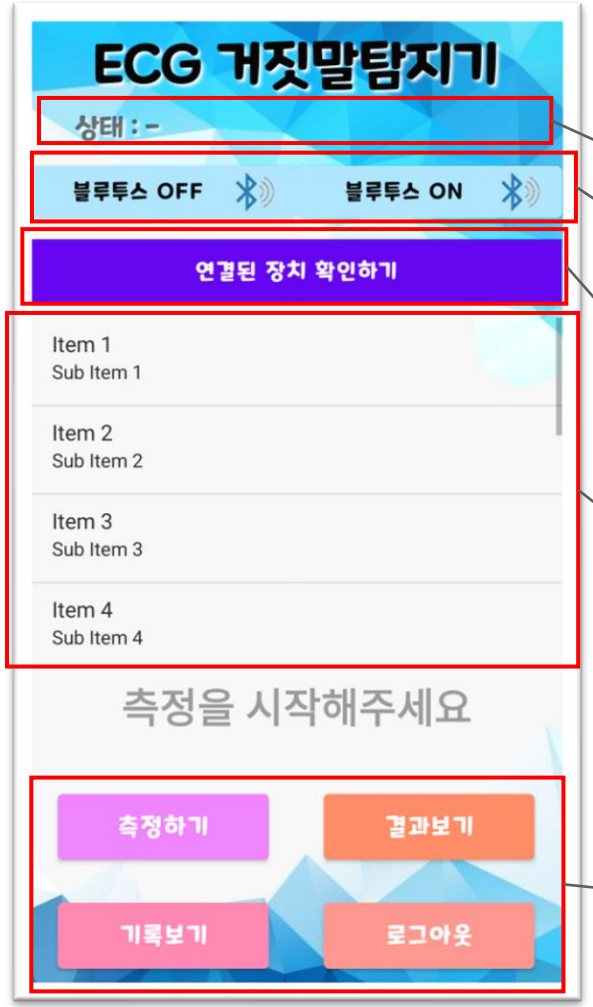


〈〈 Sign_Up.xml 〉〉 – ***Sign_Up_Activity***
If user has no account, user can make account for free!

Widget = TextView
TextField for user input(ID & PS)

