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Fujitsu development & other options

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Story So Far…

- After numerous problems with the Fujitsu hardware / software combination I have got a basic system running on the demo board. The system consists of a Hardware Access Layer (HAL) and an Application Layer (AL)
- The HAL provides an easy to use interface to the CAN and ADC peripherals on the micro. The HAL is not yet fully debugged.
- The simple AL that runs on the demo board retrieves a CAN ID from the GEOADDR pins on the backplane and reads the ADC. The ADC data is sent over the CAN bus with a CAN ID generated from the GEOADDR information. At present no attempt at calibration of the ADC has been made.

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Story so far (cont)

- I have also been working on porting the NIKF ELMB AL to the Fujitsu micro.
- This AL provides all the high level CANOpen functionality. It communicates with the hardware via the HAL.
- My HAL provides interface to the hardware via the same functions that the ELMB code expects. This keeps the modification of the AL to a minimum.

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Testing so far…

- The Fujitsu has been tested on the TCM. Some simple test code wrote an incrementing count to the CAN port and this was observed on a ‘scope.
- Testing of the ADC on the TCM is hampered by the fact the ADC is not connected.
- All that is really left to test on the TCM is VME access via the dual port RAM.

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Opinion!

Some thoughts on the Fujitsu device:

1) The micro is very poorly supported either via the distributors or via informal help on the newsgroups & web.
2) The micro only has two programmable timers, these have a maximum period of ~1/7 sec. This makes porting the ELMB application layer to the micro difficult.
3) Getting the various peripherals on the micro to function seems to be a case of more luck than judgment. Interrupts seem to be especially hard to get working correctly.

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Alternative Solution

In view of the fact that the micro is difficult to work with it may be worth considering an alternative part. I have been investigating two possible replacements, both of these offer similar features to the Fujitsu but are based on architectures that I am familiar with.

1) The Analog Devices ADC812: an 8 channel 12 bit ADC with 8051 based micro controller core with SPI interface to a stand-alone CAN controller, e.g. Microchip MCP2510
2) The Microchip PIC18Cxx: A PIC architecture core with on chip 8 channel 12bit ADC and full CAN2B interface

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ADC812 8051 based micro

Part #	Status	ADC	DAC	Flash/EE Program Memory	Flash/EE Data Memory	RAM	Package	Special Features
ADuC812	Released!	8-chan 12-bit	Dual 12-bit	8K-byte	640-byte	256-byte	52-pin PQFP	5 µs ADC Conversion
ADuC816	Released!	Dual 16-Bit	Single 12-bit	8K-byte	640-byte	256-byte	52-pin PQFP	Programmable Gain Input
ADuC824	Released!	24-bit + 16-bit	Single 12-bit	8K-byte	640-byte	256-byte	52-pin PQFP	Pin-Compatible Upgrade to ADuC816
ADuC814	Beta*	6-chan 12-bit	Dual 12-bit	8K-byte	640-byte	256-byte	28-pin TSSOP	Small, Low-Cost, Low-Power
ADuC834	Beta*	24-bit + 16-bit	Single 12-bit	62K-byte	4K-byte	+2K - byte	52-pin PQFP	"Big Memory" Upgrade to ADuC824

It is possible that Analog Devices will release a micro in this series with on die CAN in the near future, there has been no further information on this recently though.

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Microchip PIC18Cxxx

	Data RAM	Speed MHZ	I/O Ports	ADC 10-bits	Serial IO
PIC18C242	512	40	23	10	USART, SPI, I²C
PIC18C252	1536	40	23	10	USART, SPI, I²C
PIC18C442	512	40	34	10	USART, SPI, I²C
PIC18C452	1536	40	34	10	USART, SPI, I²C
PIC18C601	1536	25	31	8	USART, MI2C, SPI
PIC18C658	1536	40	52	12	USART, I2C, SPI, CAN2.0B
PIC18C801	1536	25	42	12	USART, MI2C, SPI
PIC18C858	1536	40	68	16	USART, I2C, SPI, CAN2.0B

The PIC18Cxxx is a new range of micro-controllers based on the well know PIC processor core. Two of the micros feature a full spec CAN 2B interface. These micros are now available as samples and should be in full production by year end.

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Interface to ATLAS DCS

At present the proposed interface to the ATLAS DCS is via a dual CAN micro on the TCM. If the Fujitsu is dropped then this would have to change. One possible answer is to provide the TCM with an ELMB (daughter module or 'on board') The monitor micros in the crates can then still form the internal CAN network, and the TCM node can provide the external connectivity.

This has the advantage that the NIKF ELMB software would work almost 'out of the box' – requiring a minimal software effort.

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Disadvantages

- Switching away from the Fujitsu would mean scrapping of all the code that I have written.
- Someone would have to write the new software for the monitor nodes and modify the ELMB software to work with the new nodes.
- Assuming that the TCM is going to be used in its present form in any official tests, then the DCS will be needed?

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