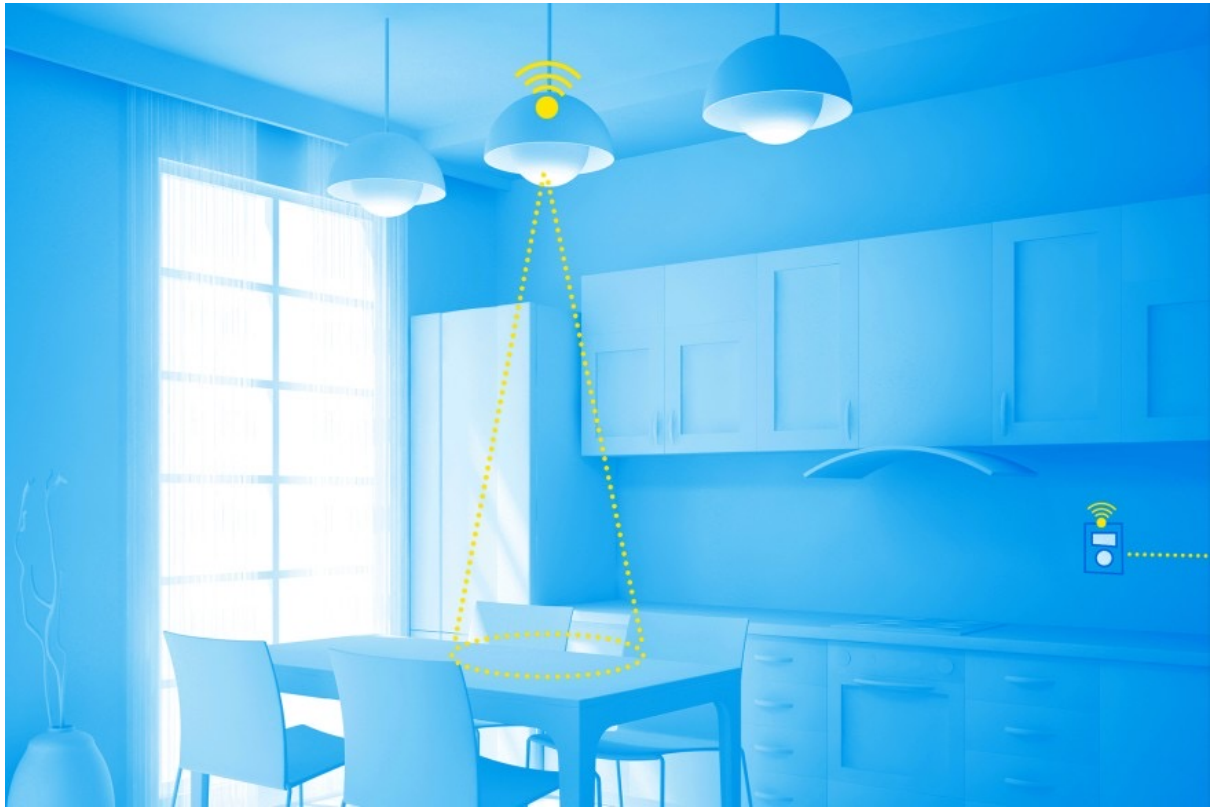
클라우드 데이터 베이스 연동 IoT 원격 LED ON/OFF 서비스 제작

Week13

무엇을 개발하나?

