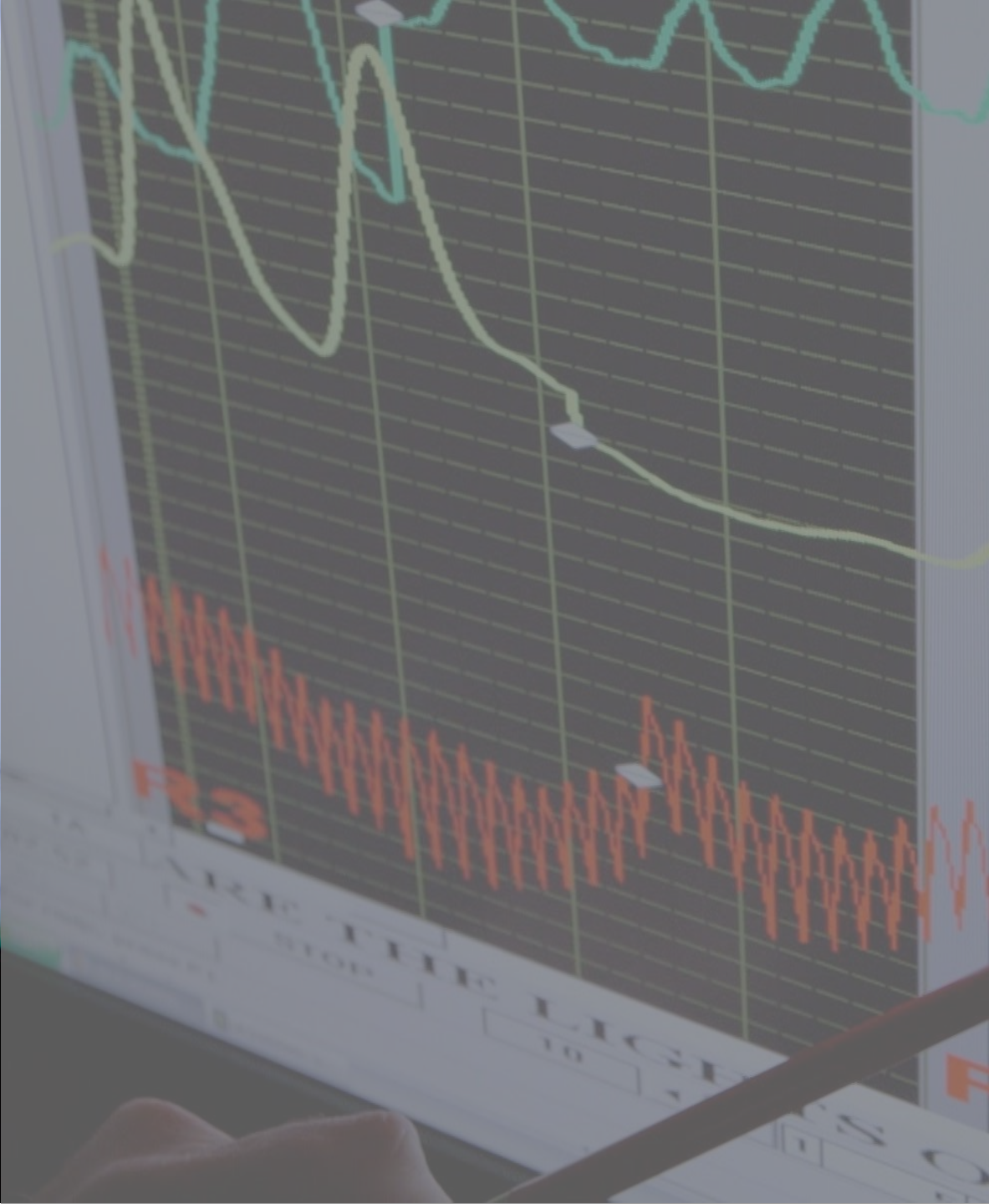


An abstract 3D composition featuring several dark brown and black cubes of varying sizes and orientations, some with a warm orange glow. Two bright yellow spheres are also present. A thin white horizontal line spans the width of the image.

Basic Mobile Lab 2 -

# ECG Lie Detector

정민호 양윤성 강형철 엄현호 서원형



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## 3 Development

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- └ (2) Back-End Development

