Naveol

Highly Versatile Automatic Pilot

NL^{IMU} - NL^{AHRS} - NL^{AP}

24/03/2011

Sensors

- 3 axes Gyrometers (2000°/s)
- 3 axes Accelerometers (8g)
- 3 axes Magnetometers (6Ga)
- Precise Barometer
- 20Hz GPS with 3D speed
- Temperature sensors
- Battery voltage sensors

Processor

- DSP 80Mhz
- Flash 256ko
- RAM 30ko

Inputs / Outputs

- 8 PWM outputs (16 bits)
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- 7 power outputs (0.5A @ 50V)
- UART with 3.3V power supply
- I²C® extension port
- 2 frequency inputs
- 3 analog inputs / digital I/O
- 2 external digital I/O

Electrical Specifications

- 4.3V to 7V
- 160mA with GPS (tracking)

Software

- 50Hz Basic Task
- AHRS Algorithms

Hardware

- 63mm * 30mm * 4mm
- 7 grams

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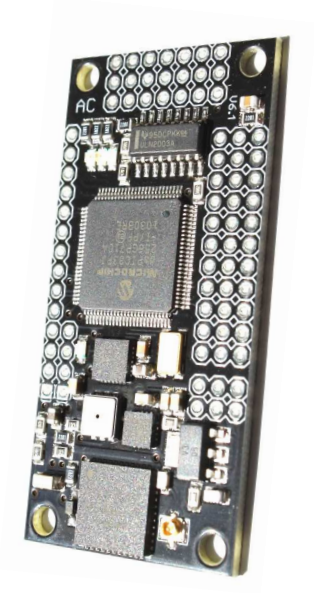
Description



This product is a small sized, low cost and highly versatile all-in-one autopilot. It is fitted with all inertial sensors, 20Hz GPS and a powerful 40 Mips Digital Signal Processor. The board can be equipped with very standard 0.1" headers for direct battery and servo connections, and can be easily integrated into the user application (all possible orientations, software configurable) with 4 standard M3 screws.

A 3.3V UART port is provided for bidirectional communication (long range Bluetooth® or Jennic® modules) at baudrates up to 115200bps.

The board only needs power and external GPS antenna (U.FL connector) to get ready. An I²C extension port supports remote magnetometers if strong parasite magnetic fields are present near board installation. This port can be also used to control multiple I²C brushless controllers.

Depending on the selected firmware option, this product has been designed for applications requiring low cost Inertial Measurement Unit with or without Attitude and Heading Reference System algorithms, as well as for complete autonomous flight control systems used in Unmanned Aircraft Vehicles (placed between radio control receiver and servos in radio-controlled aircrafts or helicopters).

Software options

Different levels of software options are proposed. In passive modes, the board comes ready to use. In active modes, the board can be set up to match the application (carrier type, gains, additional sensors etc.). For educational purposes, a skeleton of the source code can be provided, in order to use the autopilot as a development environment. Here are some examples of software configurations:

Passive modes

- IMU: the board simply outputs the raw sensor values
- GPS-aided AHRS: the board outputs Euler angles or quaternion parameters, 3D hybridized ground speed and position, hybridized altitude, battery voltage etc...

Active modes (Autopilot)

- Level 1: direct servo control for flight stabilization (aircrafts, helicopters...)
- Level 2: flight control with high level control laws (ground speeds, heading...)
- Level 3 (autonomous flight): takeoff, landing, waypointing navigation with mission control, target tracking with camera control, real time flight plan management with ground station on laptop and long range 2.4Ghz RF connection.

Applications

- 3D Positioning
- Camera stabilization and control
- Antenna pointing system
- Airplane / Helicopter stabilization
- Automatic flight control help
- Autonomous navigation