- 스마트 스위치 : 원격 LED ON/OFF

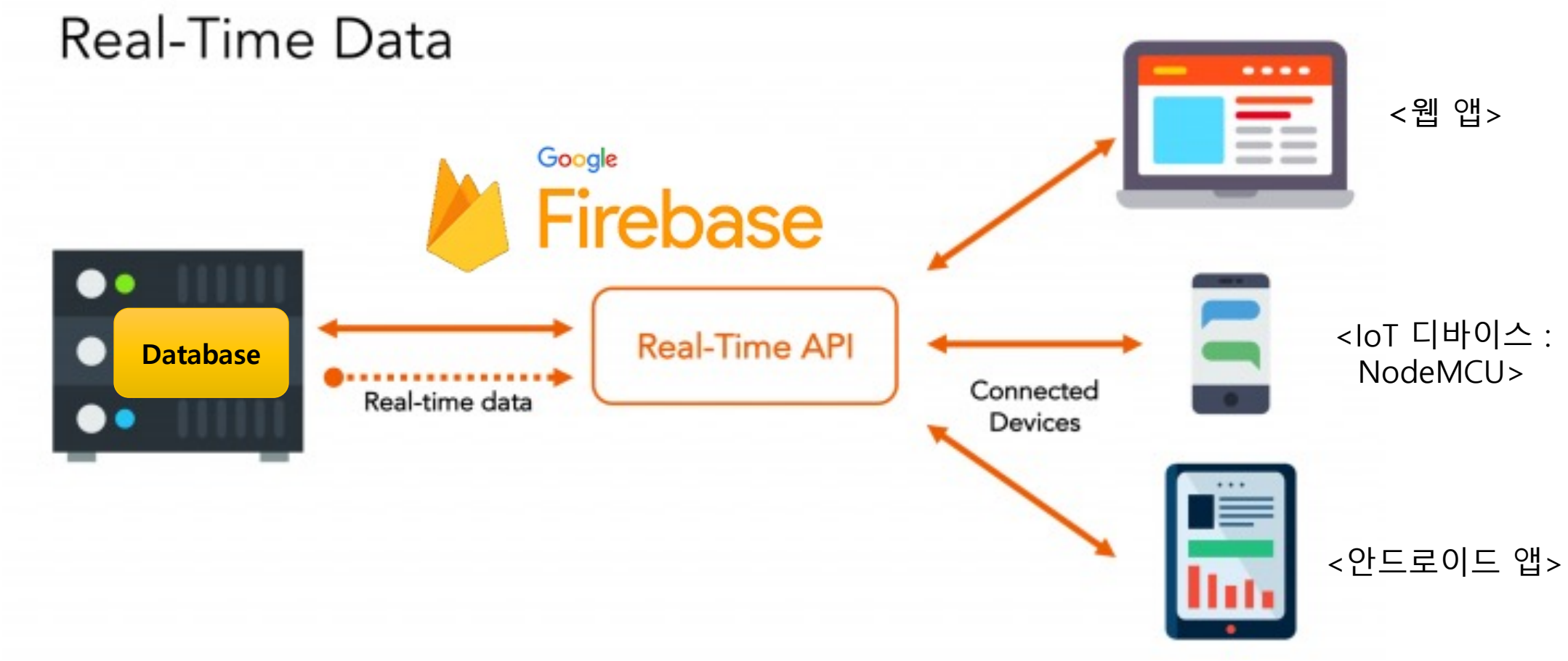


구현 중요 내용

- LED ON/OFF 안드로이드 앱과 웹 앱이 Firebase의 데이터 베이스를 중심으로 완전 동기화 됨
- Firebase 안드로이드 이벤트 처리 함수 사용
- Firebase 웹 앱 이벤트 처리 함수 사용