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## 1 Introduction

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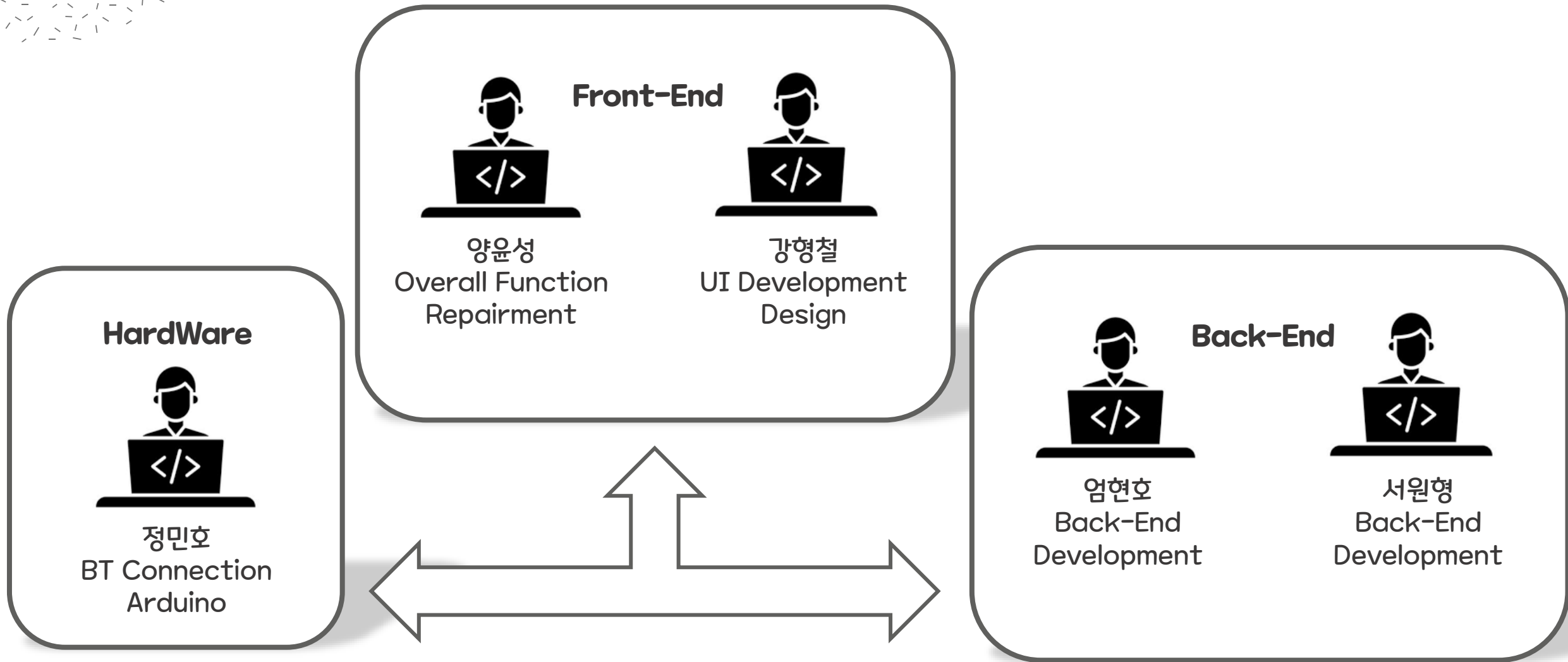
- └ (1) Front-End Development
- └ (2) Back-End Development

## 4 Summary

## 5 Implementation



# 1. INTRODUCTION – About our team



# 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...

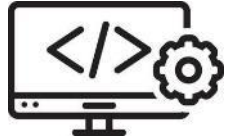
# 1. INTRODUCTION – About Implementation?

Our Application's Criteria for detecting lie is...

**Average Heartbeat(BPM)**



# 1. INTRODUCTION – About Implementation?



Develop with...

## ANDROID STUDIO / Java

For Front-End...



