The Rider's Co-Pilot

This project is an Arduino-based smart helmet designed to improve motorcycle safety. It acts as an intelligent co-pilot by wirelessly connecting to the motorcycle's ignition system.

The core idea is to ensure the **engine will only start if the rider meets critical safety checks**.

Key Safety Features:

The system enforces four main safety rules:

- **Helmet Detection**: The bike won't start unless the helmet is actually being worn.
- **Alcohol Sensing**: An integrated sensor checks the rider's breath for alcohol to prevent drunk driving.
- **Drowsiness Detection**: It monitors the rider's eye-blinking to detect fatigue. If the rider seems drowsy, the engine is safely shut off.
- **Anti-Theft System**: The motorcycle is disabled if the helmet (and its transmitter) isn't near the vehicle.

How It Works:

The system is split into two parts:

- **The Helmet (Transmitter)**: Contains an Arduino, sensors, and a wireless transmitter. It constantly checks the rider's status and sends this data to the bike.
- **The Vehicle (Receiver)**: Contains a second Arduino, a wireless receiver, and a relay connected to the engine's ignition. It receives signals from the helmet and decides whether to allow the engine to run.

If any safety rule is violated, the helmet sends a signal to the bike to immediately and safely turn off the engine. The system's live status is shown on an LCD display.

Sensors & Components Used:

The project is split into two parts: a transmitter and a receiver.

Transmitter Components (Helmet Unit):

- **Arduino UNO:** The microcontroller that processes sensor data.
- **RF Transmitter:** A wireless module to send data to the receiver.
- **IR Sensor:** Two are used; one for detecting if the helmet is worn and one for detecting eye-blinking (sleep detection).
- **MQ3 Sensor:** An alcohol gas sensor to detect alcohol fumes.

- **Buzzer:** Provides an audible alert.
- **LED & Resistor:** Provides a visual alert.
- **Breadboard & Wires:** For assembling the circuit.
- **Battery:** To power the helmet unit.

Receiver Components (Vehicle Unit):

- **Arduino UNO:** The microcontroller that receives data and controls the vehicle.
- **RF Receiver:** A wireless module to receive data from the transmitter.
- **16x2 LCD Display with I2C Module:** Displays the status of the system.
- **1-Channel Relay Module:** Acts as a switch to control the engine's ignition circuit.
- **Buzzer:** Provides an audible alert for theft or other warnings.
- **LED & Resistor:** Provides a visual alert.
- **Breadboard & Wires:** For assembling the circuit