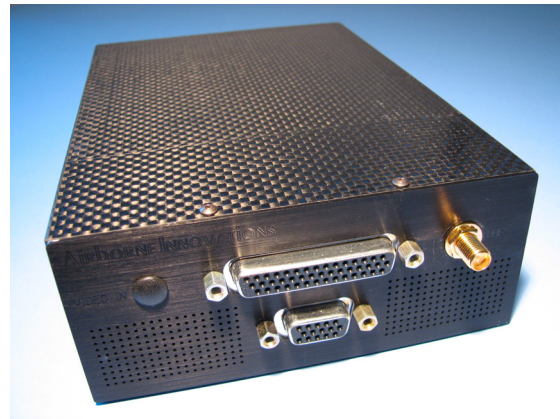# AIRBORNE INNOVATIONS LLC

RaptorEye UAV: Multi-Megapixel UAV Imaging System / Open Aerial Imaging Platform

Multi-Megapixel High Performance Imaging System with integrated UHF broadband datalink and Core 2 Duo processor

Airborne Innovations is proud to introduce our latest imaging system.

RaptorEye UAV is a UAV imaging solution capable of sending multi-megapixel images over the optional integrated 1 megabit 900 MHz datalink, or over other UHF datalinks such as the Microhard VIP2400/VIP5800 links, and over the Globalstar and Iridium satcomm systems. It integrates well with the Cloud Cap Piccolo avionics and/or Cloud Cap TASE family of gimbals, or can function standalone. It can provide rapid compression and transmission of imagery from high performance digital cameras optionally mounted in the Cloud Cap TASE family of gimbals.
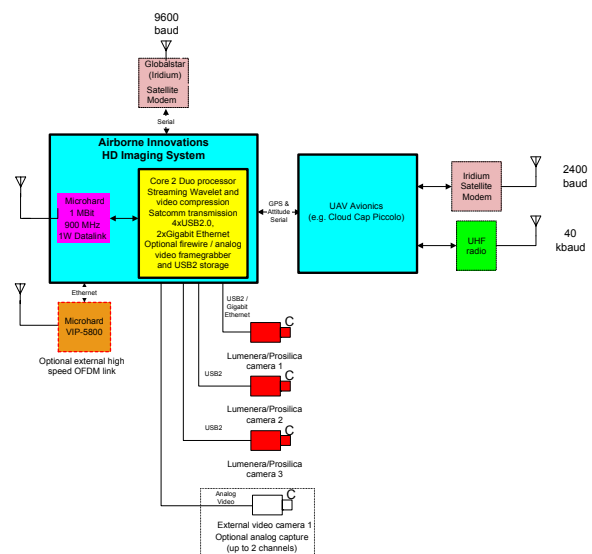
Features:

• **Integrated support for Lumenera family of multi-megapixel cameras (e.g. LW230C and larger format cameras), Prosilica cameras also a strong option**

• **Extremely high computing performance, scalable to available power (also with low power options to tune requirements to your system)**

• **4 USB2.0 interfaces, Gigabit ethernet, optional firewire / analog video capture, 2xRS232/RS422**

• **High compression performance capable of supporting realtime image downlink of very large format images (e.g. 16 megapixel)**

• **Multiple camera support, user customizable camera support**
• **Integrates with Cloud Cap TASE gimbal family**

System block diagram showing some possible configurations

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- •Supports satcomm (Iridium and Globalstar ready) or other transparent serial or ethernet UHF datalinks

- •Optional analog video or firewire interfaces
- •Video output available for video processing, WUXGA and composite/component out
- •Optional encryption (non-export version)

- •Supports a wide variety of off-the-shelf multi-megapixel industrial and consumer-level digital cameras (standard cameras + user configurable)
- •Cloud Cap Piccolo Ready
- •Compression and resolution selectable so the user can trade off quality and transmission time
- •Ready to use camera and compression module, or customizable to a variety of camera and image capture solutions.
- •GPS and aircraft attitude input and remote mapping features
- •Onboard image storage available, USB2.0 storage options available
- •EMI Shielded Carbon Fiber Box
- •Linux OS standard, other x86 OS's possible

Coming features:
- •Streaming variable resolution video
- •Bridge the gap between high resolution fast streaming images and full motion video
- •Best available effective use of video and still imagery modes

Specifications:
Power: 9-36V input, power scalable to requirements, processor configurations available as low as 5W, up to 34W at highest performance (2x2.0 GHz Core 2 Duo)
If internal Microhard 1 megabit link is installed this adds ~12W of power consumption.
Weight: ~545 grams with integrated 1 megabit radio, ~400 grams without radio
Dimensions: 1.93"x4.59"x6.6" (49x117x168mm)

Imaging System Architecture

Airborne Innovations imaging systems typically consist of a processor board, one or more cameras (USB, gigabit ethernet, firewire, or analog), and optionally a UAV avionics such as the Cloud Cap Piccolo and/or camera gimbal.

Images can also be optionally transmitted over a user configurable low bandwidth transparent serial or ethernet link available through the UAV's native or payload systems.

The imaging system performs image compression and runs a datalink protocol for robust image transmission via radio or satcomm. Images and video are transmitted over a high speed datalink, either via best available compression with a 1 megabit Microhard datalink or with an external high performance datalink such as the Microhard VIP-5800 OFDM system.

Image metadata is also transmitted with the imagery if available.

The system combines the best available low bandwidth optimized image compression technology with a robust image transmission protocol capable of transmitting streaming still images over ultra low bandwidth links, and georeferencing and image mosaicing.

Developers can integrate the imaging system with their own datalink and/or camera, or users can drop in a ready to go independent imaging system.

Image Compression

Wavelet image compression technology is used for excellent quality at low bandwidth. Image detail is preserved where it is necessary, and compression ratios of 250:1 and higher produce good quality images (an order of magnitude better than JPEG). The user can trade off quality vs. image transfer times. Reasonable quality 4+ megapixel images can be rapidly transmitted with the 1 megabit link. The system offers the most efficient possible use of bandwidth across a variety of datalinks, from ultra low bandwidth satcomm up to 54+ megabit OFDM links.

Coming features will provide multiple stream video compression capability and close integration between multi-megapixel imagery and video.

Image Transmission

A custom reliable image transmission transmission protocol is used which is optimized for low bandwidth datalinks. This guarantees complete image reception even if the link performance is not 100% reliable, and maximizes the use of bandwidth.

Custom configurations and features and royalty free source code are available.

Open Imaging Platform

The system is also an excellent hardware platform for aerial imaging and image and video processing. Customers can also write their own value added code and use a customized hardware and software platform as required. Development can be self hosted.

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