



## Drone payload controller with high precision GNSS/INS

A multi-purpose payload controller and datalogger for the Riverscapes project

### Summary:

We have developed a multi-purpose payload controller and data logging unit that is compatible with the existing Riverscapes payloads and can be adapted for future drone payloads. The payload controller is designed for common UAV platforms. It provides interfaces for on-board sensors and for the high precision global navigation satellite system (GNSS) receiver and inertial navigation system (INS). A simple graphical user interface is available for monitoring the survey and the sensor status.

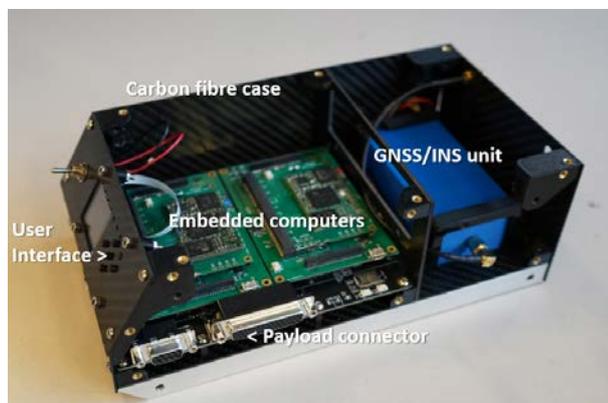
### The payload controller:

The system consists of an embedded computer with built-in storage and a high precision GNSS/INS unit from Novatel. The payload controller is powered from the UAV platform. It has a built in power distribution board and therefore sensors and payloads can be powered directly using a dedicated 12V, 3A supply rail.

The system includes common interfaces such as serial (UART), USB, Ethernet and CAN. The datalogger is synchronized with GPS time and all data and events can therefore be time-tagged accurately.

The datalogger includes a dedicated trigger controller for accurately triggering cameras and radars. In this way, sensor events can be time-tagged with an accuracy of 0.1mS relative to the GPS time.

To support new payloads and sensors, the user can use existing sensor libraries or develop own payload applications using the SDK and examples.



Payload controller and datalogger specifications	
Operating system	Debian Linux
Processor	1GHz single core
Storage	>32GB SD card
User interfaces	LCD + keypad USB, Ethernet
Sensor interfaces	Serial, USB, Ethernet, CAN I2C/SPI, GPIO
Trigger controller	3x trigger output 3x trigger input
Payload power supply	12V@3A
Weight (incl. GNSS/INS)	~773 gram

### GNSS/INS:

The drone payload controller includes a high precision GNSS/INS unit from Novatel. The technical specifications are listed in the table below:

GNSS/INS specifications	
GNSS Model	Novatel OEM7 series
INS Model	ADIS16488
Position accuracy (M), RMS	<b>Horizontal/vertical:</b> RTK: 0.02/0.03 PP: 0.01/0.02
Velocity accuracy (M/S) RMS	<b>Horizontal/vertical:</b> RTK: 0.02/0.01 PP: 0.02/0.01
Attitude accuracy (Deg.) RMS	<b>Roll/pitch/heading:</b> RTK: 0.035/0.035/0.15 PP: 0.012/0.012/0.074

### Applications:

The payload controller can be used together with the existing Riverscapes payloads. The following payloads are supported at this point:

- Water surface elevation (WSE)
- LiDAR payload
- Multispectral, thermal and RGB camera payload

The system is highly suitable for future payloads and prototypes, as it provides all essential systems (GNSS/INS, power supply etc.) – except the payload/sensor itself.