"Now let's add new I/O to that system!"

One unpleasant aspect of a systems integrator's role involves updating a current operational and certified rugged military system when a new I/O requirement arises.

Everything is working well but now the system needs to monitor and respond to a new signal or communicate with a new device, and the specialized, possibly unique, required I/O functionality is not included in the current certified system. The cost of upgrading that system in time, money, testing and re-certification makes changing it prohibitive. Space and power are also very limited on most tactical vehicles, so the potential addition of another large box is a non-starter.

An ideal solution to this dilemma is the addition of a small external, Ethernet-driven, rugged multi-function I/O system with NO required NRE!

North Atlantic Industries' small **Nano Interface Unit** (*NIU1*) easily adds extra sensor data acquisition, distribution and communications interfaces to mission computers without expensive chassis and backplane redesign. This compact subsystem connects to existing platform Ethernet networks enabling the new I/O data to be accessible to any system on that network.

We recently updated the NIU1 to our latest *NIU1A* which adds full computer capability with the addition of fully integrated SoC dual ARM Cortex-A9 processors in the motherboard's Altera Cyclone V FPGA. Now you can place both the I/O and the computer anywhere! The Altera SoC features smaller size, lower power, higher bandwidth, shared memory and lower latency than a typical separate CPU/FPGA configuration. It also offers comprehensive processor SW programming support with the available *Altera SoC Embedded Design Suite.*

The small form factor *NIU1/NIU1A* can be configured with any one of NAI's off-the-shelf, field-proven, military grade multi-function I/O modules. A wide selection of intelligent I/O is available and includes motion simulation, measurement and communications functions such as: A/D, D/A, TTL, RTD, Discrete I/O, Differential Transceiver, Synchro/Resolver, LVDT/RVDT Measurement, Simulation and Excitation, Strain Gage, Dual Channel/Dual Redundant BC/RT/MT MIL-STD-1553, high-speed Sync/Async RS232/422/423/485, ARINC 429/575 and CANBus.

This low cost **SWaP-optimized** multi-function IO/computer system is very small with three mounting options so it can easily fit into very tight space environments with limited power budgets. Total power consumption is minimal (NIU1: 6-10W, NIU1A: 8-12W) depending upon which I/O module is selected.

The *NIU1/1A* design supports all of the I/O functionality without requiring host processor management. It therefore eliminates time and cost-consuming RTOS BSP modification.

No system software or I/O drivers are necessary since all of the I/O functions are built into the *NUI1/1A's* COSA™ (Custom on Standard Architecture™) design. NAI's free *Software Support Kit (SSK)* for each I/O function can be downloaded directly from our website and includes all necessary and fully tested I/O libraries. This complete multi-function I/O/computer subsystem dramatically reduces integration risk and accelerates the customer's time-to-mission.

Both the *NUI1 and NIU1A* are ideal for new, rugged system designs as they allow customization of the payload and can fit almost anywhere near the sensor inputs with their simple Gig-E interface and small size, weight and power requirements!

The small system has proven successful in many military programs," explained Ron Stack, NAI Western Area Sales Manager. *"One key military integrator working with an airborne system needed additional discrete I/O capability— quickly, but had minimal space to do so,"* stated Ron. *"The NIU1 was the perfect solution! The customer was able to download the complimentary* Software Support Kit *(SSK) immediately and get the software application started, and within four weeks had a fully-functional, tested NIU1-K6 unit, complete with additional discrete I/O capability. The NIU1 fully met the new requirements while greatly streamlining the overall engineering efforts for this customer. They also liked the affordable unit cost and elimination of NRE. They are big supporters of the newer NIU1A multi-function IO/computer design and are incorporating these small flexible computer systems with multi-function I/O throughout this and other aircraft."*

NAI's Nano Interface Unit (NIU1)

1.5"H x 1.6"D x 6.5"L @ 16 oz. (454 g.)

The NIU1 can be ordered fully supporting the following multi-function I/O. Note that the NIU1 does not share the same I/O function modules with the latest NIU1A.