*JavaScript*

## FireBase

For Back-End Development



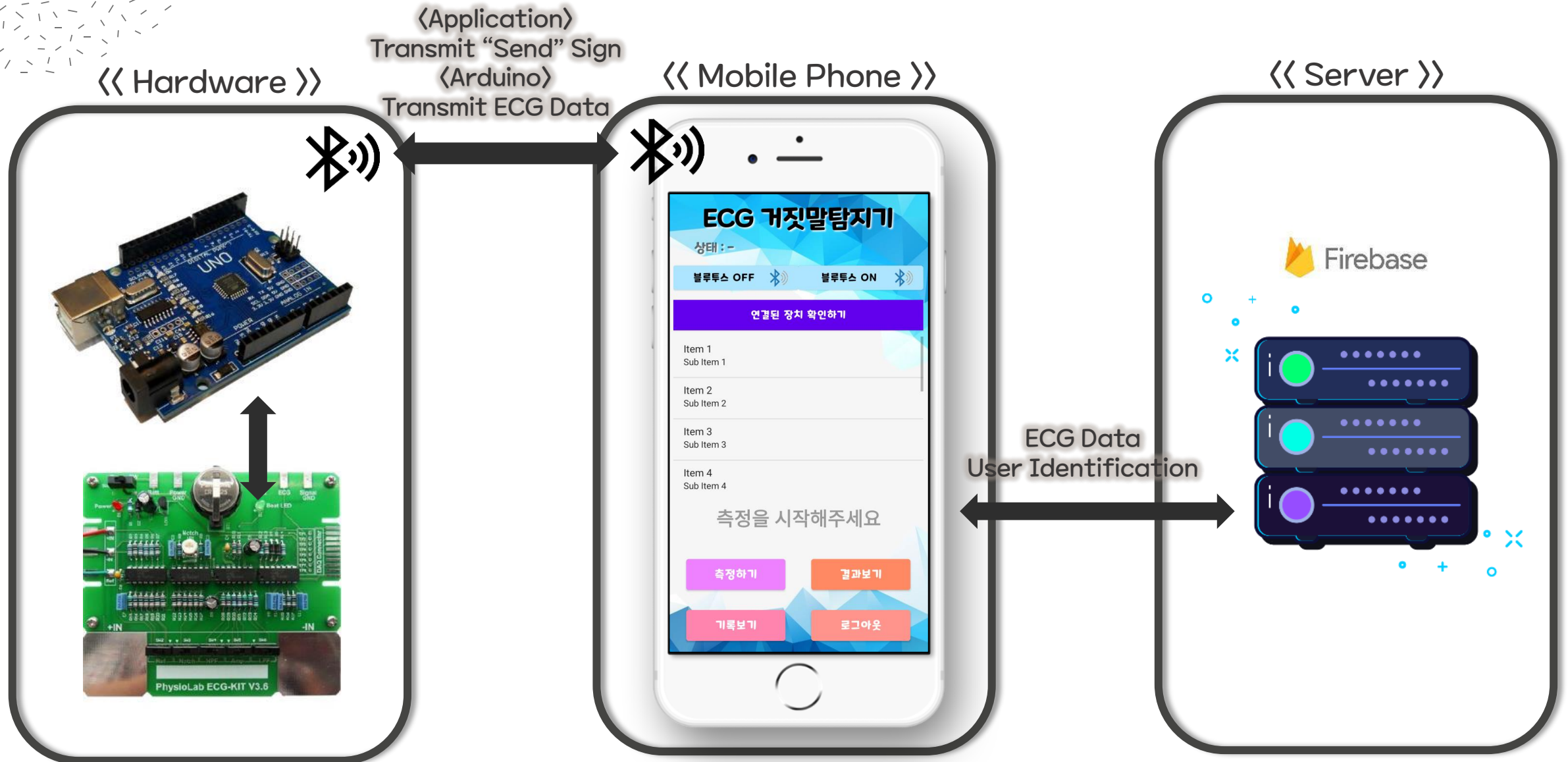


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## 2. Overall Structure & Feature



## 2. Overall Structure & Feature

Main Features are here!!

Application Starts Here!!



거짓말 탐지기  
Sign Up!

측정 기록을 저장할 계정을 생성해 주세요.

★ 이메일 주소  
Input your Email Address!

★ 비밀번호  
Input your password

회원가입 돌아가기

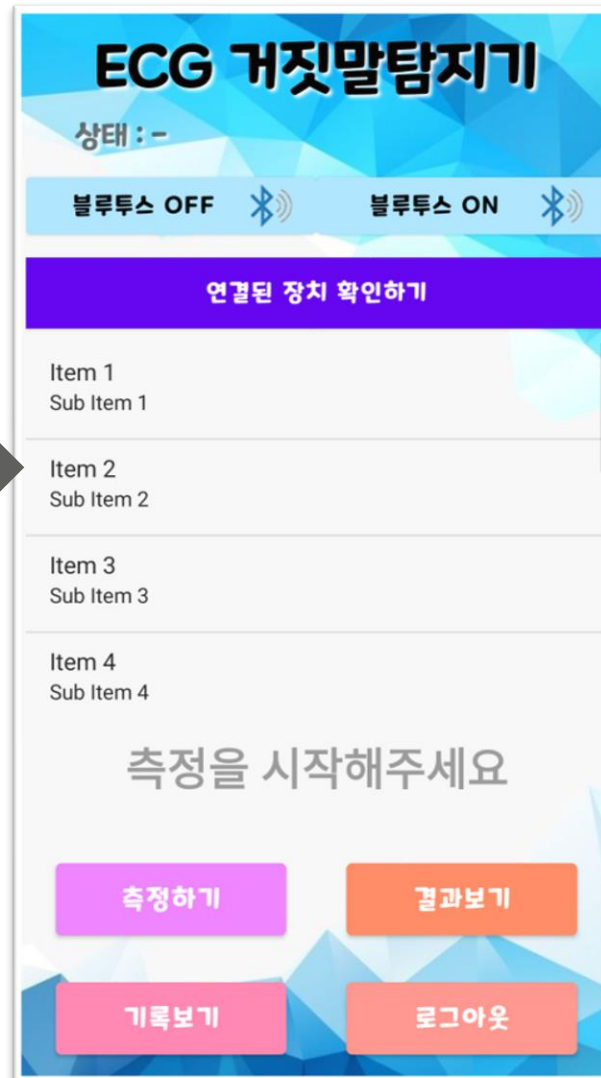


거짓말 탐지기

ID Input your ID

PW Input your Password

회원가입 로그인



ECG 거짓말탐지기

상태 : -

블루투스 OFF 블루투스 ON

연결된 장치 확인하기

Item 1  
Sub Item 1

Item 2  
Sub Item 2

Item 3  
Sub Item 3

Item 4  
Sub Item 4

측정을 시작해주세요

측정하기 결과보기

기록보기 로그아웃



거짓말 시점 측정 결과

측정시간 : 총 실행시간

심박 이상 횟수 : 거짓말 의심 심박 횟수 표시

- 메모 -  
제목, 상황 등을 자유롭게 입력하세요.

저장하기 뒤로가기



TEST HISTORY

이전 테스트 기록을 열람하실 수 있습니다.

돌아가기

### 3. Development – Developing Procedure

First

H/W Implementation & Bluetooth Connection

Second

Front-End Development

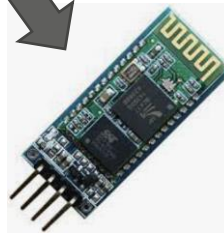
Third

Back-End Development

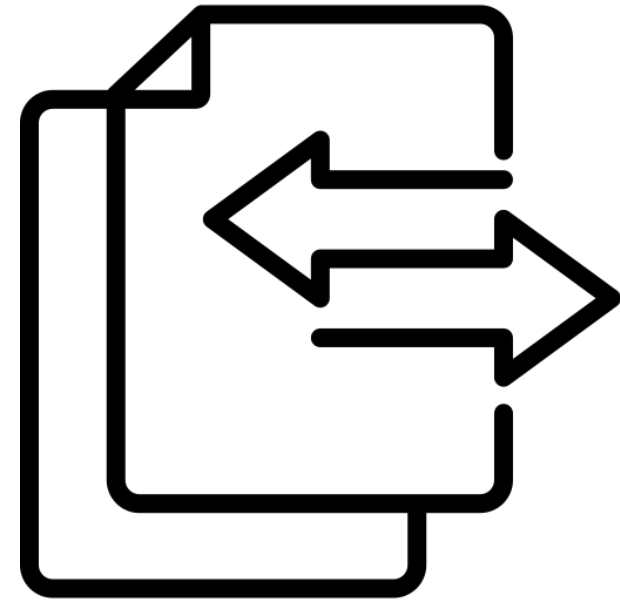
### 3. Development – H/W Implementation & BT Connection

Fetch Data  
From ECG Kit

Noise??



