AdaRacer-FCS

Autopilot Hardware Reference Development Platform

Reference hardware platform that provide the foundation for research and development of autonomous and robotic systems in Ada & SPARK.

The AdaRacer-FCS board features a wide variety of MEMS sensors and input/output connectors designed to meet the needs of generic unmanned systems and other robotic applications written in Ada & SPARK.

Summary of Features

- ARM Cortex-M4 MCU
- AdaPilot-M4, PX4 and ArduPilot compatile
- Small form factor for easy integration
- Onboard MEMS IMU and pressure sensor
- CAN, UART, SPI, PWM, ADC and I2C
- Wide variety of add-on modules
- Firmware upgrade via USB or JTAG/SWD
- Buffered UARTs and PWM outputs
- Standard OEM Board or mechanical enclosure
- Power filtering and ESB protection
- Molex PicoBlade compatible connectors
- Made for academic, hobby and industrial communities

Product Highlights

Reliable Autopilot Development Hardware Environment

AdaRacer-FCS is the hardware reference development companion for the AdaPilot initiative, a open-source DO-178C certifiable autopilot project based on the Ada & SPARK safety critical programming language and ARM Cortex M/R MCUs. The hardware consists of a single circuit board with all the necessary sensors integrated, including the popular and widely used Invesense MPU-9250 nine-axis IMU and the MS5611 high precision altitude sensor module providing a 24bit digital pressure value and 24 bit value for the air temperature. Additional add-on sensors, modules and payloads can be integrated via the available interfaces, such as UART, SPI, I2C, ADC and CAN. Servo/ESC´s can be controlled either via up to 8 PWM ports or via a second CAN bus.

Even if the AdaRacer-FCS has been developed with Ada and SPARK in mind, it is also compatible out of the box to various popular autopilot software codes, such as ArduPilot and PX4 just to name a few. Other software stacks based on the ARM Cortex-M could be easily ported to the AdaRacer-FCS platform and benefits from the high-quality hardware and add-on modules, such as GNSS receiver, data-link, battery management systems, and more.

The optionally available AdaRacer-FCS Developers Kit is a complete operational start-up kit suitable for entry level UAV applications where cost and time-to-market is the overriding consideration. The kit is software independent and comes with a generic JTAG/SWD + UART console adapter compatible with Windows, Mac OS and Linux, a DC/DC power converter, a GNSS module + antenna and a data-link. A standard RC radio transmitter with PPM/SBUS receiver can be used to send steering commands.

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Technical Specifications

AdaRacer-FCS Specifications	
Model Number	AdaRacer-FCS
Nine-Axis IMU	
IMU Type	Invesense MPU-9250
Gyroscope	Full scale range: +/- 250, 500, 1000 and 2000°/sec
Accelerometer	Full scale range: +/- 2g, 4g, 8g and 16g
Magnetometer	Full scale measurement range: +/- 4800 uT
Barometric Sensor	
Sensor Type	Measurement Specialties MS5611
Pressure Range	10 to 1200 mbar
Altitude Resolution	10 cm
Power Supply	
Voltage Input	5 VDC, USB or Pin Header
Power Consumption	50 mA
I/O Interfaces	
Serials	Uplink, Downlink, GPS/AHRS, ESP8266
RC Inputs	PPM / SBUS / FrSky
ESC / Servo Control	1x CAN, 8x PWM
Develoment Ports	CLI, JTAG/SWD
Bus I/O	1x CAN, 1x I2C, 1x SPI
Various	RGB LED, Buzzer, Safety Switch, 2x ADC
Data Storage	FRAM, SD-Card
Physical	
Unit Dimensions (H x W x D)	32 x 32 x 15 mm (board)
Unit Weight	11 g
Operating Temperature	-40°C to 85°C

Disclaimer: Check GNSS chip manufacturer datasheets for detailed information and operational conditions.

Target Applications:

- Unmanned Systems
- Autonomous Vehicles
- Robotics
- Academic & Research
- Industrial Control
- Payload Control

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