Widget = Button
Button for SIGNUP and GO Back

3. Development – FrontEnd Development



《 Main_activity.xml 》
User can manipulate main feature via buttons

TextView for show current status
About Bluetooth Connection

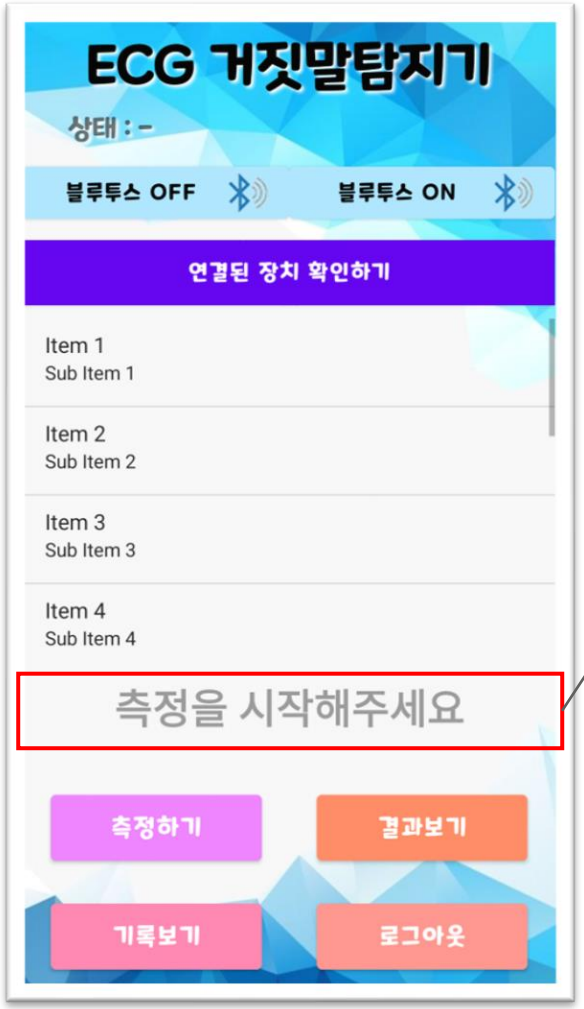
Button for Turn On&Off Bluetooth

Button for show Paired Device

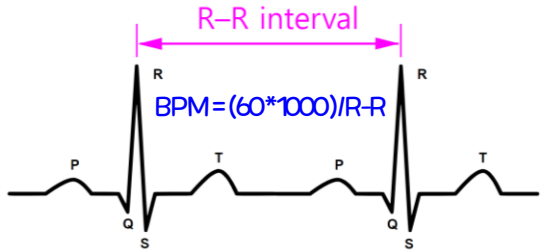
Widget = ListView
ListView for showing Paired Device

Button for TEST, Show Result
Show History, LOGOUT

3. Development – FrontEnd Development



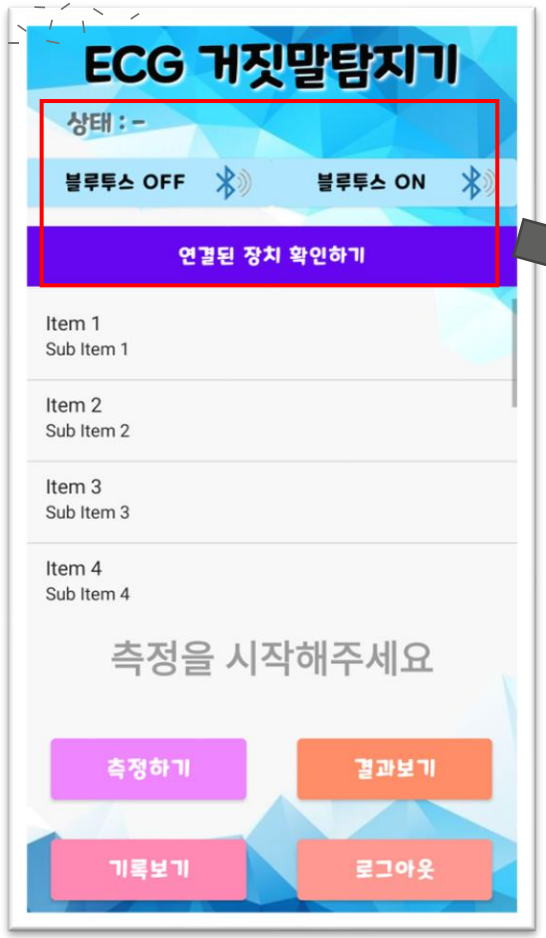
⟨⟨ Show Status ⟩⟩ TextView



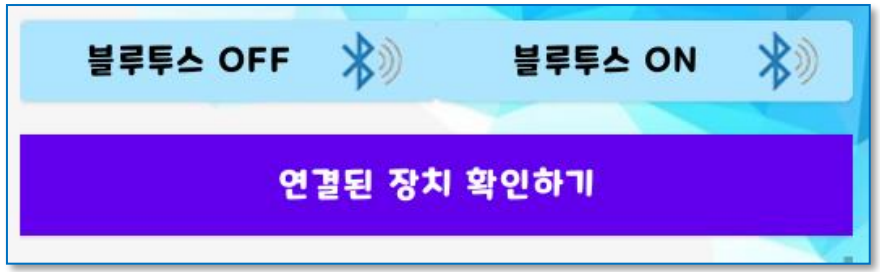
Contextual Output Text

- Begin : “Please start measuring.”
- Push Measure Button : “Measuring average value…”
  - Average : Calculate the first 5 **R-R Interval**.
    Average is always calculated during measurement.
- After AVG Measured : Display real-time BPM
  - Normal R-R : Green Text
  - Detected abnormal R-R : Red Text
  - Criterion : More than 12% faster than AVG