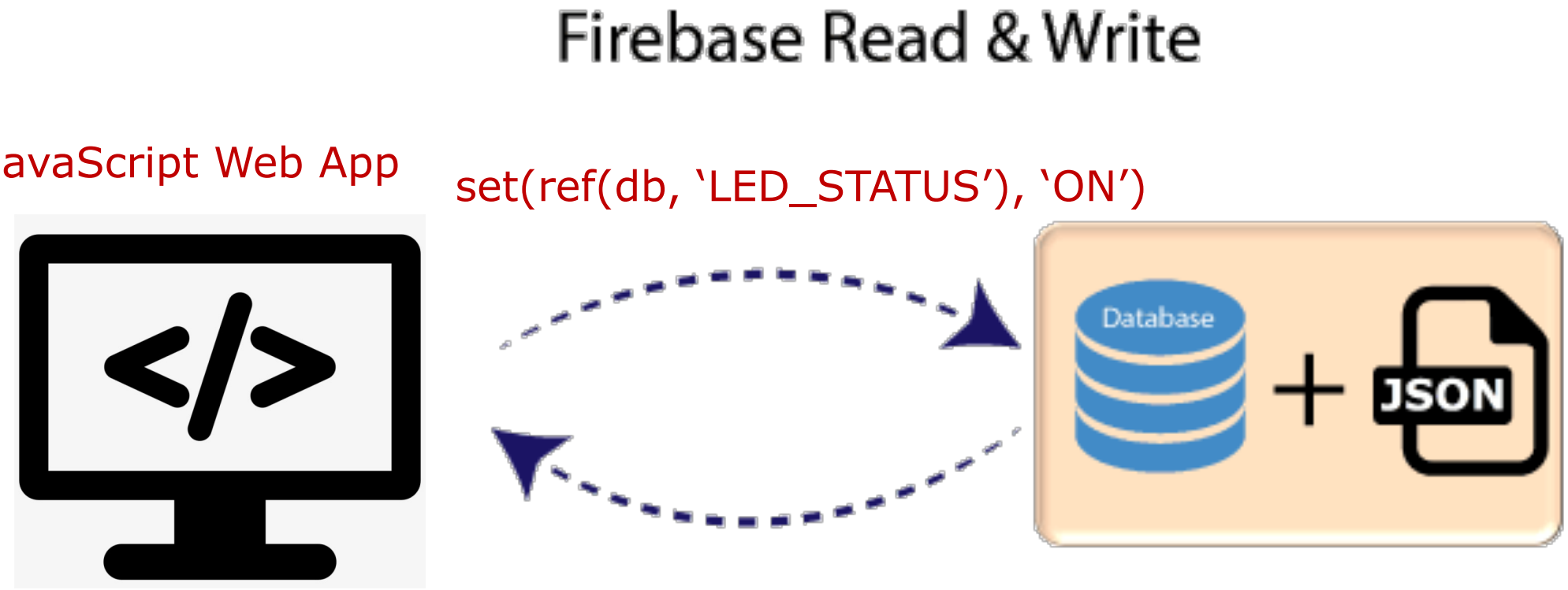

Firebase
Internet
Firebase + Google Sign In
Google Sign In
Mobile App
ESP8266 Things
Web App

Firebase Real-Time Database : NoSQL



Firebase 웹 앱 DB 이벤트

- Week09 강의자료 및 과제물 참조



Firebase 웹 앱 DB 이벤트

```
// Initialize Firebase
const app = initializeApp(firebaseConfig);
const analytics = getAnalytics(app);
const db = getDatabase(app);
console.log(db);

var OnButton = document.getElementById("onBtn");
OnButton.addEventListener("click", onBtnClick, false);

var OffButton = document.getElementById("offBtn");
OffButton.addEventListener("click", offBtnClick, false);

function onBtnClick(event) {
    set(ref(db, 'LED_STATUS'), 'ON');
    console.log("LED ON");
}

function offBtnClick() {
    set(ref(db, 'LED_STATUS'), 'OFF');
    console.log("LED OFF");
}

const dbRef = ref(db, 'LED_STATUS');
    onValue(dbRef, (snapshot) => {
    console.log(snapshot.val());
    OUT_TEXT.innerText = 'LED is ' + snapshot.val();
})
```

Firebase 안드로이드 DB 이벤트

Firebase 안드로이드 DB 값 변화 이벤트

```
FirebaseDatabase.getInstance();
DatabaseReference myRef = database.getReference("LED_STATUS");

myRef.addValueEventListener (new ValueEventListener () {
    @Override
    public void onDataChange(@NonNull DataSnapshot dataSnapshot) {
        String ledState = dataSnapshot.getValue (String.class);
        textView.setText ("LED is " + ledState);
    }
    @Override
    public void onCancelled(@NonNull DatabaseError databaseError) {
    }
});
```

Firebase 안드로이드 DB write 이벤트

```
// DB에 "ON" 값 write
onButton.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View view) {
        textView.setBackgroundColor(Color.YELLOW);
        // write to the Database
        myRef.setValue("ON");
    }
})
```

```
// DB에 "OFF" 값 write
onButton.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View view) {
        textView.setBackgroundColor(Color.GREEN);
        // write to the Database
        myRef.setValue("OFF");
    }
})
```