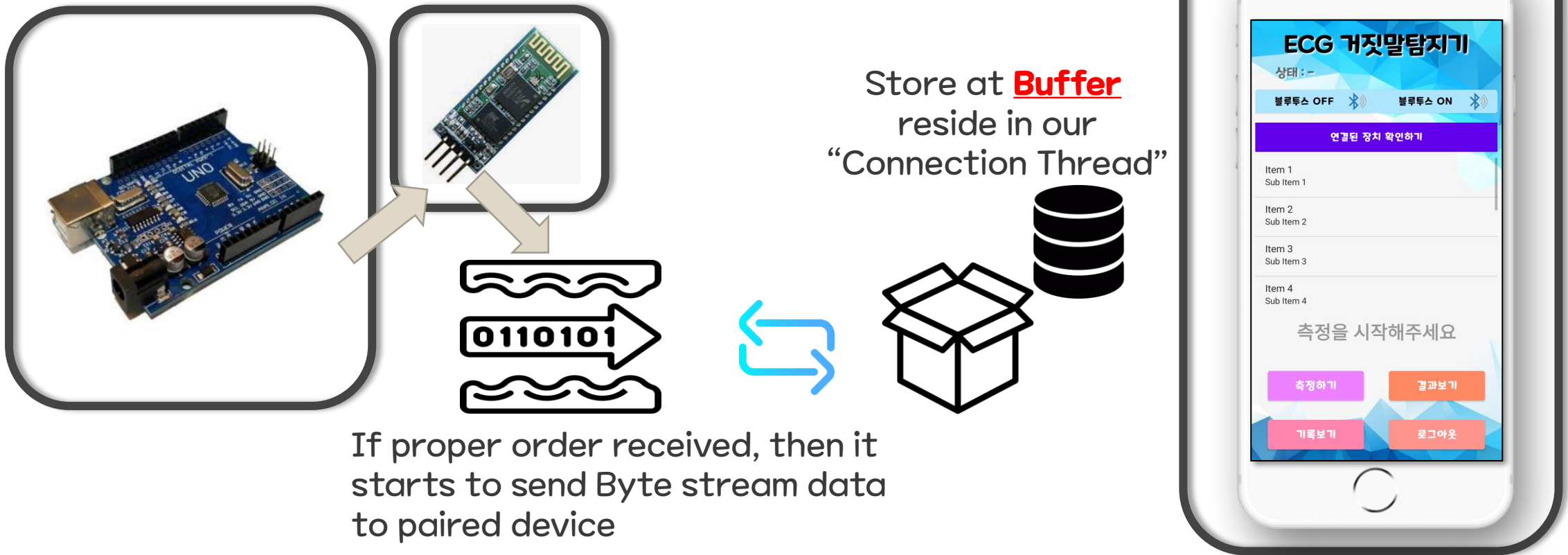
Then How to SEND data to APP??





### 3. Development – H/W Implementation & BT Connection

Use 'Bluetooth' Class which is provided by Android Studio



### 3. Development – Developing Procedure

First

H/W Implementation & Bluetooth Connection

Second

Front-End Development

Third

Back-End Development

### 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

The screenshot shows a mobile app interface for signing up. At the top, there's a blue geometric pattern background with the text '거짓말 탐지기 Sign Up!'. Below this, a message says '측정기록을 저장할 계정을 생성해 주세요.' (Please create an account to save measurement records). There are two input fields: one for '이메일 주소' (Email Address) with the placeholder 'Input your Email Address!' and another for '비밀번호' (Password) with the placeholder 'Input your password'. At the bottom, there are two buttons: '회원가입' (Sign Up) in a yellow box and '돌아가기' (Go Back) in a green box. Red boxes highlight the input fields and the buttons.

<< Sign\_Up.xml >> - **Sign\_Up\_Activity**

If user has no account, user can make account for free!