3. Development – FrontEnd Development

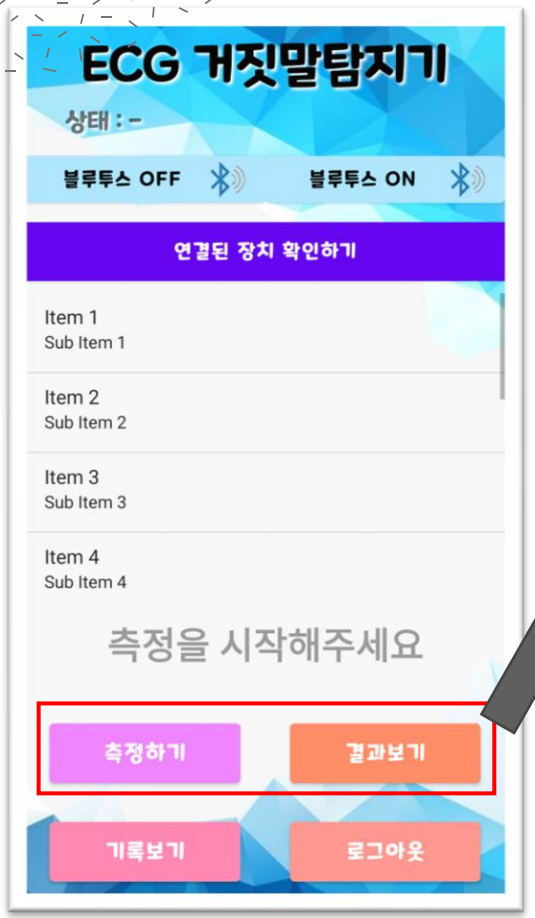


《 On&Off Bluetooth 》 Button
《 Show paired device 》 Button



These buttons have feature about bluetooth activation.
And, user can check current bluetooth status by checking STATUS

3. Development – FrontEnd Development



《 Test 》 Button
《 Show Result 》 Button

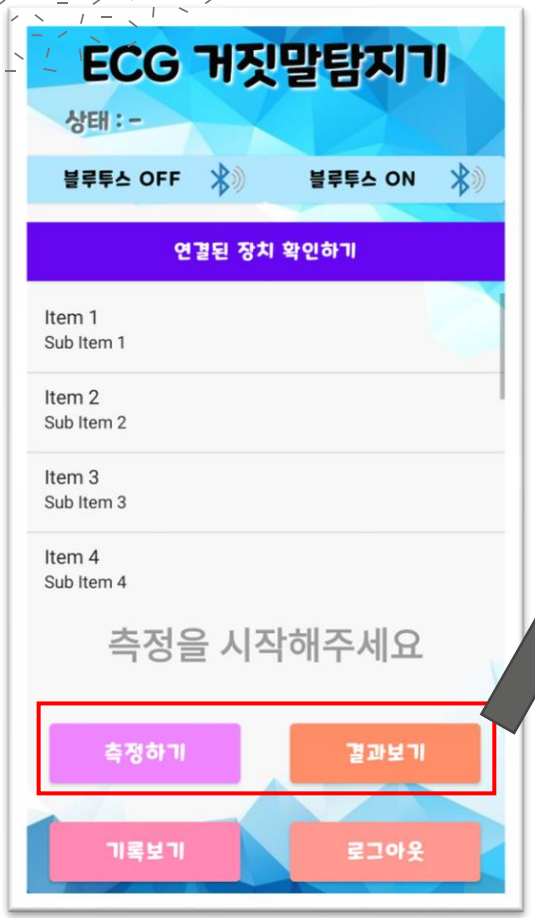
측정하기(Test) Button : Start to send ECG data.

Implemented by using [Thread]

If 측정하기(Test) Button Clicked,
it sends start message to our pre-defined thread “ConnectedThread”

Thread : Exchange data With Arduino in real, via Bluetooth.

3. Development – FrontEnd Development



《 Test 》 Button
《 Show Result 》 Button

결과보기(Show result) Button : End to send and show result.

Implemented by using [Thread] and [Intent]

If 결과보기(show result) Button Clicked,
it sends stop message to our pre-defined thread “ConnectedThread”

And transfer data to Show Result activity.

