

SA electronics companies profile: C2I2 Systems

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C2I2 Systems (C2I2) was registered in 1990 and the founding and current MD is Richard Young, a highly qualified engineer with a PhD. This company is focused on the development of realtime systems, including data communication. Markets currently addressed are mainly military and include naval, avionics and land applications.

C2I2 (www.cci1.co.za) is growing dynamically and is building on its base of expertise and experience by ensuring that all technical employees are graduate engineers. Together with its capabilities in software engineering and system integration, C2I2 is well placed to provide effective solutions to any organisation's information engineering requirements (this includes commercial industrial companies).

C2I2 was one of two companies competing to supply the combat suite for the new SA Navy corvettes. It also appeared that it was the preferred bidder as *Armcor* itself had provided funding for the development of some of the systems required for this application. In the event the contract was awarded to its competitor, *ADS*, but a lot of political controversy surrounds this decision. What is relevant for this article is that at one stage (2003) the C2I2 solution was referred to as a technology demonstrator and carried too much risk. This is not borne out by the facts presented below as the company is selling some of these products to *Raytheon* in the US. It is my personal opinion that any local company that can sell high-tech products to the great USA, particularly in the defence market, must be operating at the cutting edge of that technology and thus the efforts and technology of C2I2 must be applauded.

The website of C2I2 is very full of data and press releases, but it appears that the US story started about 2001 when the conduction-cooled High-Speed Aerial I/O PMC adaptors from C2I2 were selected for use in the US Army's air defence radar system. More significantly, in the same year the FDDI PCI, PMC and CC PMC Adaptor Boards were selected by *Raytheon* for use in the US and German Navy's Rolling Airframe Missile (RAM) surface to air launch system. The other important event for 2003 was when *Raytheon* selected the

C2I2 FDDI PMC Adaptor Board for application in its Ship Self-Defence System (SSDS) Mk 2 and its upgrades. Note that *Raytheon* unveiled the 150th RAM Guided Missile Launching System in August 2004 (Good business for C2I2!).

During 2003 the US decided that all of the Nimitz-Class aircraft carriers would be equipped with the SSDS system with the in-built USS Ronald Reagan being the test vessel. During 2003 *Raytheon* completed the development and functional qualification testing of the SSDS Mk2 Mod1 for the Ronald Reagan and later that year it was awarded a contract to supply the Navy with five new SSDS systems. Three of these would be land-based for training, one would be used on the Reagan and one would be evaluated for use on the new in-construction amphibious assault vessels.

It should be noted that the SSDS is largely based on COTS (commercial off the shelf) technology and the long term view is that it will be retrofitted to all vessels in the fleet with the exception of the AEGIS-Class ships. The USS George Bush is the next aircraft carrier to be built and will be the most advanced of the class, acting as a bridge between the Nimitz class and the next generation of carriers. The American press is quoted as saying that ship is seen as revolutionary by the US Navy, largely because of the electronic systems sourced from C2I2 and a former Pietermaritzburg man, namely Richard Young.

The new amphibious assault craft (12 in total) were earmarked for the SSDS as long ago as 1995. The San Antonio Class are a major addition to the US fleet and the SSDS was selected because the heart of the ship's defence capability is quick reaction. They are also the first US Naval vessels to be equipped with a fibre optics based Shipboard Wide Area Network (SWAN), and they will also use the RAM missile for which C2I2 is also supplying components as described above. In a report dated 2003 it was noted that the existing amphibious assault vessels (Whidbey Island and Wasp Classes) would also be fitted with the SSDS.

In fact, regarding SWAN, much of the success of C2I2 can be attributed to the early adoption of FDDI (Fibre Distributed Data Interface) technology, which is just now being implemented by the US Navy and hence the sales of the FDDI PMC cards. Although the current ideal networking technology would be Asynchronous Transfer Mode (ATM), this is a long way from maturity. Richard Young strongly believes that FDDI will remain a feature of major ship-borne networks for years to come.

All of this appears to be good business for C2I2. The company was not however

completely excluded from the local arms deal as in 2001 it received a contract for the adaptation of the software for the ISUS 90 Combat Measuring System for the SA Navy's U-209 submarines. Other products developed by C2I2 amongst many others, include a Universal Tracking Platform (UTP), a Helicopter Take off and Landing System (HTLS), a Tracker Radar console (TRC), a Search Radar console (SRC), a Signal Concentrator Unit (ICCU), a Real-Time Weather Watch (RTWW) and a Real Time Surveillance Watch (RTSW).

The UTP provides an integrated solution for monitoring and reporting the geographic position, movement parameters and internal health of a vehicle. The HTLS assists in the take-off; landing and flying of ship-borne helicopters by measuring and displaying weather conditions and the ship's motion data (will *Armcor* buy it for the Lynx helicopters?). The TRC provides a sophisticated, geographically-oriented, human-machine interface for optronics and radar trackers (as used on the corvettes). The SRC is a control and display console for a 3-D Naval Search Radar Tracker incorporating primary search radar, missile control radar and air control functionality.

Moving on to the ICCS, it is a hierarchy of IT elements integrated so as to supply commanders and battle troops with command and control data and information to support joint operations in the 21st Century digital battle space. The RTSW provides realtime surveillance of remote sites on an interactive website. Digital cameras capture high resolution images that are displayed on web pages allowing www clients to view these sites. The RTWW provides realtime weather information from a number of remote sites on an interactive web page. Weather trends are displayed allowing clients to monitor and predict weather patterns. A digital camera captures high-resolution images which are displayed on a web page allowing www clients to view the selected site and weather patterns.