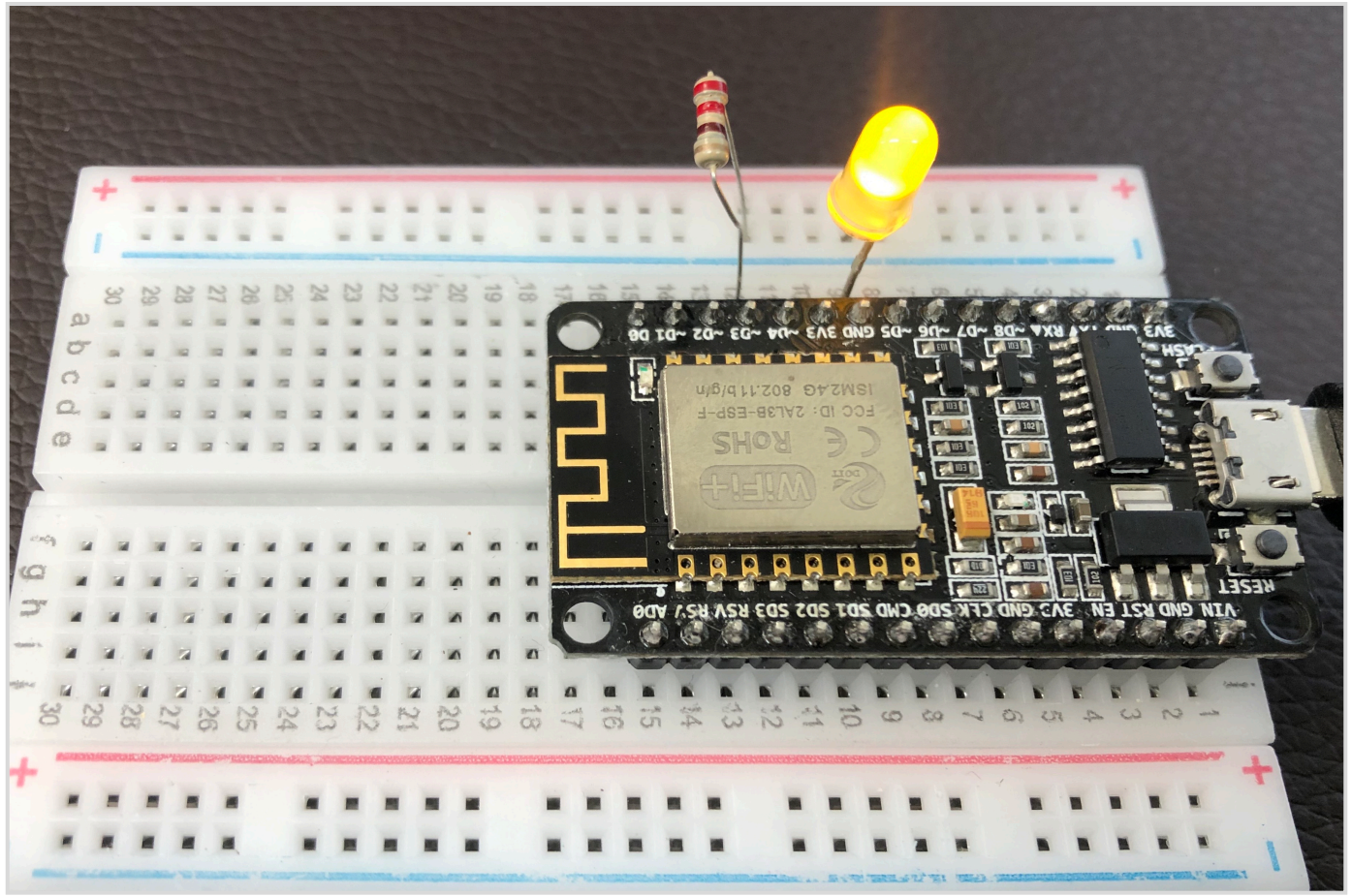
Firebase SDK API 참고

Firebase 웹 API

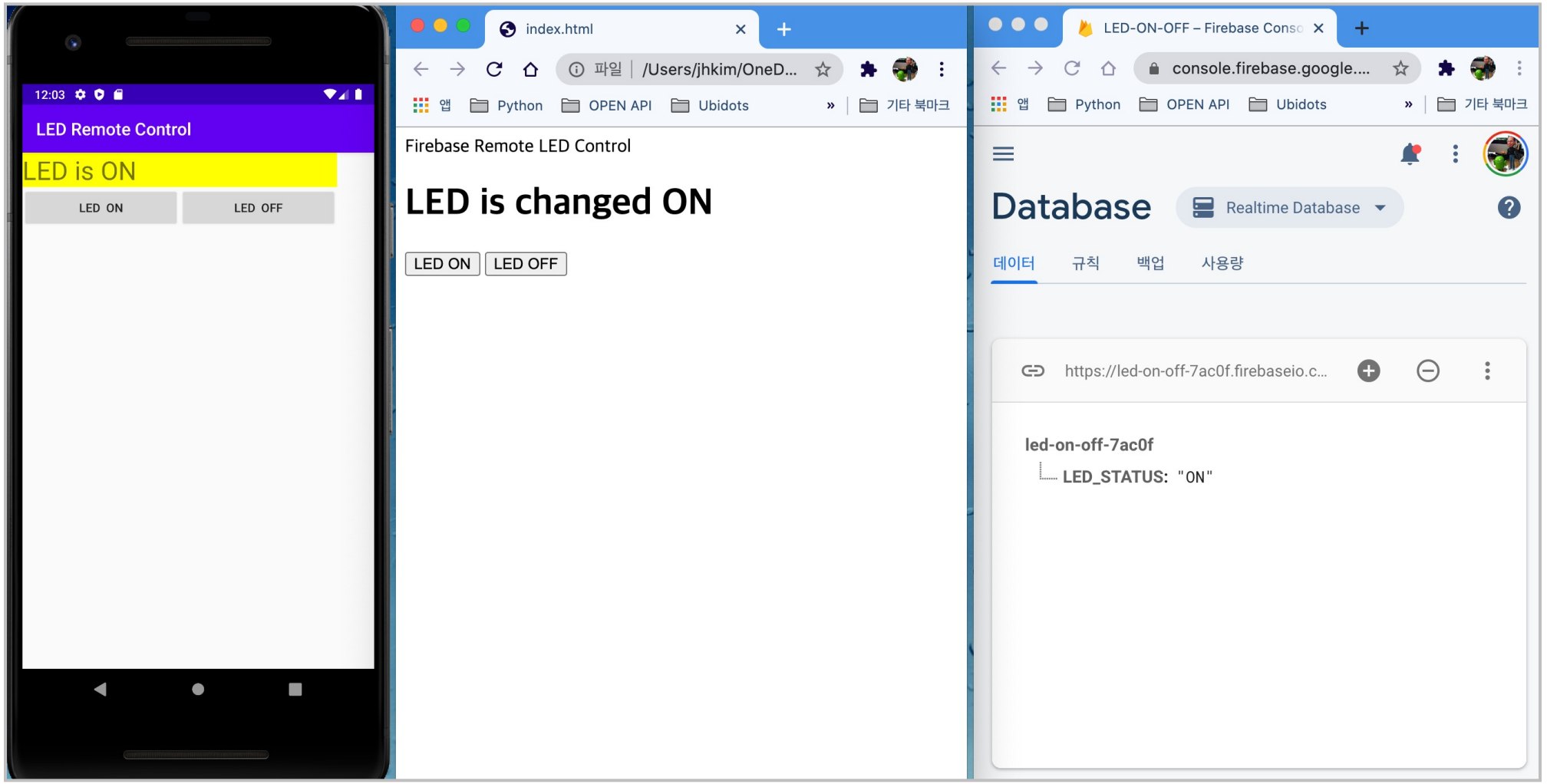
- https://firebase.google.com/docs/database/web/read-and-write?authuser=0

- Firebase Andriod API
  - https://firebase.google.com/docs/reference/android/com/google/firebase/database/package-summary?authuser=0