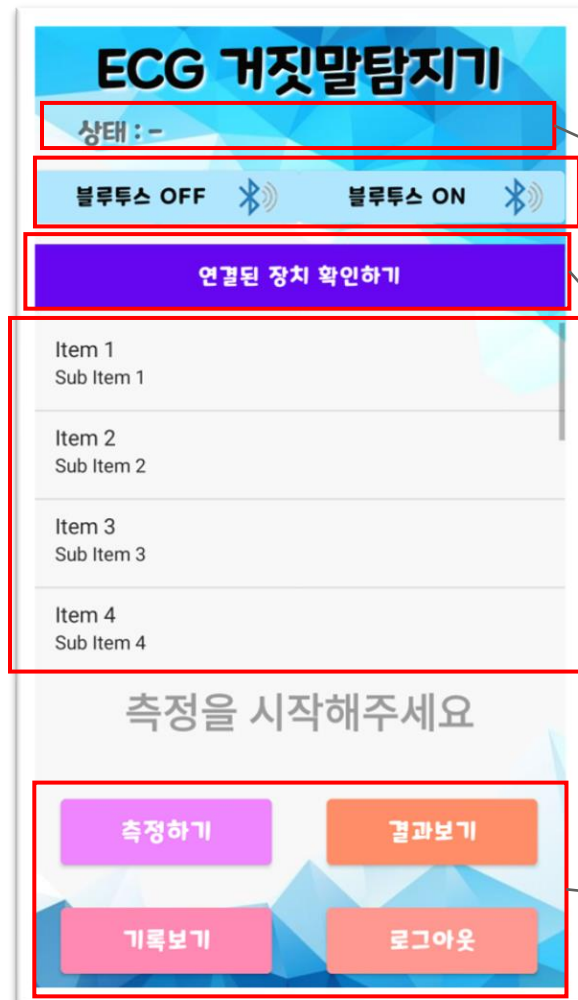
Widget = TextView

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

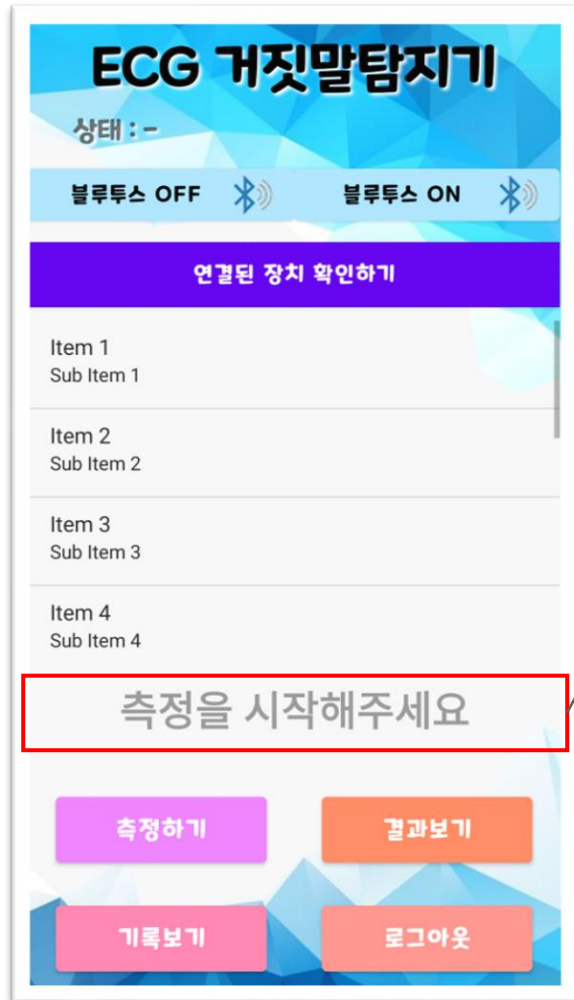
Button for Turn On&Off Bluetooth

Button for show Paired Device

Widget = ListView  
ListView for showing Paired Device

Button for TEST, Show Result  
Show History, LOGOUT

### 3. Development – FrontEnd Development

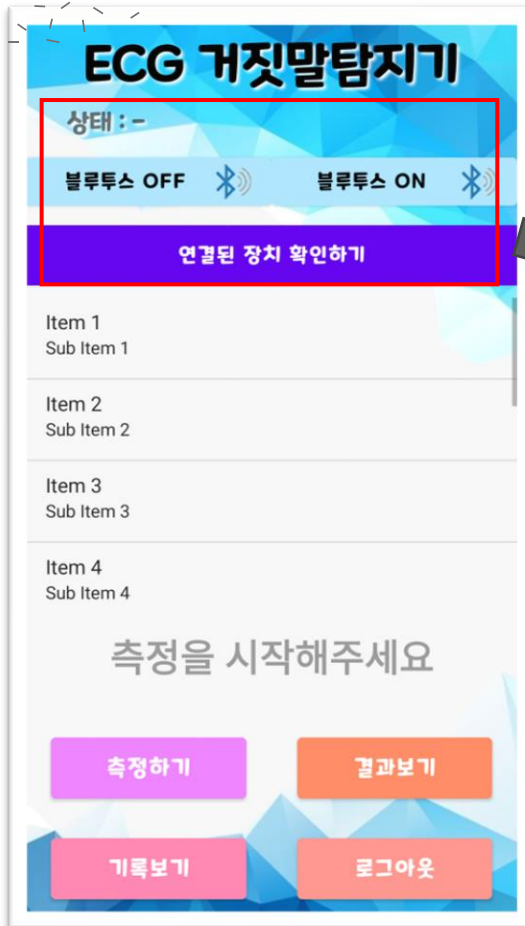


《 Show Status 》 TextView

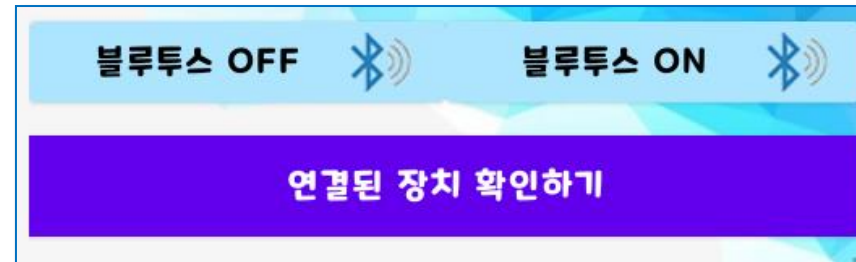
#### Contextual Output Text

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