3. Development – FrontEnd Development

《 Show_Result.xml 》
For Showing Result of Lie Detection

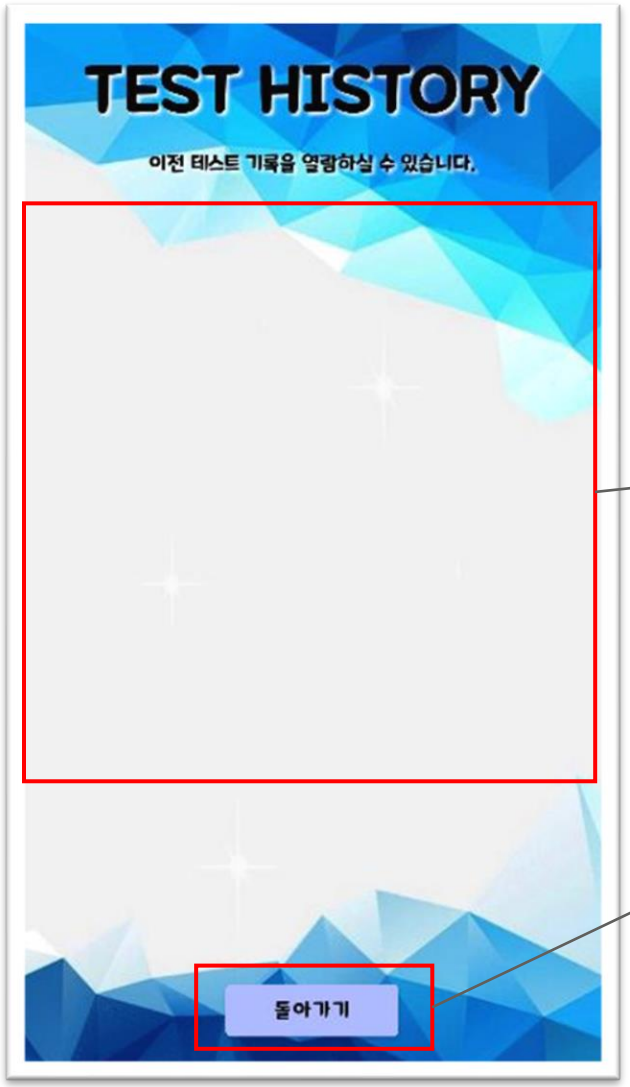
A ListView Widget for showing Detected timing for Abnormal heartbeats. (Format : %d sec %d milsec)

User Can Check Runtime and Detected times of Abnormal Heartbeat's

User can take some notes about circumstance of this detection

Button for SAVE results include notes about this detection and to go back

3. Development – FrontEnd Development



《 Show_History.xml 》
User can Check Past History.

Widget = ListView
Will be shown Past Test History in selectable.
Data will be shown with summarized information

