



NDSF Vehicle Imaging



NDSF Vehicle Imaging – Status Report and Future Plans

Jonathan Howland

- Open items from previous discussion
- Recent experiences with *Jason*
- Plans for imaging on *Alvin* upgrade
- Recent advances/future efforts in NDSF



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Open Items from Previous Discussion

- Hardware, Software Issues for *Jason*
 - Operator control
 - Data formats
 - Documentation



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Recent Experiences with *Jason*

- User comments that pilot camera (mini-Zeus) appears superior to science camera in some circumstances
 - Apparently more light sensitive
 - Greater absolute zoom capability
 - Still images not available from Mini-Zeus
- Plan:
 - To conduct a more quantitative comparison during engineering dive in January
 - Develop and integrate a stills capability for pilot/brow camera, also in January



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Alvin Plans and Progress

- Infrastructure Capabilities
- Camera & Lighting Selection
- In-Hull Operation
- Offload and Distribution



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Design Guidelines

- Flexibility
- Adaptability
- Fault Tolerance

Infrastructure Capabilities

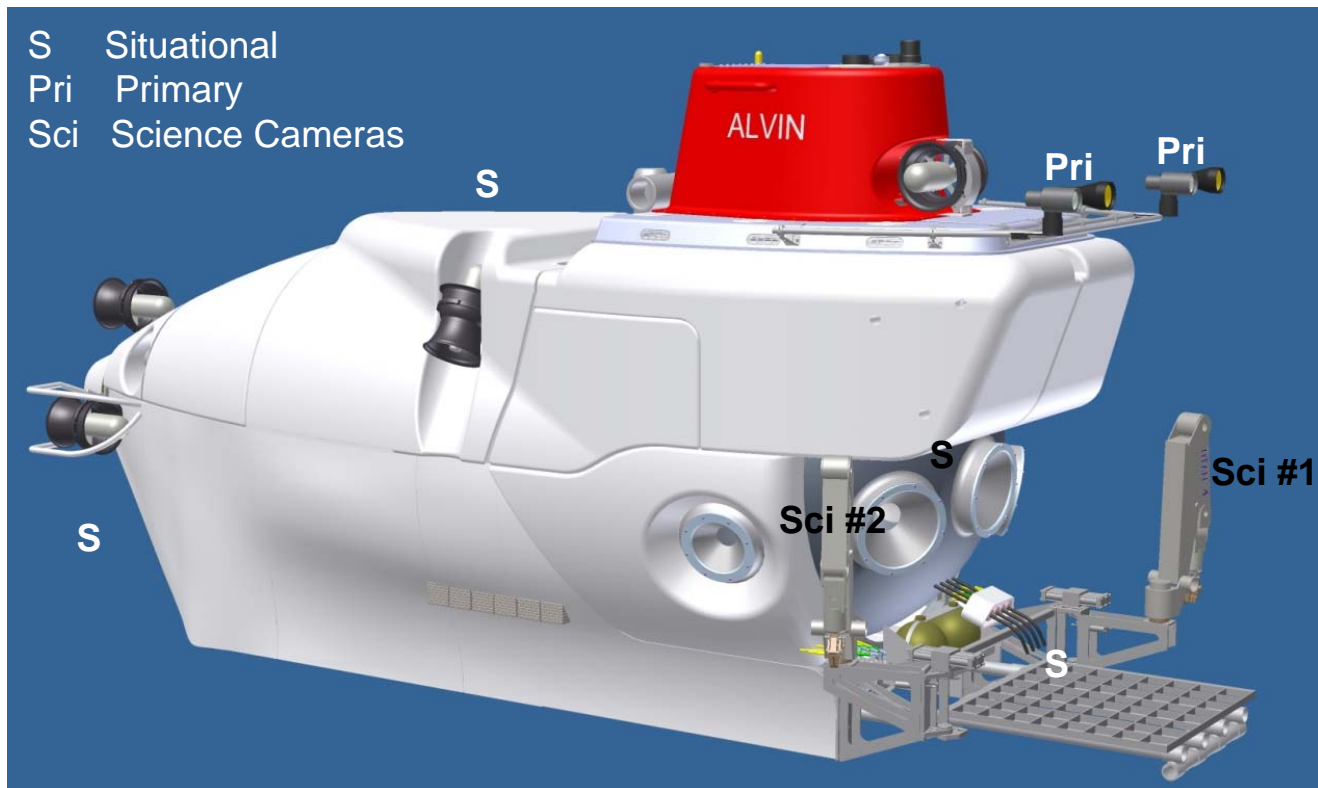
- 6x optical fibers for HD imagers
- 2x4 = 8x standard definition video on mux
- 40x40 internal HD switcher
- Internal sync, time code
- Two external bottles, serial control of cameras