### 3. Development – FrontEnd Development

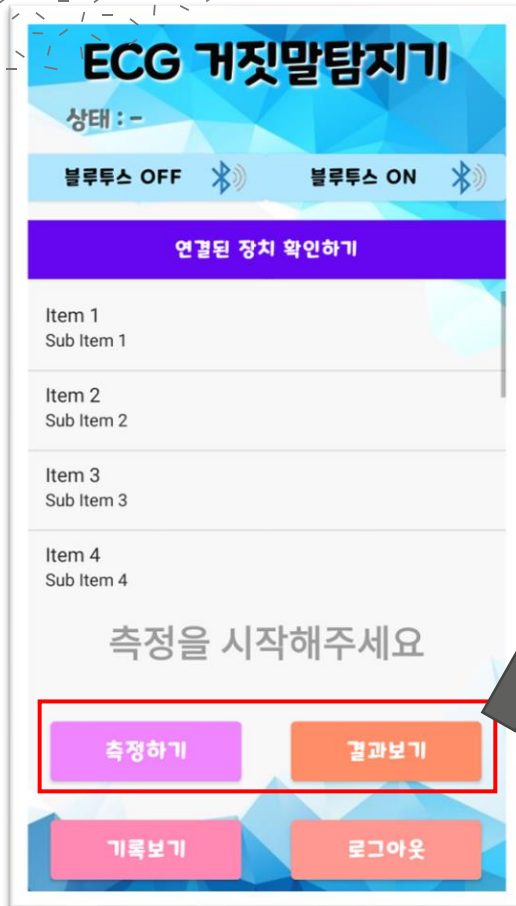


《 On&Off Bluetooth 》 Button  
《 Show paired device 》 Button



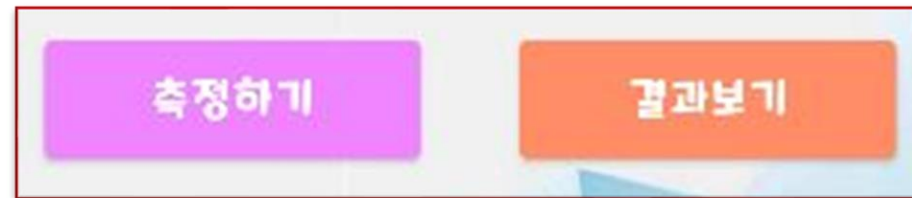
These buttons have feature about bluetooth activation.  
And, user can check current bluetooth status by checking STATUS

### 3. Development – FrontEnd Development



<< Test >> Button

<< Show Result >> Button



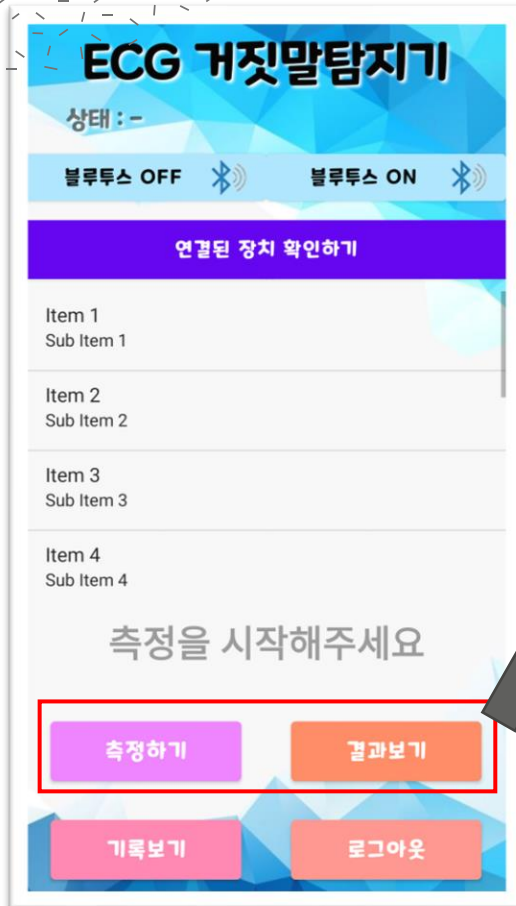
**측정하기(Test) Button** : Start to send ECG data.