IoT 디바이스 : NodeMCU 12E



LED ON 이벤트

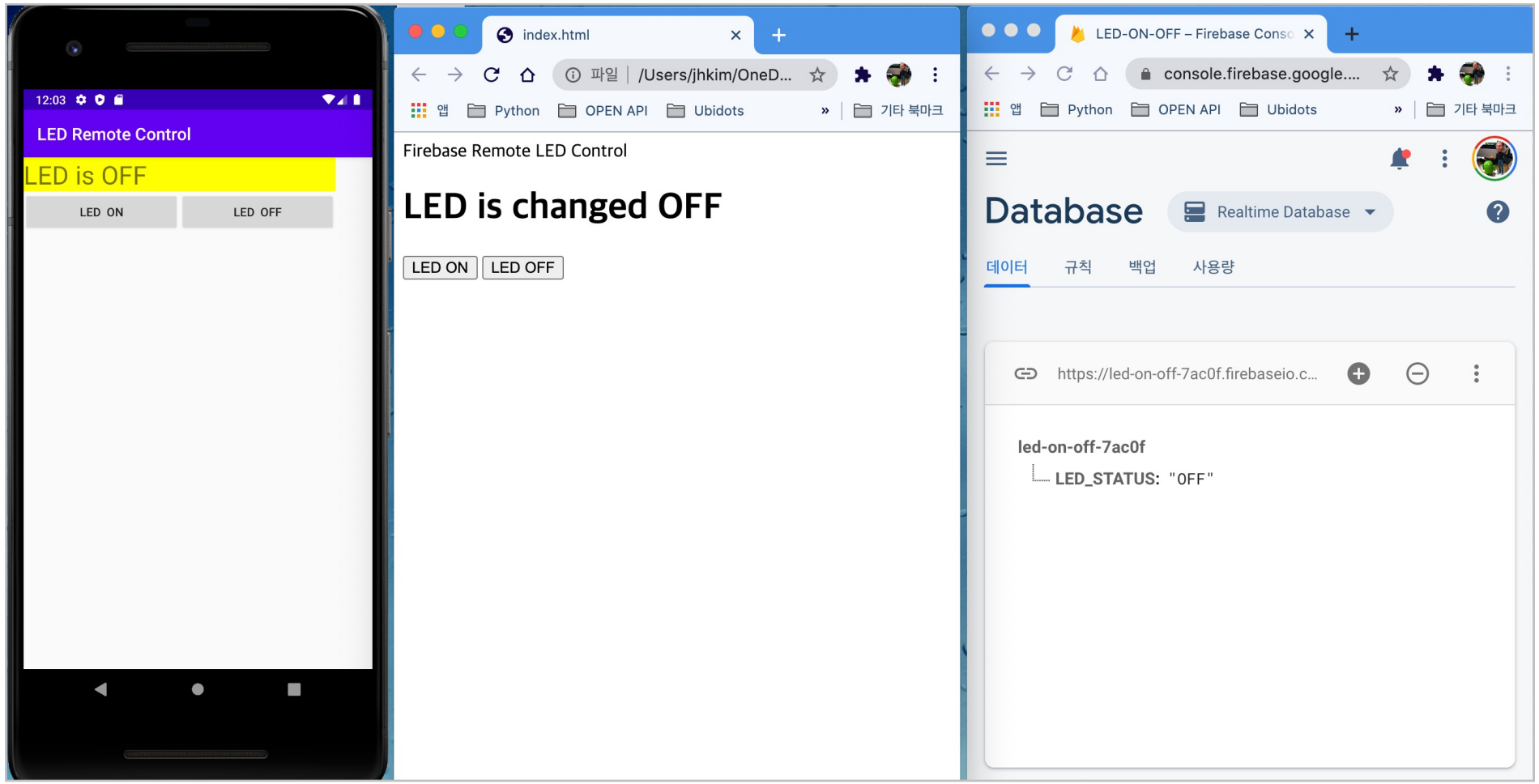


<안드로이드 앱>

<웹 앱>

<Firebase 데이터베이스>

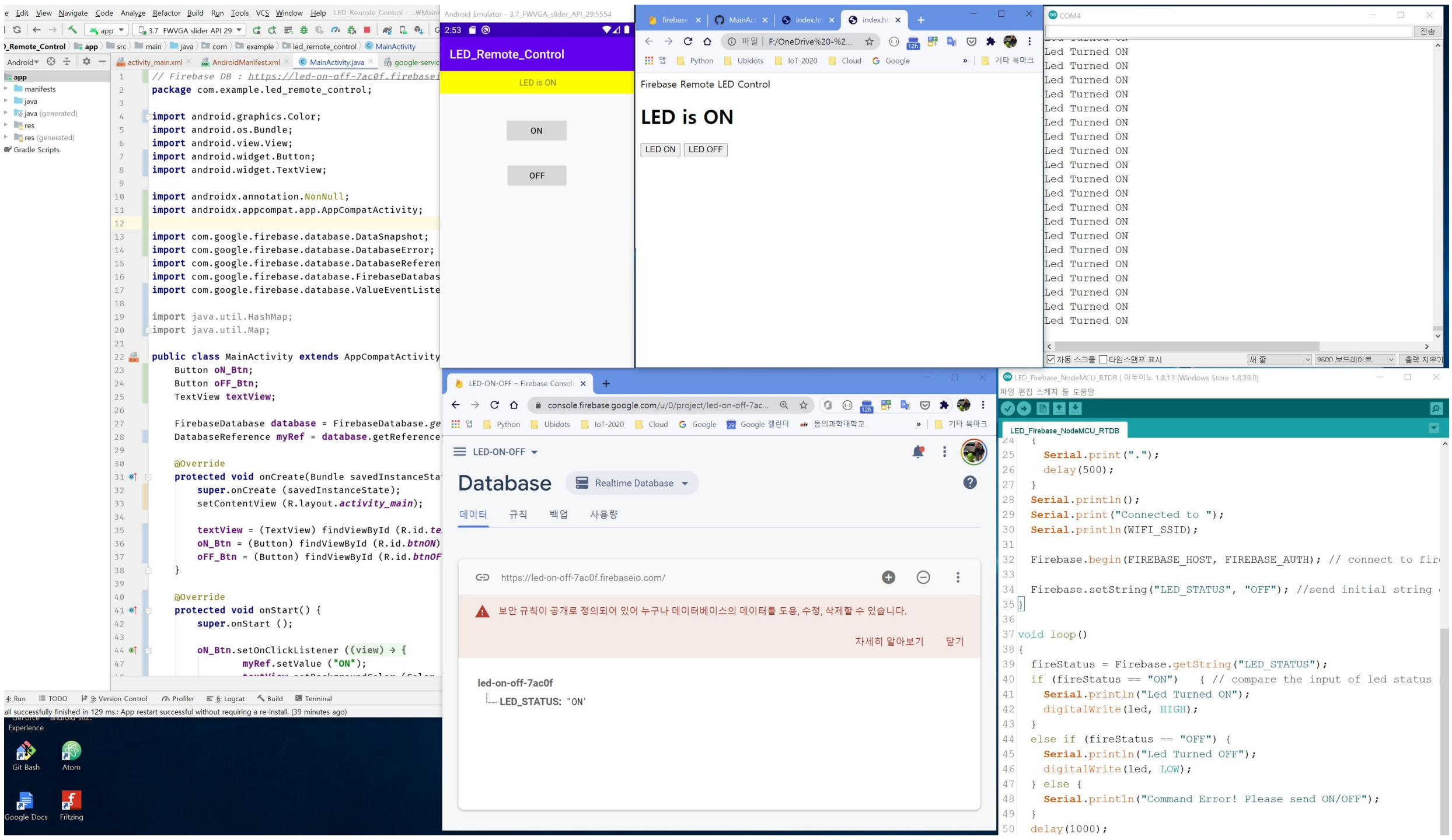
LED OFF 이벤트



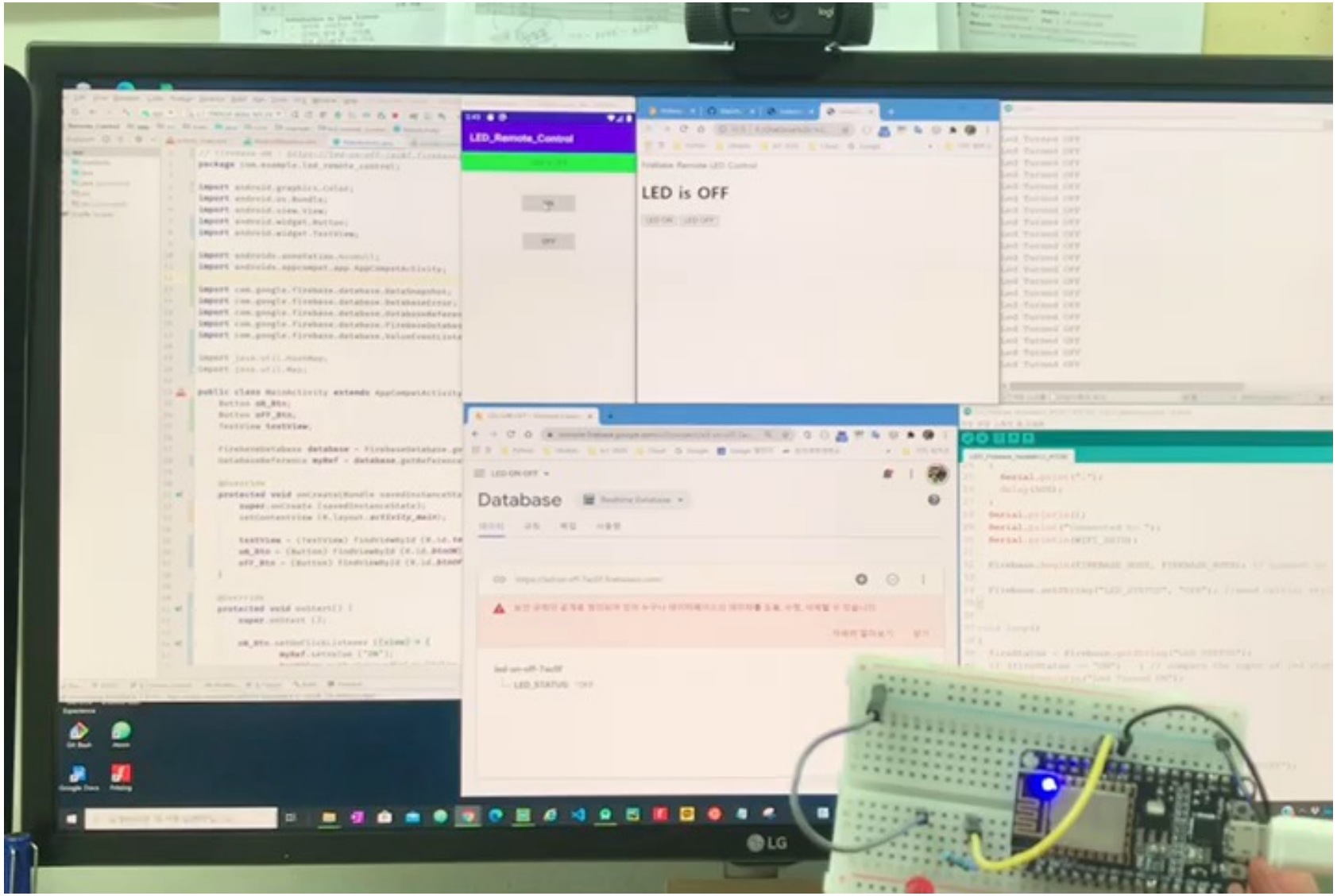
<안드로이드 앱>

<웹 앱>

<Firebase 데이터베이스>


// Firebase DB : https://led-on-off-7ac0f.firebasei
package com.example.led_remote_control;
import android.graphics.Color;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.TextView;
import androidx.annotation.NonNull;
import androidx.appcompat.app.AppCompatActivity;
import com.google.firebase.database.DataSnapshot;
import com.google.firebase.database.DatabaseError;
import com.google.firebase.database.DatabaseReferen
import com.google.firebase.database.FirebaseDatabas
import com.google.firebase.database.ValueEventListe
import java.util.HashMap;
import java.util.Map;
public class MainActivity extends AppCompatActivity
Button oN_Btn;
Button oFF_Btn;
TextView textView;