Button for Return to Main Activity

3. Development – Developing Procedure

First	H/W Implementation & Bluetooth Connection
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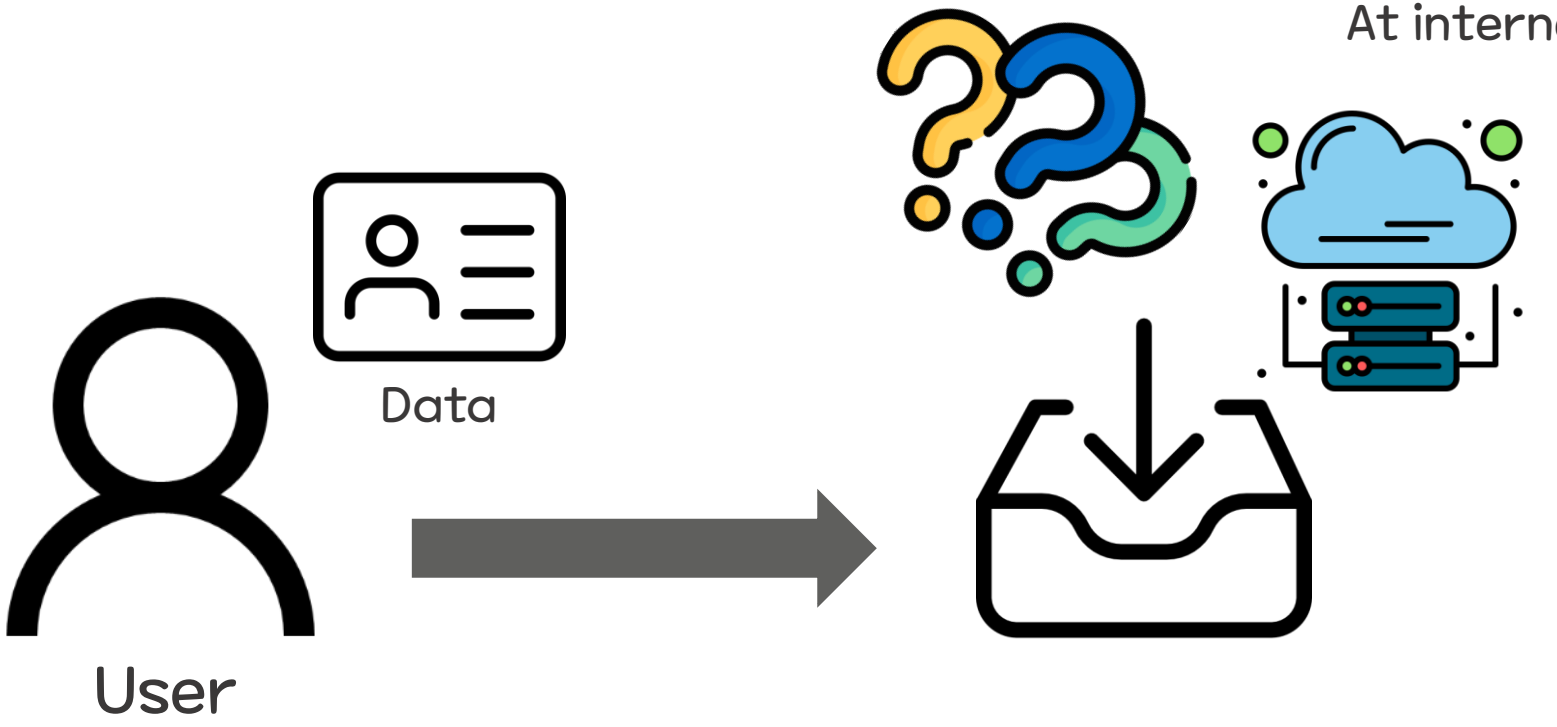
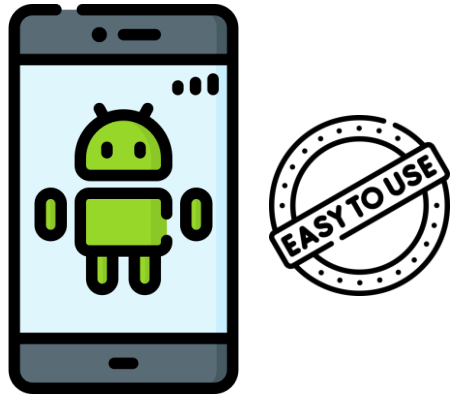
3. Development – BackEnd Development

How to store User's test data
At internet server?



3. Development – BackEnd Development

Django?



Firebase?

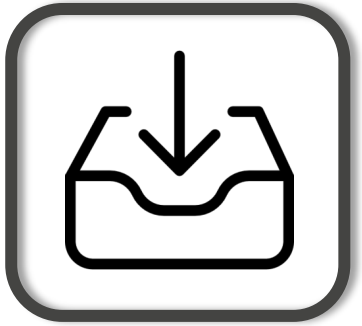
Amazon Web Service?

3. Development – BackEnd Development

What is Firebase??

