'pseudo-satellite' Apus from UAVOS

'central' processing unit," Stratsilatau said. "The computations are distributed across the system's components, and data is shared and processed across the UAV's internal network.

"That makes it possible to scale the system or wield redundancy very easily, because you just add more units to it without having to modify the software, or develop new algorithms for master-slave configurations or redundancy supervision, because the architecture of the system is distributed."

UAV safety company ParaZero released the latest generation of its Smart Autonomous emergency computer, SmartAir, and low-altitude ballistic recovery parachute products for Enterprise and commercial UAVs, SafeAir.

The SmartAir uses its accelerometer, barometer, gyroscope and magnetometer to detect loss of flight control. "And it has its own independent electricity, providing independent redundancy to the UAV," Oren Aviram reported.

Five capacitors are installed on the SmartAir's board, which provide access to electrical pulses through onboard systems including the autopilot and main computer. Should power received reach zero, the SmartAir triggers the SafeAir.

In the event of an inflight freefall or a non-predefined flight envelope roll, during which power is still supplied to the motors, the SmartAir will signal the autopilot to shut down the rotors to prevent human casualties from a high-rpm rotor impact. That is in parallel with parachute deployment.

Also, the company has changed the ejection agent for the parachute, from compressed CO_2 on the previous DropSafe model to a pyrotechnic system similar to that in automobile airbags or seatbelt pre-tensioners. The new system has fewer components and is therefore inherently more reliable.

The transition from the DropSafe to the SafeAir also included a 50% reduction in volume, a reduction in system weight from 550 to 400 kg, and a general increase in the weight of UAV that can be saved by the parachute: the SafeAir10 is designed for craft weighing 4-14 kg, the SafeAir30 is for 12-35 kg craft.

So far, the system has been successfully tested at 5 m from the ground. It is already in use with one UAV manufacturer, which received the first known permit from the UK's Civil Aviation Authority to operate completely autonomously.

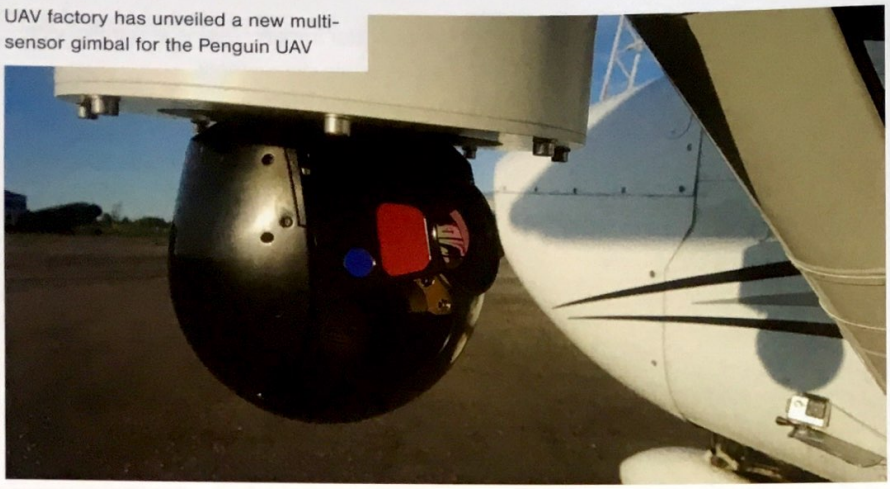
ParaZero's SafeAir recovery parachute system

Chris Wheeler told us about Trimble's breakthrough in SoftGNSS RTK (real-time kinematics) as used for UAV navigation. "Trimble has taken the RTK software engine out of the UAV control board – reducing the weight of the vehicle – since we can now run the RTK engine on an Android tablet," he said.

He explained that by using RTX, a satellite-based correction for GNSS signals that removes the need for a base station, very little overlap is required when photographing a given area of terrain. In turn, that reduces the battery-sapping use of the payload camera and also post-processing time.

Rajant Corporation attended the show to display its wireless mesh technology, having recently been selected to provide the comms infrastructure for xCraft's X PlusOne UAV.

"Moving from outdoor mounts to aerial platforms, our biggest challenge was weight," Don Gilbreath explained. "We had to de-ruggedise our heavy-duty



UAV factory has unveiled a new multi-sensor gimbal for the Penguin UAV

mesh radios, which had been designed to withstand up to 140-degree heat, add new CPU cooling techniques and make them smaller."

Central to Rajant's approach is its patented InstaMesh packet delivery system, which significantly improves the chances of successful transmissions even as transmitter and receiver nodes move around an ad hoc mesh network.

Each transmitter uses a bridge table with both a preferred route and an optional auxiliary route to a receiver. These are augmented by a 'discovery' mode that converts a data unicast to a data broadcast designed to discover a new route once all presets are exhausted.

Upon successful discovery, an introduction/acknowledge packet goes to the sender, which updates the routes to the receiver in the bridge tables of all the nodes in the path from source to destination, and acknowledges successful delivery.

The RG2-16 dual axis rate gyro sensor from MTC Industries & Research

MTC Industries & Research introduced its RG2-16 dual-axis rate gyro sensor, which features an angular random walk of 0.2°/√h, short-term bias stability of 30°/h and in-run bias stability of 6°/h, while weighing just less than 35 g and measuring 33.8 x 28.4 x 25.4 mm.

"Usually, rate gyros have only one degree of freedom, but in the RG2-16 we use two, one-axis gyros placed in two orthogonal planes – the x and y axes," Nir Eldar said.

"The biggest challenge in the RG2-16's development was optimising the electronics and mechanics to preserve the parameters of our one-axis MEMS gyroscope chip, as well as gyroscope misalignment and temperature-dependent drift compensation."

Although temperature compensation was time-consuming, it was caused largely by test equipment parameters and resolved by using environmental test chambers with less 'noise'.

The design optimisation consisted of selecting suitable electronic components for gyro application circuits and fulfilling the PCB requirements according to the gyro's specification (1 cu in).

FreeWave Technologies showcased its range of wireless networking systems, including its newest ZumLink 900 series for the 900 MHz ISM band in embedded UAS applications.

The ZumLink Z9C and Z9T serial radio modules use two RS-232 and two TTL interfaces respectively, and have a data link range of 60 miles. An Ethernet radio version, the Z9-PC, is built on an interface card about 0.75 in longer to hold the Ethernet port.

"The real difference between the serial and Ethernet modules is that the latter includes an edge computer with Cortex-A8 ARM processor, 512 Mbytes of RAM, 1 Gbyte of flash storage and a Linux kernel supporting Java, Python, C, Node Red, Node.js and others," Scott Allen said.

"Programmers and engineers can create and write applications such as intelligent video monitors or cognitive telemetry filters for UxVs [unmanned ground, sea and aerial vehicles] into it, processing and exploiting data rather than just communicating it.

"We based the new radio on a TI chipset, and installed our waveform and security layers on them. We have also developed four algorithms that work with the TI chipset for data compression, packet aggregation, forward error correction, and automated spectrum learning," he said.

UAV Factory unveiled its latest multi-sensor gimbal for the Penguin UAV at the show.

In addition to an electro-optical (EO) camera with 30x optical zoom, laser rangefinder and laser illuminator, the new Epsilon 175 – named for its diameter in millimetres – also contains a cooled medium-wavelength infrared (MWIR) sensor with a 15x optical zoom. The company says the gimbal is the smallest of its type on the market.

"Fitting MWIR into a small, 6.9 in diameter gimbal was challenging," Konstantins Popiks said. "The MWIR detector and 275 mm focal length