FirebaseDatabase database = FirebaseDatabase.ge
DatabaseReference myRef = database.getReference
@Override
protected void onCreate(Bundle savedInstanceSta
super.onCreate (savedInstanceState);
setContentView (R.layout.activity_main);
textView = (TextView) findViewById (R.id.te
oN_Btn = (Button) findViewById (R.id.btnON)
oFF_Btn = (Button) findViewById (R.id.btnOF
@Override
protected void onStart() {
super.onStart ();
oN_Btn.setOnClickListener ((view) -> {
myRef.setValue ("ON");
LED_Remote_Control
LED is ON
ON
OFF
Firebase Remote LED Control
LED is ON
LED ON
LED OFF
Led Turned ON
LED-ON-OFF – Firebase Console
console.firebase.google.com/u/0/project/led-on-off-7ac...
LED-ON-OFF
Database
Realtime Database
데이터
규칙
백업
사용량
https://led-on-off-7ac0f.firebaseio.com/
보안 규칙이 공개로 정의되어 있어 누구나 데이터베이스의 데이터를 도용, 수정, 삭제할 수 있습니다.
자세히 알아보기
닫기
led-on-off-7ac0f
LED_STATUS: "ON"
LED_Firebase_NodeMCU_RTDB
Serial.print(".");
delay(500);
Serial.println();