Authentication

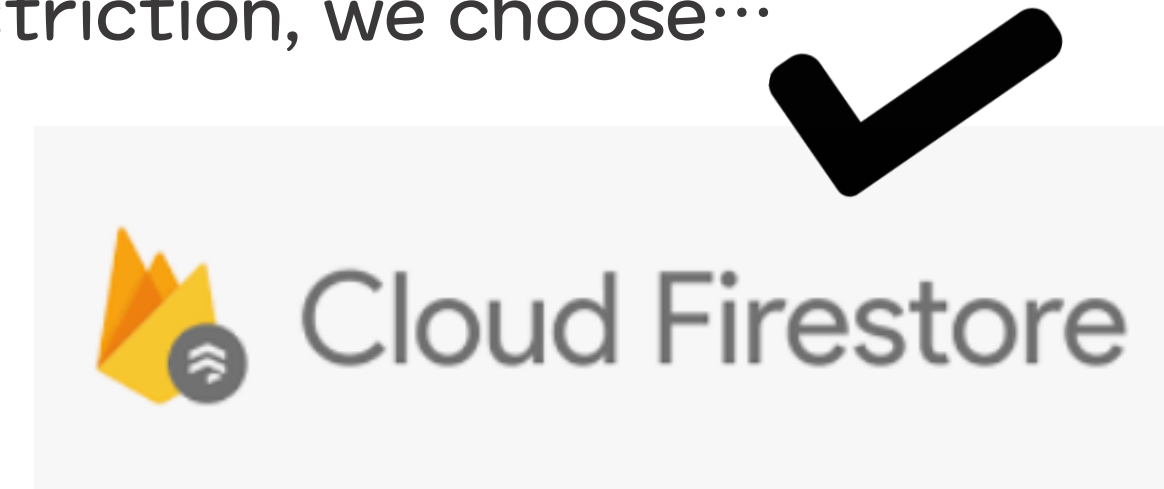
Analyzation



Store

3. Development – BackEnd Development

Due to the realistic restriction, we choose…



3. Development – BackEnd Development

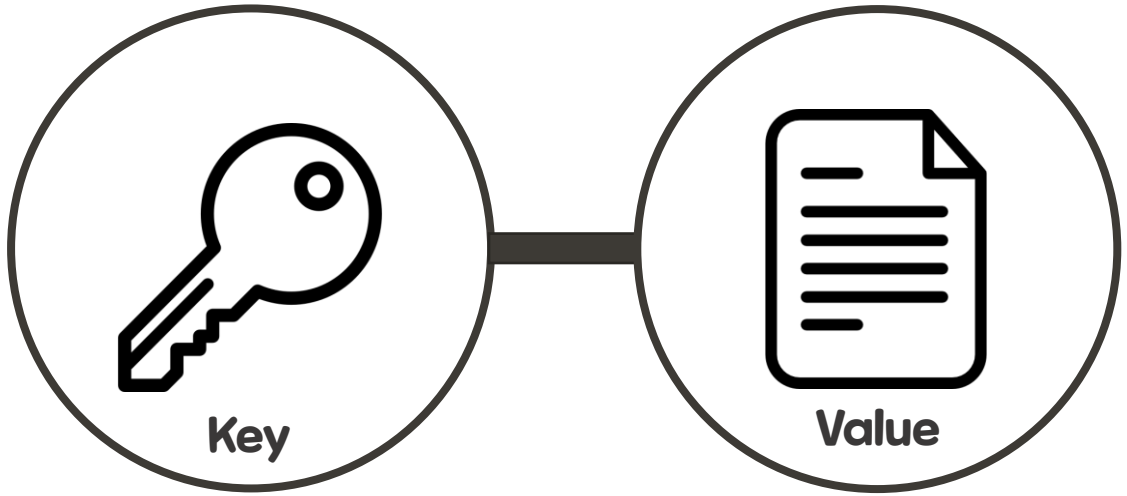
U I D

If a User make Account with 123@gmail for example, User is assigned Arbitrarily UID such as 111222333, and then another User make account with 456@gmail, and then some another Arbitrarily UID Such as 444555666 and so on.