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Camera & Lighting Selection





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Camera Selection

- Science Camera 1
 - Current NDSF HD camera (new dome)
- Science Camera 2
 - COTS HD/Still camera. Choice depends upon resolution of use of glass near hull/viewport
 - 10-12 megapixel imagery
 - Real-time HD
- Primary Cameras
 - COTS HD camera (2): mini-Zeus on P&T
- Situational Cameras
 - COTS HD cameras (2) with internal P&T
 - Suite of existing cameras



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Science Camera 2

- COTS HD/Still camera - choice depends on port material:
 - Glass
 - Sapphire flat port
 - Acrylic
- 10-12 megapixel imagery
- Real-time HD for recording
- Nominally mounted on manipulator
- Investigating several COTS options



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Insite Mini-Zeus (Primary Cameras)



Mounted on P&T on brow
Same camera used on
Jason, Isis, Pisces,
ROPOS, Hayuko

HD-SDI output



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Kongsberg OE14-522 (Situational Cameras)

Mounted low on hull (2x)

HD-SDI output





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Lighting Selection

- 24 DSP&L SeaLite Spheres
- Existing lighting is available and compatible
- Final placement and circuitry configuration is flexible





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In-Hull Display and Recording

- HD-SDI infrastructure
- 40x40 switcher
- HD monitors for pilot and observers
- 2x recorders with visible display
- Video annotation



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2x Atomos Samurai HDD Pro res 422 Standard

ATOMOS SAMURAI
YOUR 10-BIT HD/SD-SDI PRODUCTION WEAPON

Simple-to-use 5.0" Touchscreen
Access all of the Samurai's operations via the fast, responsive touch interface. New features are easy to add with software upgrades. All the main functions are accessed through big, colorful icons. It's so simple, there's no need for complicated menus.

Current Video Input Format And Status
Display information about the current video input.

Input (Color used for recording)
Shows you which variety of Apple ProRes® you are using.

Battery Power Remaining
Shows approximate estimated remaining battery life.

Currently Active Battery - 1 or 2
Shows which battery is currently being used to power the Samurai. You are free to replace the one that isn't being used; the current active battery is illuminated orange.

1080150 ProRes HQ

Rec Play Mon Menu

00:00:00:01

01:46:18

Headphone Line Out Volume
Lets you adjust the volume of the professional quality headphone amplifier.

Audio Input Level Meters
Shows the approximate level of each of the audio inputs.

Recording Time Remaining
Shows the recording time left on the currently inserted recording media. Remaining time is calculated dynamically and is based on the bitrate of the chosen level of Apple ProRes® in use and the size of the HDD or SSD inserted.

Tripod screw-mount points
at the top and bottom of the tough aluminum chassis.

ProRes POST PRODUCTION QUALITY, 10-BIT RECORDING
Samurai takes the uncompressed video output from your camera and, in hardware, encodes it in real-time to visually-lossless Apple ProRes®, recognized across the industry as a class-leading codec for editing and post-production. Record direct from your camera's sensor electronics direct into super-high quality Apple ProRes® for the most streamlined, affordable Final Cut Pro workflow available today.*
*Apple ProRes® also works on the PC platform with RED's latest software.

