📌 Project Description – *Smart Basketball Coach*

Course: IOT
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🏀 Overview

This project is a **computer vision-based virtual coaching system** for basketball players focused on improving shooting mechanics. Using pose detection through a webcam, the system analyzes **upper body motion**, **jump mechanics**, and **wrist flick**, then delivers **real-time audio feedback** through Bluetooth headphones or speakers.

If necessary, basic sensors (such as an **MPU6050 IMU**) may be added to improve wrist analysis where CV performance is limited.

🎯 Use Cases

- Players training alone who want guided shooting feedback
- Detecting and correcting poor form such as:
    - Weak or missing wrist flick
    - Inadequate jump or jump timing issues
    - Incorrect arm/shoulder positioning
- Voice-guided corrections using Bluetooth audio devices
- CV system acts as a **virtual coach**

🧠 Features

- Full upper-body **pose tracking** using computer vision (e.g., MediaPipe)
- **Wrist flick detection** using vision or IMU (optional fallback)
- **Jump detection** and vertical analysis
- Real-time **audio feedback** to the player
- Optional sensor integration for increased precision

🔧 Technology Stack

- **OpenCV + MediaPipe** – Computer vision and pose estimation
- **Python** – Main development language
- **Bluetooth audio** – Feedback output
- **MPU6050** (optional) – Motion sensor for wrist data
- **ESP32** (optional) – Microcontroller for sensor communication