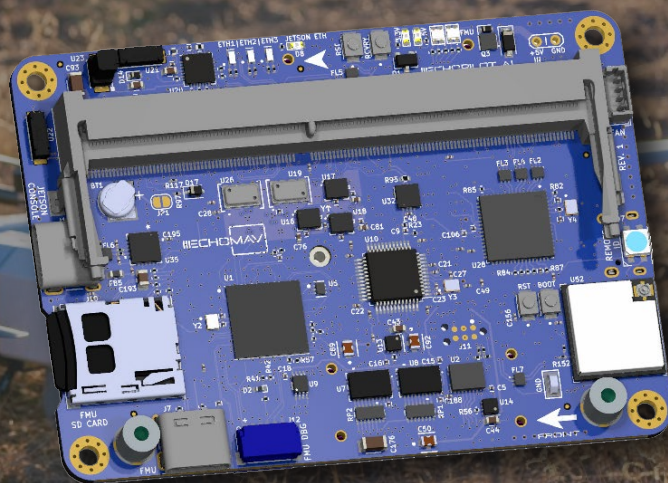# ⦀ECHOPILOT AI

Extensible command, control, communication and compute platform for uncrewed vehicles.

A fully integrated, SWAP-optimized control and compute solution for uncrewed vehicles. The EchoPilot AI combines a professional flight management unit with an Nvidia Jetson single board computer and 5G connectivityin a tiny 83 x 59 mm package.

Designed to be tightly integrated into end-user products, the EchoPilot AI provides the compute power, networking, video encoding, compliance and cloud-connectivity to enable next-generation uncrewed systems.

FEATURES

Open-Source FMU Software Support
- Built on open hardware standards, the EchoPilot AI system is compatible with firmware from popular open-source projects including ArduPilot and PX4.
- Compatible with a wide range of vehicles including multirotors, planes, quadplanes, rovers, boats, submersibles and more.

Modular Radio Architecture
- Designed to be used with modern mobile ad hoc network radios from multiple radio manufacturers including Persistent Systems™, Doodle Labs™, Silvus™, and Microhard™. Includes support for Iridium™ SBD and 4G LTE/5G modems via M.2 slot.

Design
- Designed and built in the USA, **NDAA Compliant**[*]
- Wide operating temperature range and industrial-grade components used throughout.
- Triple-redundant and heated inertial measurement units provide stability and fall-back options.
- Board-to-board connectors and design resources make it easy to integrate into existing platforms.

GCS Compatibility
- Compatible with industry standards, ensuring easy integration with GCS solutions including QGroundControl, MissionPlanner and others.
- Integration with ATAK provides real-time CoT messages and video feeds.

BLOS and Cloud Connectivity
- Integrated 5G modem options (M.2), support for Iridium SBD modems, and on-board RemoteID. The EchoPilot AI is ready for BLOS.

Payload Support
- A diverse peripheral system includes USB 3.0 SS, USB 2.0, Ethernet, SPI, CAN, I^{2}C, and MIPI, ensuring that nearly any payload, camera or sensor is compatible.

Low-Latency Video Encoding
- Open-source software libraries provide a reference for video encoding and distribution. The EchoPilot AI Supports h.264 and h.265 encoding from USB or MIPI-CSI (2 channels available) sources.

Remote ID
- On-board Remote ID subsystem supports Wi-Fi and Bluetooth BLE. The system is built on Open Drone ID, ensuring your platform will be compliant with emerging FAA and international standards.

Expandable Storage
- Process and store data on-board with NVMe SSD storage. Size 2230 NVMe SSDs (M.2) are supported.