**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

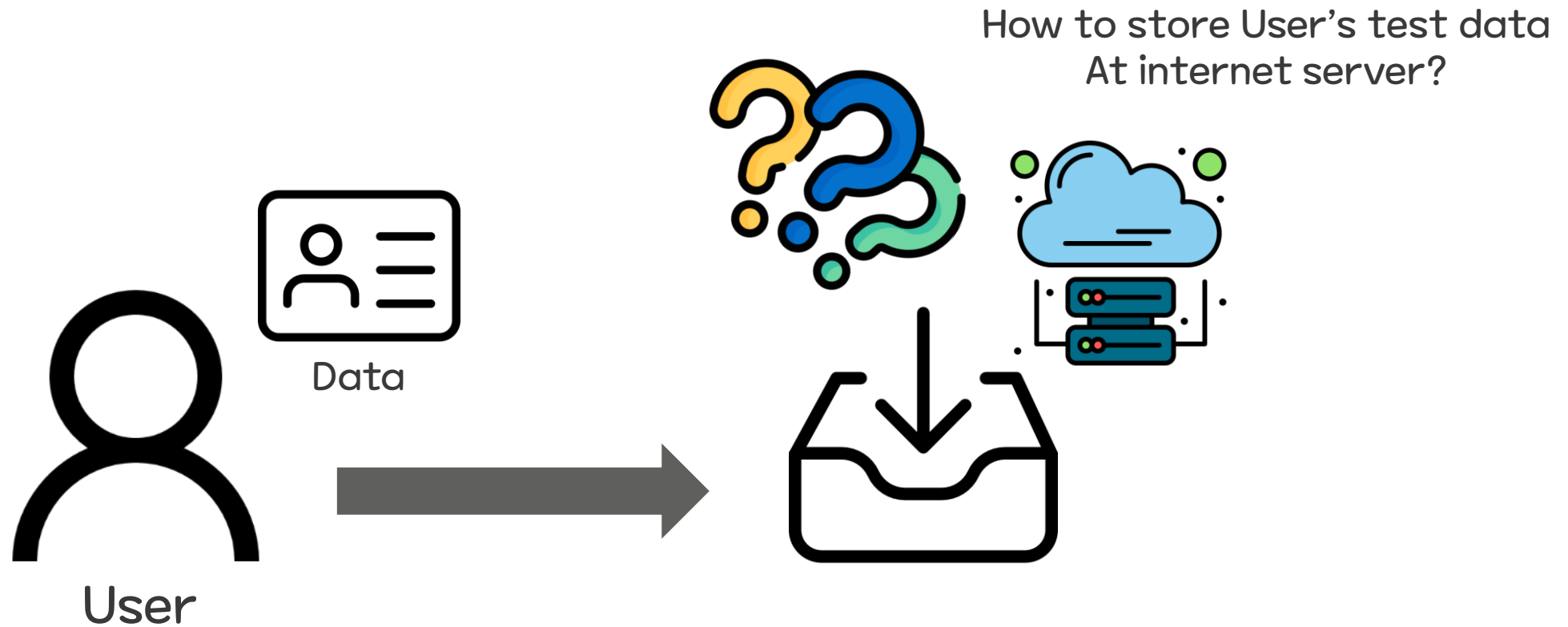
Second

Front-End Development

Third

Back-End Development

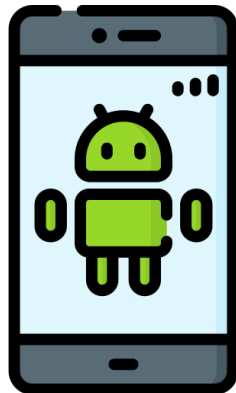
### 3. Development – BackEnd Development



### 3. Development – BackEnd Development



Django?



Firebase?



Amazon Web Service?



### 3. Development – BackEnd Development



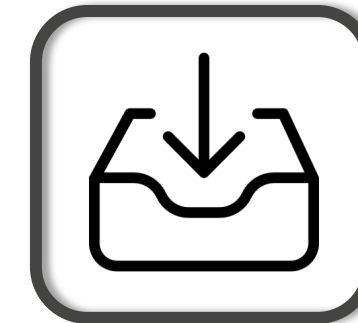
What is Firebase??



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.

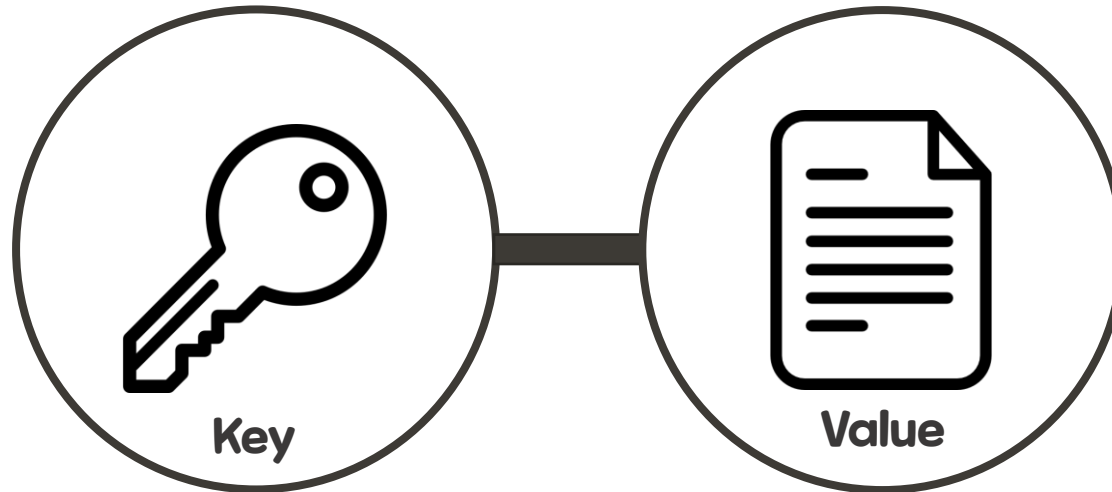
### 3. Development – BackEnd Development



Cloud Firestore



Is an NonSQL DB  
So...



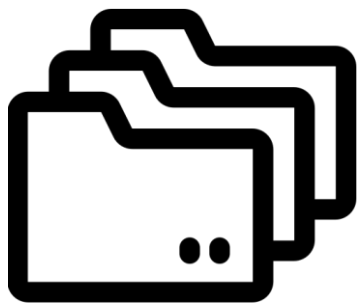


### 3. Development – BackEnd Development



Cloud Firestore

Create ECG  
Collection



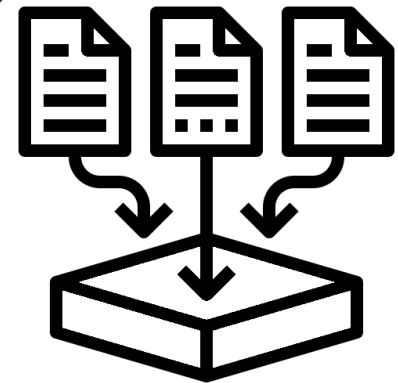
collection

Create UserInfo  
Document



Document

Create  
User Datafield



Field

include

include

Like a folder...

