Blynk IoT Process for Helmet Sensor Project

# 1. What is Blynk?

Blynk is an IoT platform that allows you to connect your hardware (ESP32/Arduino/etc.) to the cloud and control/monitor it from a mobile app or web dashboard.  
  
- ESP32 → Sends sensor data (MQ2, MPU9250, DHT11, etc.)  
- Blynk Cloud → Stores & processes the data  
- Mobile App/Dashboard → Displays values, sends notifications, controls hardware

# 2. Blynk Setup Process

## A) Create Project in Blynk App

1. Download Blynk IoT App (Android/iOS).  
2. Log in with your account.  
3. Create a New Template (e.g., Helmet Sensor).  
 - Template ID (generated automatically).  
 - Template Name (you choose).  
 - Hardware = ESP32.  
 - Connection Type = WiFi.  
  
4. Copy these values:  
- BLYNK\_TEMPLATE\_ID  
- BLYNK\_TEMPLATE\_NAME  
- BLYNK\_AUTH\_TOKEN  
  
👉 These values are already in your code.

## B) Add DataStreams in Blynk

Each virtual pin (V0, V1, …) in your code needs to match a DataStream in Blynk.  
  
For example:  
- V0 → Overall Alert (0/1)  
- V1 → Acceleration  
- V2 → Gyro  
- V3 → Motion Alert (0/1)  
- V4 → MQ2 Value  
- V5 → Gas Alert (0/1)  
- V6 → Temperature  
- V7 → Humidity  
- V8 → Temperature Alert (0/1)  
  
📌 In the Blynk Template, go to Datastreams → Add Datastreams → Virtual Pin and create each one with the correct virtual pin number.

## C) Configure Dashboard

Now design your app/web dashboard:  
- Add Value Display widgets → Link them to V1 (Accel), V2 (Gyro), etc.  
- Add LED/Indicator widgets → Link them to V3 (Motion Alert), V5 (Gas Alert), etc.  
- Add a Notification Widget → To send alerts when V0 = 1.  
- Optionally add Charts → To see real-time graphs.

## D) Upload Code to ESP32

1. Your code connects to WiFi + Blynk Cloud.  
2. ESP32 reads sensors → Sends values to Blynk Virtual Pins.  
3. Blynk App updates in real-time.

# 3. Data Flow Example

1. You crash (Helmet detects high acceleration).  
2. ESP32 calculates totalAccel → totalAccel > 2.0.  
3. ESP32 sets alertMotion = true → Sends Blynk.virtualWrite(V3, 1).  
4. Blynk App shows Motion Alert = ON.  
5. If buzzer also triggered → ESP32 sends V0 = 1 → Mobile app pushes Notification.

# 4. Benefits of Using Blynk

✅ No need to build your own server.  
✅ Real-time data from anywhere.  
✅ Cloud storage + automation.  
✅ Easy dashboard design.