Click on links below for detailed I/O function module specifications:

Analog-to-Digital (A/D)	NIU1-C1; C2; C3; C4 (10 channels of selectable Input Scaling)
Digital-to-Analog (D/A)	NIU1-F1;F3;F5:J3;J5;J8 (10-4 channels of selectable output)
Discrete I/O - 16 Channel (K6)	NIU1-K6 or K7 (16 channels of selectable output range)
Digital I/O - TTL/CMOS	NIU1-D7(16 channels of input/output range)
Digital I/O - Differential Transceiver	NUI1-D8 (16 channels of input/output range)
ARINC 429/575	NIU1-A4 (6 channels 100 KHz or 12.5 KHz)
MIL-STD-1553B - Dual Channel/DR	NIU1-N7 (2 channels VC, RT, BM, BM/RT)
CANBus	NIU1-P6 (4 channels RX/TX [32 Kbytes])
RS232 / RS422 / RS485	NIU1-P8 (4 channels RS-232/422/485 Async/Sync)
Synchro / Resolver Simulation	NIU1-6X (3 channels selectable frequency range)
LVDT / RVDT Simulation	NIU1-5X (3 channels selectable frequency range)
LVDT / RVDT Measurement	NIU1-LX (4 channels selectable frequency range)
Synchro / Resolver Measurement	NIU1-SX (4 channels selectable frequency range)
SSI / Encoder / Quadrature Counter	NIU1-E7 (Counter Modes SSI, A-Quad-B/Counter)
Resistance Temperature Detector	NIU1-G4 (6 channels update rate 16.7 Hz/channel)
Strain Gage (G5 Module)	NIU1-G5 (4 channels update rate 4.7 Hz to 4.8 KHz)
AC Reference Supply	NIU1-WX (1 channel up to 6 VA power)

**NIU1 Motherboard
with Digital I/O – TTL/CMOS
Function Module**

Part Number: NIU1-D7

Available multi-function I/O for the NIU1A includes modules below. Note that the NIU1 does not share the same I/O function modules with the latest NIU1A.

Analog-to-Digital	NIU1A AD1-AD6 (12-16 channels; ±1.25 VDC to ±100.0 VDC or 0- 25 mA)
Digital-to-Analog	NIU1A DA1-DA4 (4 - 16 channels; 10 mA to 100 mA output)
Discrete I/O	NAI1A DT1-DT3 (24 programmable I/O channels input or output)
Digital I/O - TTL/CMOS	NIU1A TL1 (24 programmable channels input or output)
Digital I/O - Differential Transceiver	NIU1A DF1 (multi-mode w/16 individual RS422/RS485 channels)
AC Reference Supply	NIU1A AC1-AC3 (1 ch; 2 - 115 VAC; 47 Hz –10KHz)
Strain Gage	NIU1A SG1 (4 channels; ± 0.1% full scale accuracy)
RTD Measurement	NIU1A RT1 (8 channels; 0.05% full scale accuracy)
CANBus	NIU1A CB1-CB2 (8 channels; CAN 2.0 A/B and J1939 protocols)
Ethernet Switch	NIU1A ES1 (12-port Gig-; +5Vdc @ 1200 mA power)
MIL-STD-1553	NIU1A FT1-FT6 (multi-channel; dual redundant; BC, RT, BM; Notice 2 comp)
LVDT / RVDT Simulation	NIU1A DLX (3, 2, 1 channels; 0.5 VA, 1.5VA, 3.0 VA per channel)
RS-232 / 422/ 485 / 423	NIU1A SC1-SC2 (4 channels Async/Sync to 4 Mb/sec)
LVDT / RVDT Measurement	NIU1A LD1-LD5 (4 channels; ± 0.025% full scale accuracy)
Synchro / Resolver Measurement	NIU1A SDX (4 channels; ± 1 arc-minute accuracy)
ARINC 429/575 Communications	NIU1A AR1 (12 programmable RX or TX channels; 100 KHz or 12.5 KHz)
Synchro / Resolver Simulation	NIU1A DSX-DRX (3, 2 or 1 channels; 0.5 VA, 1.5 VA, 3.0 VA per channel)
Thermocouple	NIU1A TC1 (6 channels; J, K, T, E, N, B, R, S types; up to ±0.2°C accuracy)
Relay	NIU1A RY1-RY2 (4 channel: latching/non-latching)

NIU1A with Dual ARM Cortex- A9 Processors

1.5"H x 1.7"D x 6.8"L @ 16 oz. (454 g)