COMPLIANT NDAA

ARDUPILOT   PX4 autopilot

ATAK   QGroundControl   MissionPlanner

⦀ECHOMAV®

⫿ECHOPILOT AI

The EchoPilot AI is ready for next-generation UAS systems. Build your system with the power to support machine learning, artificial intelligence, detect and avoid, GNSS-denied navigation, visual odometry, SLAM and much more.
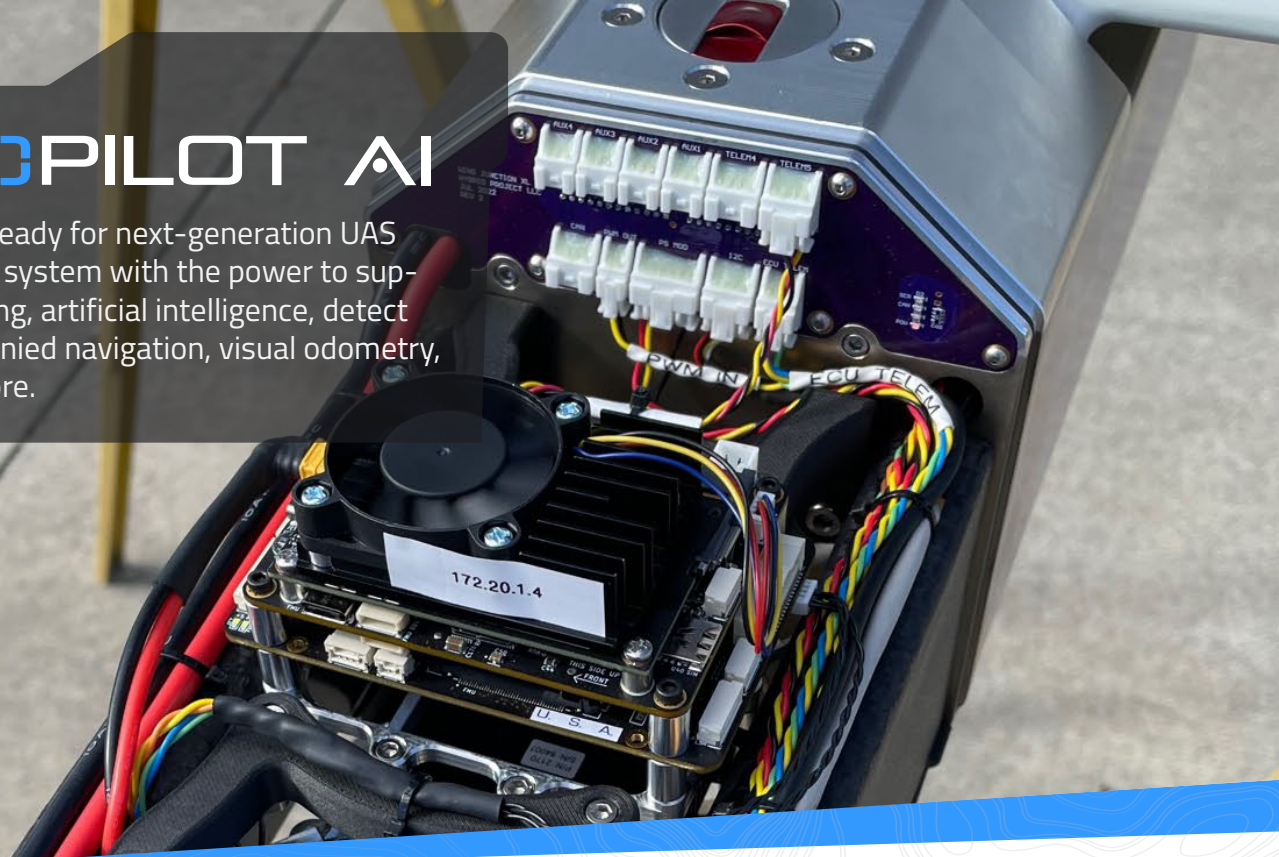
Specifications

📶 COMPATIBLE RADIOS

- Sierra Wireless™ 5G and 4G LTE (onbaord)
- Persistent Systems™ MPU5
- Doodle™ Smart Radio
- Silvus™ Streamcaster
- Microhard™ pMDDL
- Iridium™ 9603N (via Rockblock 9603)
- SiK Radios, e.g. RFD900

🔌 POWER

- 7-56 VDC input via carrier board
- 5 W steady-state power (Jetson Nano)
- Redundant power supplies for FMU and Jetson

💨 ENVIRONMENTAL

- -20°C to +85°C
- < 75% RH

⚙️ MECHANICAL

- 83 x 59 mm
- ~60g + Nvidia Jetson+ heatsink
- Dual high-density board to board connectors for Optional direct integration into vehicles.