A PIPELINE TO YOUR TIMELINE
File-based production is all about efficient workflow, and with Samurai, we take the workflow to the camera - not the other way round. The Samurai's tight Apple ProRes® integration means recorded footage is instantly and natively editable in Final Cut Pro. No need to waste time transcoding or converting from other camera formats. And remember - Apple ProRes® is a better editing codec than long-GOP delivery or camera codecs like AVC/HD or similar MPEG filetypes. We use standard computer connections - FireWire® 800 and USB 2 - to give you total flexibility when connecting to your Mac or PC. Simply load your Master Caddy into the Master Caddy Dock provided and you are editing instantly. You can also, of course, transfer the footage to your central SAN or LAN.

INCREDIBLY LOW-COST, HIGH-CAPACITY STORAGE
Flash memory is the best for still photography, but with High-Capacity video, quality is compromised by the extreme compression needed to fit huge quantities of data onto tiny in-camera storage media. Professional storage media like 5x8 and P2 are simply too expensive to "use and forget", which means that you're never free to just work as you want to.

Samurai liberates you from the financial and operational constraints of separate Flash media by allowing you to use cheap, commodity storage available in any computer storage media - yet inexpensive traditional 3.5" Hard Disk Drives (Spinning Disks) for most projects and Flash-based SSDs for rough-and-tumble use.

Playing Flash memory in the form of SSDs is much cheaper than the equivalent memory size on in-camera flash memory cards. Unweighted and sealed storage guarantees performance and reliability. A 750GB SATA3 drive holds up to 16 hours of high-quality Apple ProRes® footage and costs under US\$100.






RECYCLE OLDER CAMERAS!
Samurai records direct from the HD-SDI output from your cameras, so it doesn't care what format your camera is. Whatever it receives through the HD-SDI connect box it will record with out in reception detail on www.atomos.com. So if you've got an older camera with HD-SDI - just plug it in a Samurai and bring it into the world of file-based production. You'll get better quality from your old camera than when it was new!

EVERYTHING YOU NEED
Samurai works right out of the box - you can be using it within minutes! We supply everything (except storage media which is cheaper to source locally) in a tough professional carry-case. The Samurai, two Master Caddies ready to receive your storage media, a USB 2 - 3 - FireWire® 800 docking station, two 3800mAh batteries and a smart battery charger, together with cables for connecting all of this together. There's no need for software drivers and no installation is necessary. NOTE: Ninja kit pictured below.

CONTINUOUS POWER FROM HOT-SWAPPABLE BATTERIES
Powering video devices on location is no longer a worry, because:

We provide two batteries with every Samurai, each capable of a minimum of 3.5 hours, and a combined maximum of up to 16 hours continuous operation when fully charged, depending on codec and screen use. Samurai has two battery compartments but only uses one at a time and switches to the second battery when the first is depleted. Simply swap batteries on the fly without stopping the production!

LATCHING BATTERIES SAFE AND SECURE
Batteries are held in place on the outside of the Samurai. To ensure that they never come loose, we've designed an ingenious latching system that holds batteries in place securely, but releases them instantly if you release the catch.



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Video Offload & Distribution

- HDD hand-carry from sphere
- Ingest into RAID (redundant)
- Original media protected throughout
- Data available to scientists immediately following backup
- Backup to LTO, consistent with previously published plan
 - Archive at WHOI is LTO
- Available on editing workstations throughout voyage
- Distribution via hard drive to Chief Scientist; current estimate is one drive/day



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Future Plans/Programs

Quantitative 3D imaging

- Trialed on recent *Sentry* cruise (Valentine)

Stefan B. Williams, Oscar Pizarro,
Matthew Johnson-Roberson,
Ian Mahon, Michael Jakuba*

*Australian Centre for Field Robotics
University of Sydney*

**Now at WHOI*





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Serpent Stereo System (ACFR) on *Sentry*