Serial.print("Connected to ");
Serial.println(WIFI_SSID);
Firebase.begin(FIREBASE_HOST, FIREBASE_AUTH); // connect to fir
Firebase.setString("LED_STATUS", "OFF"); //send initial string
void loop()
fireStatus = Firebase.getString("LED_STATUS");
if (fireStatus == "ON") { // compare the input of led status
Serial.println("Led Turned ON");
digitalWrite(led, HIGH);
else if (fireStatus == "OFF") {
Serial.println("Led Turned OFF");
digitalWrite(led, LOW);
} else {
Serial.println("Command Error! Please send ON/OFF");
delay(1000);

작동 동영상



소스 코드 참고

- JavaScript WebApp
  - https://github.com/DIT-IoT-Cloud-2021-2/Source/tree/main/LED_Control_FB_WebApp

- 안드로이드
  - https://github.com/DIT-IoT-Cloud-2021-2/Source/tree/main/LED_Control_FB_Android

기말과제

- 배운 수업 내용을 공부하여 Remote LED ON/OFF (1)웹 앱, (2) 안드로이드 앱을 Firebase Relatime Database와 연동하도록 제작하시오.

- 웹 앱과 안드로이드 앱의 UI를 CSS, Bootstrap, JavaScript, image 등을 사용하여 직관적이고 편리하도록 제작하시오.
  - 예 : UI에 light 이미지 활용