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First Person View Drone Technology: Challenges and Future Prospects

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Abstract: First-Person View (FPV) drones have revolutionized aerial technology, offering immersive piloting experiences, precise control, and a wide range of applications. This project focuses on developing a next-generation FPV drone system equipped with real-time high-definition video transmission, ultra-lowlatency communication, and fully customizable flight controls. The drone integrates a high-resolution camera (a smartphone), a robust wireless transmission system, and a responsive flight controller supporting Betaflight, iNav, or ArduPilot firmware. Designed for racing, freestyle flying, autonomous navigation, and professional applications, this drone offers advanced PID tuning, firmware updates, and On-Screen Display (OSD) customization via wireless connectivity (Bluetooth/Wi-Fi). Performance optimization is further enhanced through Blackbox log analysis. Additionally, mission planning capabilities expand its utility for aerial photography, industrial inspections, and search-and-rescue operations. The system features autopilot functionality, allowing the drone to autonomously navigate to user-selected locations. A gimbal stabilization system, paired with a smartphone camera, ensures smooth video capture. The camera supports live HD video transmission for FPV piloting while simultaneously recording highquality videos and photos, making it ideal for aerial photography and surveillance. The modular design also enables AI-driven customizations, including object tracking, obstacle avoidance, and autonomous flight optimizations. Furthermore, the drone can be adapted for delivery tasks by integrating a servocontrolled crane mechanism for secure and precise payload handling. By leveraging cutting-edge flight control technologies, AI integration, and mobile application support, this FPV drone redefines versatility and performance, catering to both enthusiasts and professionals seeking a seamless, high-performance aerial experience

Keywords: FPV Drone, HD Video Transmission, Flight Controller, PID Tuning, Blackbox Log Analysis, Autopilot, Object Tracking, Obstacle Avoidance, Mission Planning, AI Integration, Aerial Photography