3. Development – BackEnd Development

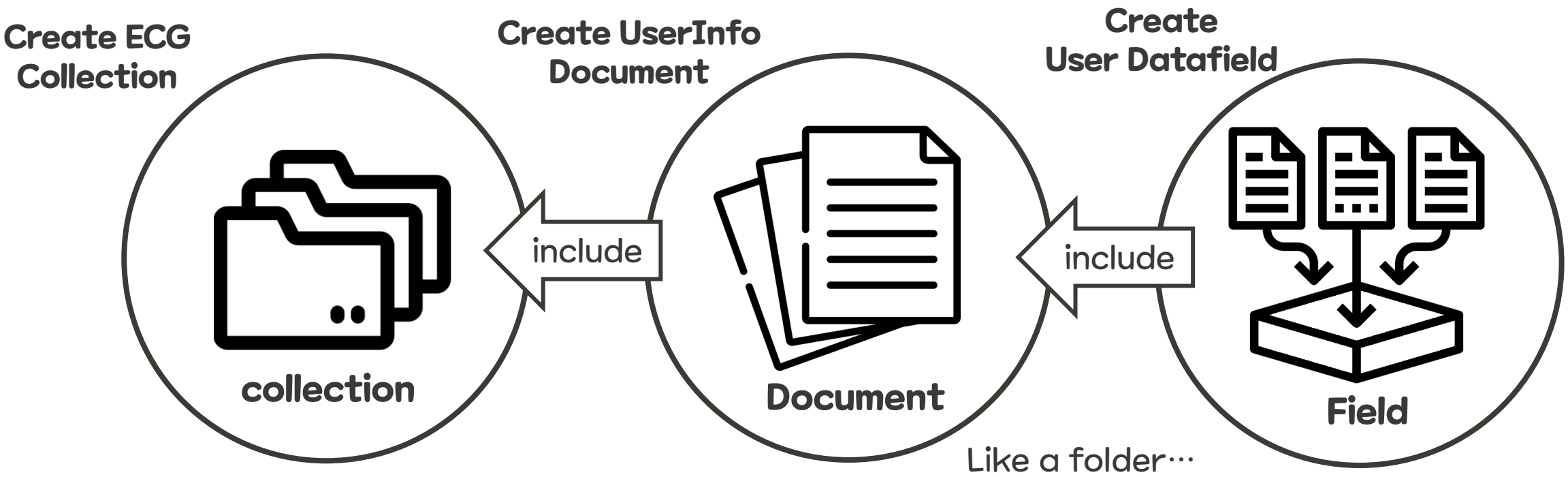
Cloud Firestore

Is an NonSQL DB
So…

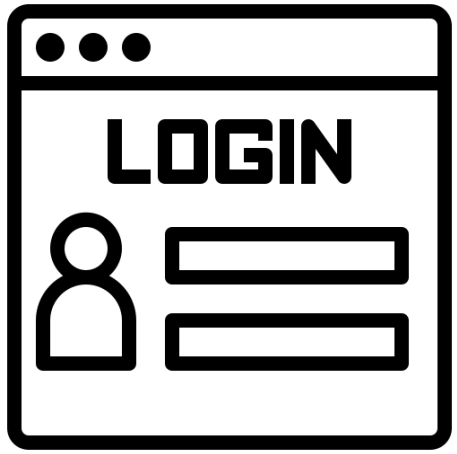


3. Development – BackEnd Development

Cloud Firestore

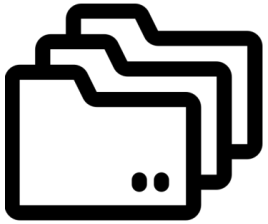


3. Development – BackEnd Development



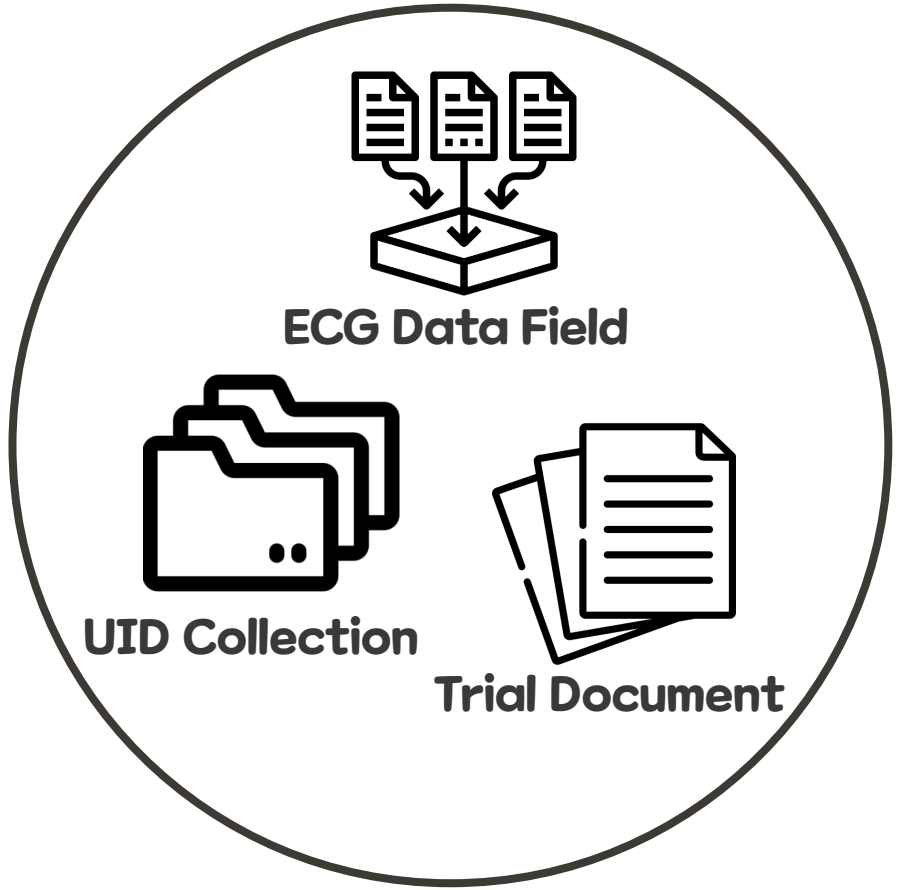
After Login…

Created with UID



Collection

Document



UID : 123456