The above is a summary of about a third of the products developed by C2I2 for realtime applications. Many of these developed products would have been appropriate for the corvettes.

In the beginning, with its focus on realtime information (Young's PhD thesis was on realtime mission-critical protocols) C2I2 started out to develop a series of board level products, including PMC Adaptors, PCI Adaptors, PC 104 Plus Adaptors and Converters. One of these products was the much-mentioned FDDI PCI Adaptors, the company being at the forefront worldwide in the adoption of FDDI technology.

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Semiconductors in military and aerospace electronics

In terms of the military and aerospace market, electronics is one of the few segments that has not yet reached a mature stage, which indicates a favourable outlook for semiconductor suppliers. There is expected to be a higher growth year for this market this year, with revenue likely to reach \$2,46 bn – a 5% increase over last year, according to a *Databeans* forecast for military and aerospace semiconductors.

The Americas region is the leading producer of military and aerospace semiconductors by far, producing 53% of the industry revenue share. This is expected as global defence spending is dominated by the Americas with a 45% share, followed by Europe with 15%, Russia with 7%, China with 6%, and Japan with 5%, and 22% for the rest of the world, says the analyst firm.

Significantly, global spending on military and aerospace will exceed \$1 trillion again in 2006, with the US alone contributing about a 44% share.

www.databeans.net

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The FDDI (Fibre Distributed Data Base) PCI adaptor provides dual-redundant 100 Mbps communications links signalling over multimode fibre and is ideally suited to realtime data communication applications. The adaptor is available in air-cooled versions in either commercial or ruggedised (-40 to 85°C) packaging. Whereas the FDDI PCI features VxWorks software drivers, the newer FDDI PC104 Plus adaptor features additional software drivers, including Linux, Solaris, Windows 2000, Windows XP and Windows 2003 as standard, as well as a wide range of compatible and qualified third party software drivers. Both adaptors use the AMD Supernet 3 chipset which offers advanced features such as Synchronous Bandwidth Allocation (SBA) and End Station Support (ESS).

Having studied the capabilities of C212, there is no doubt in my mind that it could, together with its partner companies, have developed a truly state-of-the-art combat suite for the local corvettes. Not knowing what C212 actually offered, but if it was an FDDI solution then the combat suite would have been on par with what the US Navy is just introducing.

Rugged 400 MHz PowerPC based SBC designed especially for harsh environments

Further developing on its MIP405 single-board computer, with its new MIP405T SBC, *MPL* has put strong focus on special requirements like small size, wide temperature range and ruggedness.

Based around the highly-integrated embedded PowerPC processor (PPC405GPr) with a CPU clock of up to 400 MHz (608 DMIPS@400 MHz) the MIP405T offers 10/100 Mbit Ethernet, one 44-pin E-IDE port, two serial ports and a real time clock.

Additionally, the 16-bit PC/104 (ISA) and the PC/104-Plus (PCI) interface offers easy and flexible expansion capabilities. The SBC can be equipped with up to 128 MB SDRAM and up to 8 MB Flash all on-board soldered. Additional Flash (up to 1 GB) can be plugged in.

The MIP405T is supplied with the Open Source 'U-Boot' bootloader, providing various boot sources like Ethernet, IDE, FLASH. Also, a MPL Embedded Linux distribution and development chain is ready. Real-time OS BSP for VxWorks and QNX can be delivered with the product.

The MIP405T can be expanded with any PC/104 & PC104-Plus Board, and development systems are available.

The MIP405T is intended and designed



for use in harsh environments with operating temperature ranging from -40 to +85°C without the need of a heatsink or a fan. Special efforts have been taken on the quality of the components and their long term availability, as well as on the low power consumption of the system (less than 3 W at 400 MHz).

All these features and specialties make the MIP405T ideal for any embedded control application requiring small size, high computing performance and low power consumption. With these properties the MIP405T is being used in airborne and transportation systems, military, industrial or just any raw/secure application.

For more information contact Electronic Products Design, 012 665 9700.

Million-gate FPGA touts leading performance and highest security

Actel is now shipping its one million system-gate ProASIC3 device, which it says fulfils the industry's demand for cost-effective, full-featured field programmable gate arrays (FPGAs). The A3P1000 offers total system cost, performance, power and security advantages over comparable SRAM-based products, it states.

Exploiting the benefits of the company's flash-based architecture, the ProASIC3 device also supports implementation of a soft ARM7 processor core and is an optimal solution for power-, cost- and size-conscious designs.

The ProASIC3 family lowers overall system costs by eliminating the need for various components on the system board. The single-chip device requires no external boot PROM or microcontroller to support

device programming, and the Level-0 live at power-up feature of the ProASIC3 device eliminates the need for an external CPLD. Using fewer components reduces board space, which increases reliability, simplifies inventory management and lowers total system costs by as much as 70% compared to similar SRAM-based FPGA solutions, claims the company.

The ProASIC3 A3P1000 has a stand-by current consumption of only 8 mA under typical conditions – nearly an order of magnitude lower than industry standard. In addition, it contains 1024 bits (128 bits x 8 pages) of on-chip user nonvolatile flash memory and an on-board phase-locked loop (PLL). The device also provides secure in-system programming capability through on-chip 128-bit AES decryption and built-in flash key storage technology.

For more information contact ASIC Design Services, 011 315 8316.