### 3. Development – BackEnd Development

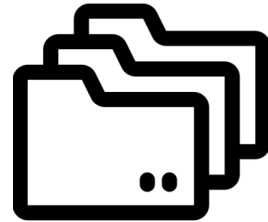


After Login...



UID : 123456

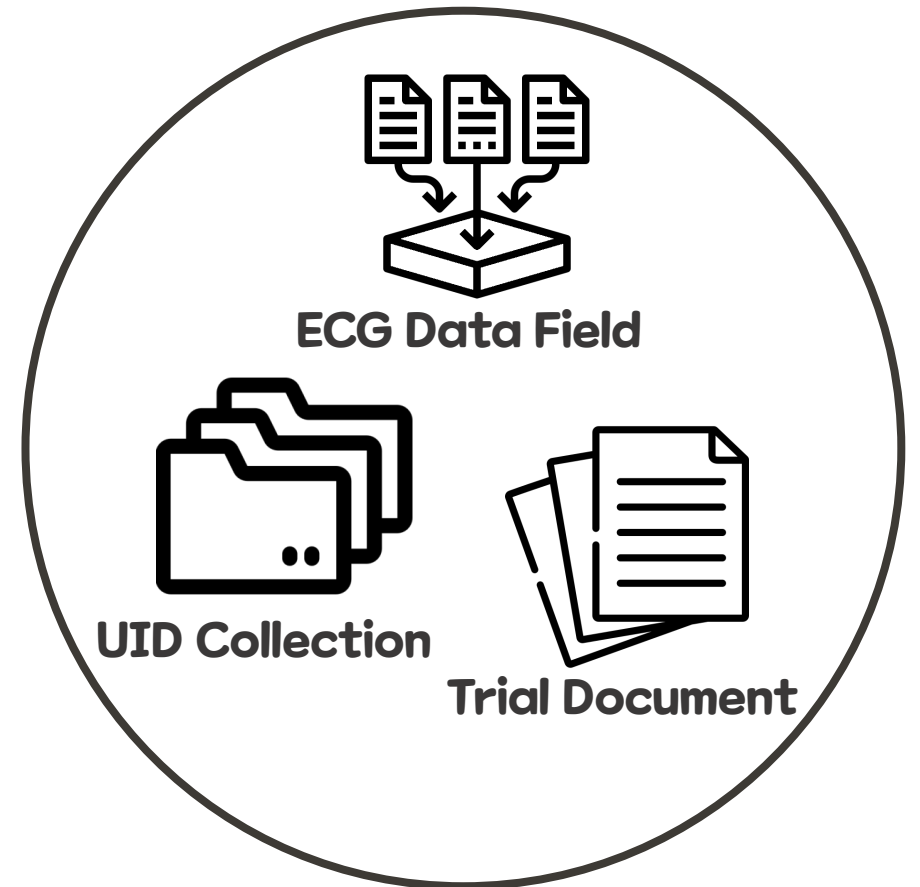
Created with  
UID



Collection



Document



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## 4. Summary – Review



What we  
studied?

ECG kit, Arduino, Bluetooth,  
Android Studio, Server

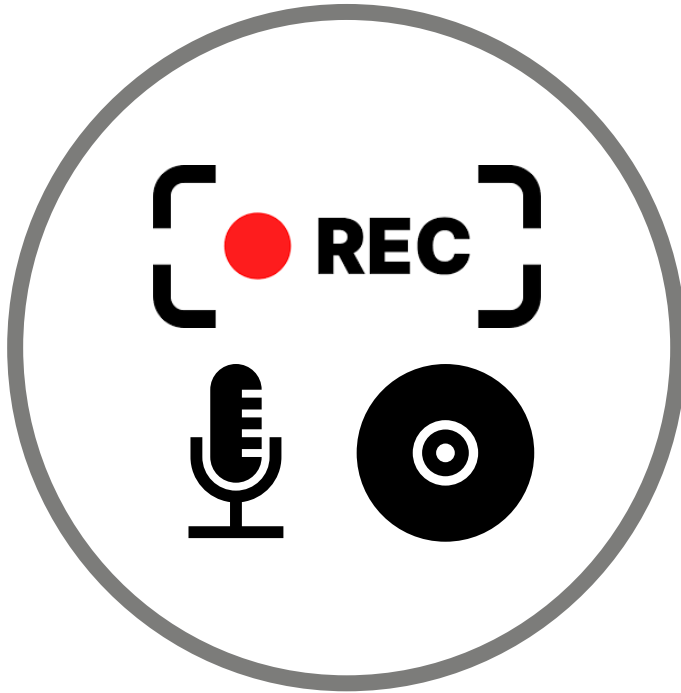
What we  
learned?

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



The background is a solid medium gray. It features several large, light gray spheres of varying sizes. A thin, dark gray arc curves across the middle of the frame, with a small, clear glass bead resting on its highest point. The text "Thank you!!" is centered horizontally and partially overlaid by the arc and bead.

**Thank you!!**