NÅNO[™] 300 – Hardware



NÅNO[™] 300 Flow Computer





NÅNO[™] 300 Flow Computer





NÅNO[™] – Overall Design

- Comprises of Three boards Main, CPU & Analog
- Sequencing of Information very important in the philosophy of our design.
- The design captures the input data and pre-processes it at the Main board. It is then passed to the CPU board for further processing on the NÅNO's Heartbeat
- Outputs are calculated in the CPU board, then passed to the Main board (again on the Heartbeat), processed and then passed to the physical I/O as raw data for output.
- . High Accuracy
- . High Repeatibility



NÅNO[™] – Overall Design

- As an Operating System we decided to use Linux as;
 - Royalty Free
 - We own the source code, therefore;
 - We can modify, if any problems are found.
 - We are not tied with restrictions such as;
 - Expensive maintenance contracts (Linux has a very high user base, giving availability of extensive support)
 - . Being tied to Manufacturers release schedules of Proprietary Firmware.
 - Trying to chase Manufacturers releases to keep the units supportable.



NÅNO[™] – Overall Design

- Although the OS is multi tasking, we have implemented a C∥Cure[™] programming language and environment.
- In the NÅNO itself, it has;
 - a sequential, single threaded task
 - using a Hardware generated Heartbeat with a 'pulse' every 0.5 seconds.
- . We have taken the advantages of C,
- . But then removed some of the disadvantages
 - pointer referencing
 - declared types



NÅNO[™] 300 – Field I/O

- All field I/O including the RS485 port are optically isolated to eliminate crosstalk and aid robustness
- Six high resolution Analog Inputs, two can be used as RTDs
- Four meter Pulse Inputs support Level A, B or E and can be used for period measurement with nanosecond resolution
- Nine Digital Inputs and Eight Digital Outputs, two of the outputs can be used as Pulse Outputs
- Two Analog Outputs
- Alarm "relay" with NO and NC contacts



NÅNO[™] 300

• How Does It All Plug Together??



NÅNO[™] – Overview

. The Nano comprises of 3 Component Parts;

- Main Board (P513)
- . CPU Board (P514)
- Analog Board (P511)





Main Board (P513)

- This uses an NIOS II FPGA (Field-Programmable Gate Array).
- Current builds use an Intel Cyclone 10 device however other manufacturers can be used.
- . Split into 2 areas;
 - Hardware interface
 - Soft Core NIOS 2 CPU running at 75 MHz



Main Board (P513)

- Contains the Power Supply
- . I/O Processor
- Protection Circuitry
- I/O Connection Terminals
- Expansion
 Connector





Field Connectivity – Connectors





Field Connectivity - LEDs





Field Connectivity - LEDs





Main Board (P513) – I/O



- Gives the following I/O Capabilities;
 - 9 x Digital Inputs
 - 8 x Digital Outputs, 2 of which can be allocated as Pulse Outputs
 - 4 Pulse Inputs, can be used as;
 - Pulse Trains A & B Either Single Pulse Trains or a Dual Pulse Train
 - Pulse Trains C & D Both can be either Single Pulse Trains, Period (Density) Inputs or a mixture.
 - . 1 x Raw Pulse Input/Output







- TI Sitara Cortex-A8
- 1GHz AM3352 used
- Working DRAM, 256MBytes DDR3
- NOR Flash, 128MBytes
- Ferroelectric RAM, up to 512KBytes
- Battery Backed SRAM, None \Rightarrow NO BATTERIES!
- Dual, Independent 10/100MHz Ethernet NICs
- Four Serial Ports: 1 x RS232, 1 x RS485, 2 x RS422/485
- . Highly stable master clock source



- Connector to allow an external Metrology switch
- . DIP Switch to secure the application
 - SW1-1 NMI/MET Security Link (to lock out Metrology Level logins)
 - SW1-2 Boot Reserved for future expansion
 - SW1-3 Cold Used to clear down the application and memory in the NÅNO
 - SW1-4 Debug/DBG To be used under factory instruction only



 Protected so Metrology data can not be changed





 Un-Protected, Metrology data can be changed





Analog Board (P511)





Analog Board (P511)

Plugs onto the Expansion Connector and gives the following I/O Capabilities;

- 4 x Dedicated 4-20mA / 1-5V Inputs
- 2 x Selectable 4-20mA / 1-5V / RTD / 4 wire PT100 Input
- 2 x 4-20mA Outputs



Analog Board (P511)





• Now time for Visual C||Cure....



Visual CllCure[®] Demo

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