TARGET PROJECTS & LABS

- Plant parameter measurement
- IMU calibration
- PID & LQG/LQR attitude control design
- Wi-Fi ranging
- Cooperative multi-node formation flying
- Differential GPS landing system
- Vision-aided navigation
- Real-time video downlink

COMING ENHACEMENTS

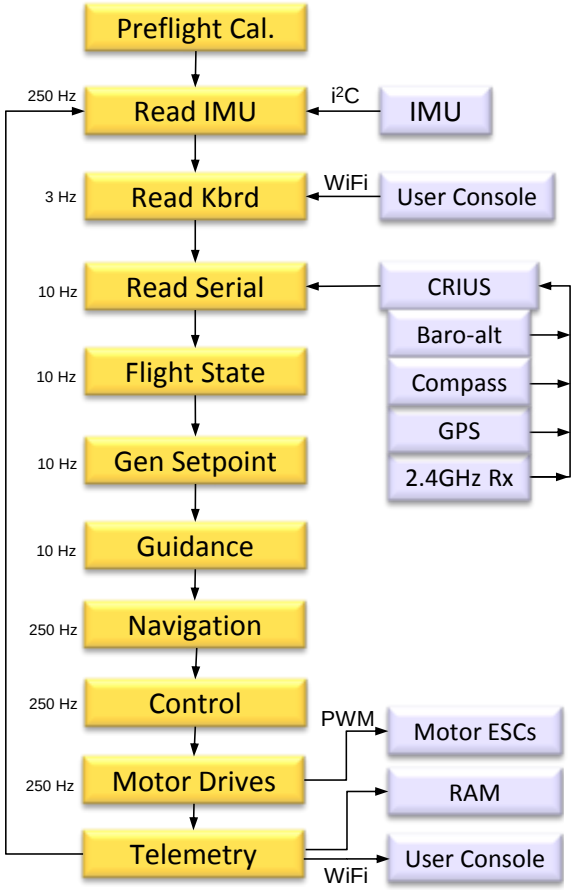
- GPS-aided waypoint navigation
- Pilot-commanded return home
- Doppler velocity-aided horizontal hold
- Port to Raspberry Pi 3
- RPi Camera - Video downlink and open CV image processing

KIT INCLUDES

- Raspberry Pi A+
- Turnigy 9x 2.4 GHz radio controller
- Ultimate GPS receiver
- 5000 mAHr LiPo battery and charger
- Wi-Fi
- Operation and flight instruction manuals
- Tether clips for constrained flight testing

ARCHITECTURE BLOCK DIAGRAM

The **PiQuad™** open software and hardware architecture—shown below—is described in an Interface Control Document (ICD)—at roboticsinflight.com.



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ROBOTICS IN FLIGHT

Unmanned Areal Systems for Education, Research, and Development

MOSTLY OPEN SOURCE FLIGHT CONTROLLER – PYTHON PILOT™ –

GPS TRACKING & TELEMETRY

STABILIZED VIDEO

WHO WE ARE

Robotics in Flight is a Limited Liability Corporation that is developing Unmanned Air Systems (UASs) for education. Our initial offering — the **PiQuad™** — is a quadcopter built upon the Raspberry Pi — a single-board computer serving as the flight controller and realizing key functions needed for controlled flight:

- Guidance
- Navigation
- Control
- Sensor Data Reception
- Motor Command Transmission
- Remote Pilot Interface

PIQUAD

Offered as a turnkey system, the **PiQuad™** is well-suited for use in education as a laboratory platform for control-system design and experimentation. Users have open access to the functional interfaces present in the code; the hardware interfaces on the Raspberry Pi; the source code of the top level and several modules; and to the features provided by the Linux OS.

Built upon the Linux Operating System and coded in Python, this new UAS is offered as an open-architecture, mostly open-source unmanned system development platform.

Devices and functionality can be added, enabled by the various interfaces provided by the Pi and its ability to host multiple applications within Linux. For example:

- Test and demonstration of an improved control law that you've developed
- Sense-and-avoid testing with a new sensor connected to the Pi

The incorporation of new ideas and innovations are limited only by available processing resources, interfaces — and your imagination.

FEATURES

- Built upon Linux and coded in Python
- Open architecture, open interface
- Inertial Navigation:
    - IMU—angular rates, linear accelerations
    - Magnetometer
    - Baro-altimeter
- Flight data logging and in-flight plotting
- Lost RC link-controlled auto-land
- Eight (8) channel Remote Pilot Command interface with two (2) spare channels

REALTIME TELEMETRY

GPS location and other user-selectable telemetry (altitude, attitude, velocity, etc.) are stored locally at approximately 250 Hz and transmitted via WiFi at 5 Hz for real-time visualization of the flight trajectory.