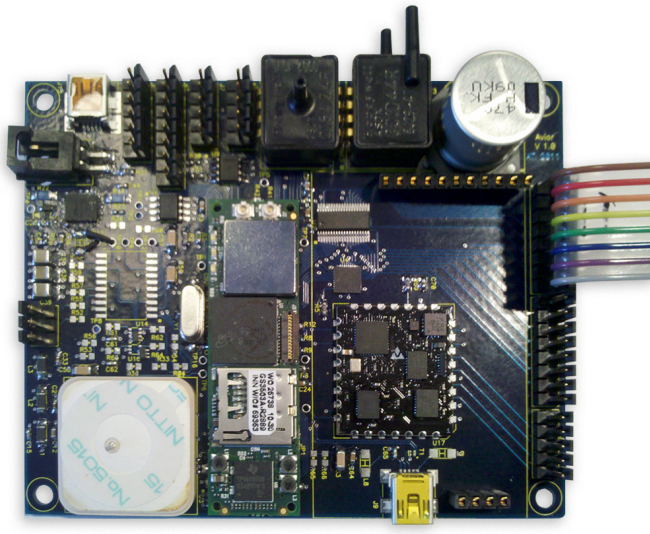
AVIOR 100

Avior offers unprecedented autopilot performance, accuracy, and capabilities in a small package.



ATI Avior 100 Autopilot

The ATI Avior 100 autopilot is an advanced design built around high performance, high quality, state of the art components and sensors. The CPU is a 600 Mhz OMAP 3503, offering 256 Mb of Flash and 256Mb of RAM. The core sensors include a VectorNav VN100T IMU and the Ublox Neo 6 GPS. The firmware is built around an advanced 15-state Kalman filter that blends the inertial and GPS sensor data to accurately estimate roll, pitch, and true yaw angles. The ATI Avior offers unprecedented performance, accuracy, and capabilities in a small package — at a competitive price.

Specifications

- Dimensions: 103mm x 82mm x 13mm
- Weight: 68grams
- Texas Instruments OMAP 3503 CPU (600 Mhz ARM Cortex-A8, up to 1200 Dhrystone MIPS)
- 256Mb RAM, 256Mb Flash, MicroSD slot
- I2C, SPI, 1-wire UART, High Speed USB Host and USB OTG, Ethernet
- 8 PWM in, 8 PWM out, 6 Analog in
- Professional double-sided SMT (Surface-Mount Technology) Mil-Spec available
- 5 - 44.4V input voltage range
- 0C < T < 85C rated
- VectorNav VN100/VN100T IMU
  - Accelerometer range: +/- 2g / 6g
  - Gyro range: 500 deg/sec
  - Magnetometer range: 6 gauss
  - Shock limit: 1000g (unpowered), 500g (powered)
- Advanced 15-state Kalman filter with true-heading estimation (INS/GNS)
- 100hz filter update rate
- Ublox Neo 6 GPS
  - 5 Hz navigation rate
  - Anti-jamming technology
  - Cold starts: 26 s, Hot starts: 1s
- Radio modem: direct plug-in support for Digi 900 Mz XTend modem — serial or IP connection provided for external modem and hardware.

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Avior FG Base Station

Firmware Specifications

- IMU based stabilization and flight control — 15-state Kalman filter provides accurate roll, pitch, and "true" yaw angle estimates
- WGS-84 (great-circle) route navigation
- Unlimited waypoints (limited only by hardware RAM.)
- Supports fixed waypoint routes and "pattern based" routes that can be repositioned at startup or during flight
- Accurate onboard wind vector estimation
- Stable heading control (even in high wind operations)
- Autonomous flight mode; Command Augmentation flight mode; Manual flight mode.
- Circle holds (wind compensated)
- Altitude hold (pitch-based or throttle based)
- Speed hold (pitch-based or throttle based)
- Lost link return home safety feature
- Includes drivers for additional sensors and hardware
- Extensive on board data logging
- Real-time air-to-ground communication via an open, well documented API
- Able to directly control servo based pan/tilt camera mechanism with support for WGS-84 point holds and NED vector holds
  - Firmware uses a robust quaternion based formulation in combination with the Kalman filter based attitude estimate to compute the correct pan/tilt angle offsets for pointing the camera at the intended target independent of aircraft motion
  - Potential to leverage this internal math to drive more sophisticated stepper motor based pan/tilt mechanisms.
- Auto launch, auto land (under development)

Base Station

- Base station hardware
  - Advanced IMU controlled pan & tilt antenna tracker (options for mounting on a moving platform)
  - Ruggized laptop computer
  - Packaged in portable, rugged and waterproof cases
  - Self-contained power supply
- Base station software:
  - Real-time moving map
  - Interactive route creation
  - Supports pre-programmed routes and "pattern routes" that can be relocated (in flight) relative to a reference point
  - Glass cockpit-style instrumentation
  - Live 3d flight visualization
  - Extensive logging options available (both onboard and on-ground)
  - Sophisticated data replay and visualization system

Payload

- Autopilot computes a number of internal parameters that can be sent to a payload package: accurate location, and true attitude estimate — including yaw (critical for camera pointing applications), accurate local wind vector estimate, accurate true airspeed estimate
- Variety of communication interfaces available: UART, Ethernet, and USB

Research & Engineering

- Significant portions of the firmware code base are licensed under the LGPL (open-source compatible)
  - Firmware is compiled with the GCC toolchain
  - Hooks can be provided for extending the firmware to support custom modules or to interface with custom payload packages
- Open APIs, open & documented logging file formats, open & documented telemetry protocol
- Hooks and interfaces to Avior FG which can be used to model and simulate the airframe, prototype flight control systems and higher level mission programming
- The autopilot firmware can be compiled as a standalone application that can run on a PC and interface to Avior FG for software in-the-loop testing
- The autopilot firmware running on the Avior hardware can be configured to talk to Avior FG via a network connection for hardware in the loop testing

Training

- The extensive flexibility and connectivity of the Avior autopilot along with the open-source Avior FG flight simulator can be leveraged for pilot training, demos, and mission planning
- The built in scripting system offered by Avior FG offers the ability to script training scenarios from basic to advance

AVIOR FG

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