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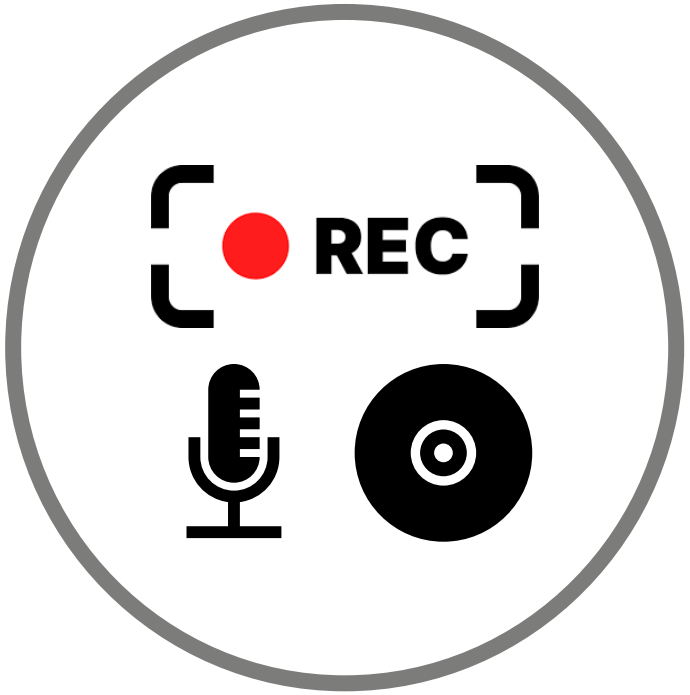
4. Summary – Review

What we studied?	ECG kit, Arduino, Bluetooth, Android Studio, Server
What we learned?	Team Project : Role Distribution First App Development
Weak point?	Limited time → Lack of Implementation

4. Summary – Supplementation



Add Recording System

Display BPM Graph

Increase Accuracy

Implementation

Thank you!!