⚡ ADDITIONAL SPECS AND INTERFACES
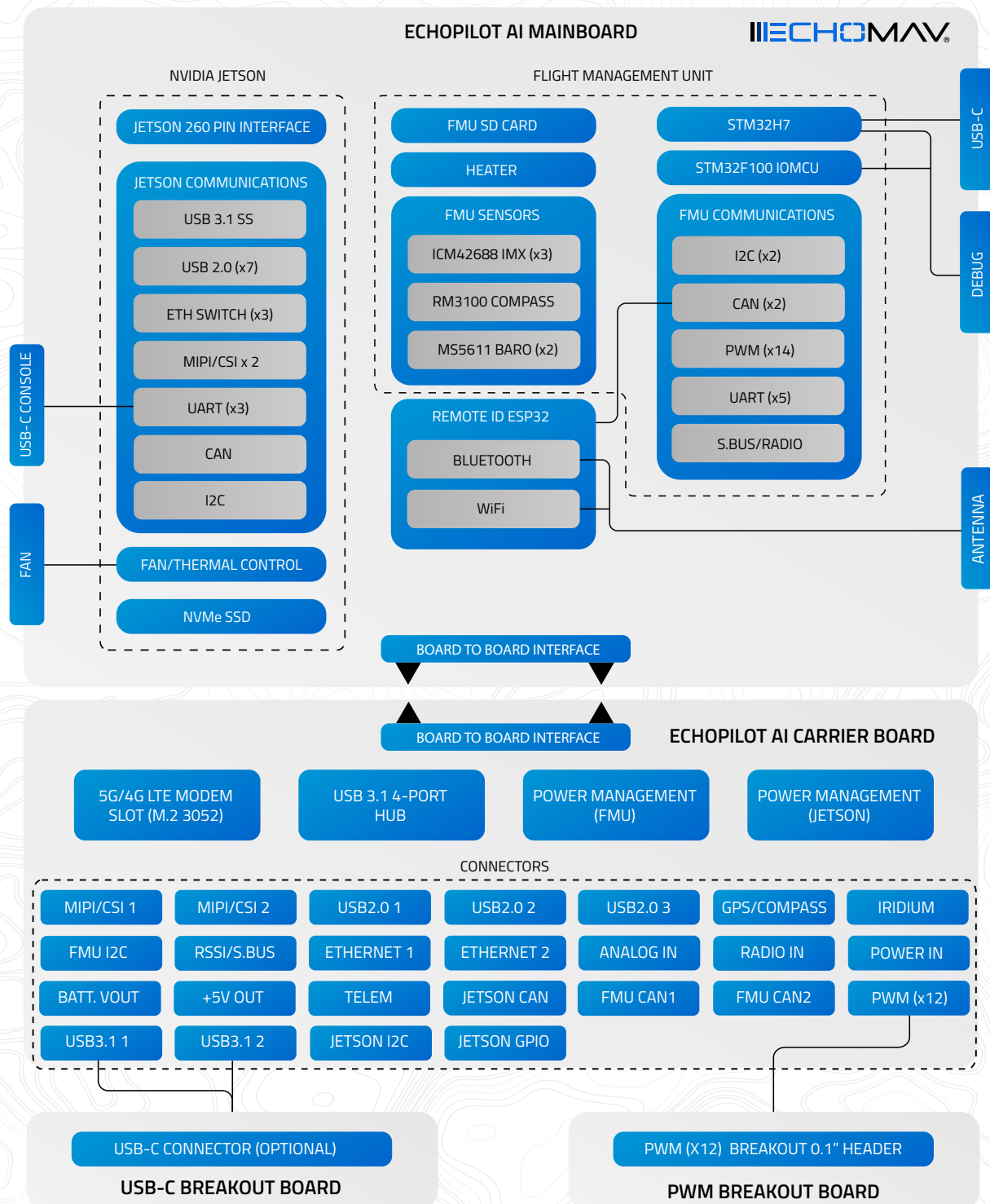
- Jetson Nano, Xavier NX, TX2 NX or Orin NX
- STM32H743 Flight Controller
- ICM-42688 IMUs (Heated, x3)
- MS5611 barometer (Heated, x2)
- h.264 and h.265 Video Encoding
- Ethernet 10/100 (2)
- UART, I²C, GPIO, CAN (2), SPI, PWM (14)
- SD Card for FMU logging
- SD Card for Jetson Storage (up to 2TB)
- USB 3.0 SuperSpeed (3) and USB 2.0 (4)
- RemoteID 802.11 a/b/g/n WiFi, Bluetooth

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ECHOPILOT AI

The EchoPilot AI uses a board-to-board design, with the carrier board providing voltage regulation and connector pin outs. This design allows users to optionally create their own carrier board for highly integrated products.

ECHOPILOT AI MAINBOARD

ECHOMAV.

NVIDIA JETSON

JETSON 260 PIN INTERFACE

JETSON COMMUNICATIONS
- USB 3.1 SS
- USB 2.0 (x7)
- ETH SWITCH (x3)
- MIPI/CSI x 2
- UART (x3)
- CAN
- I2C

USB-C CONSOLE

FAN

FAN/THERMAL CONTROL

NVMe SSD

FLIGHT MANAGEMENT UNIT

FMU SD CARD

HEATER

STM32H7

STM32F100 IOMCU

FMU SENSORS
- ICM42688 IMX (x3)
- RM3100 COMPASS
- MS5611 BARO (x2)

FMU COMMUNICATIONS
- I2C (x2)
- CAN (x2)
- PWM (x14)
- UART (x5)
- S.BUS/RADIO

REMOTE ID ESP32
- BLUETOOTH
- WiFi

USB-C

DEBUG

ANTENNA

BOARD TO BOARD INTERFACE

BOARD TO BOARD INTERFACE

ECHOPILOT AI CARRIER BOARD

5G/4G LTE MODEM SLOT (M.2 3052)

USB 3.1 4-PORT HUB

POWER MANAGEMENT (FMU)

POWER MANAGEMENT (JETSON)

CONNECTORS

MIPI/CSI 1	MIPI/CSI 2	USB2.0 1	USB2.0 2	USB2.0 3	GPS/COMPASS	IRIDIUM
FMU I2C	RSSI/S.BUS	ETHERNET 1	ETHERNET 2	ANALOG IN	RADIO IN	POWER IN
BATT. VOUT	+5V OUT	TELEM	JETSON CAN	FMU CAN1	FMU CAN2	PWM (x12)
USB3.1 1	USB3.1 2	JETSON I2C	JETSON GPIO			

USB-C CONNECTOR (OPTIONAL)

USB-C BREAKOUT BOARD

PWM (X12) BREAKOUT 0.1" HEADER

PWM BREAKOUT BOARD

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*NDAA Compliance may depend on the specific compute module used with the EchoPilot AI. For sensitive applications, we recommend the TAA variant of the Nvidia Xavier NX.

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