

Andes e-Report

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Andes Technology Corporation president Frankwell Lin's presentation on Linley Processor Conference
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New IP Solutions for IoT Designs

There exists a massive new opportunity in the Internet of Things (IoT) applications. These include autonomous cars and

drones where computer vision becomes very important. In addition, artificial intelligence and deep learning is showing increased growth and acceptance. Beyond these virtual and augmented reality are becoming lifestyle applications. All of these applications are looking to incorporate increased security as hacking continues to increase. Consider some of the successful IoT products that are already shipping in the market. These include smart doorbells, smart sensors, Bluetooth speakers, motor controllers, health care measurements, and even toys—they connect to each other through the Internet.

Over the last several years devices built by customers of Andes Technology Corporation serve in IoT applications. These include chips in electronic shelf labels,

sensor hubs, IoT MCU, Bluetooth related applications, and WiFi for drone applications. Through these design wins, Andes analyzed the characteristics of IoT projects and found that are highly fragmented and involve a multi-design effort. In addition, these projects produce chips that are manufactured in low to medium volumes initially. Furthermore, the design effort involved a diversity of know-how, including skills in processors, sensors, connectivity, security, the cloud and Big Data. Nevertheless, the barriers to entry to create an IoT device is relatively low.

Andes analysis determined that to build an IoT edge device requires a customizable CPU core with better performance along with power efficiency over the existing solutions on the market. In addition, the analysis also showed a requirement for integrated platform IP—the IP that's required in any design, but does not add value to the final design. Finally, the analysis showed that designers building IoT edge devices needed a simplified access to third party IP, one that did not require a high upfront design fee and a complicated licensing process.

Andes has developed new CPU cores that address these design requirements: the new E8 and N6 series CPUs. The first in the N6 series is the N650 which comes with a 3-stage pipeline, 16 general purpose registers, a fast or small multiplier, a 12- to 37 cycle divider, nested interrupts with four priority levels, power management instructions. To facilitate software application development, the N650 affords all-C-embedded programming. The N650 also allows easy arrangement of preemptive interrupts, along with an extensively clock-gated pipeline.

In a comparison with its leading competitive 3-stage pipeline CPU alternative, the N650 is 25 percent better in the Dhrystone/MHz benchmark (1.27 versus 1.02) and over 20 percent better in the CoreMark/MHz benchmark (2.8 versus 2.33). The N650 over double the number of instructions (157 versus 58) to provide richer programmers richer semantics. In a 90LP process, the N650 provided 40 percent better performance efficiency in terms of DMIPS/mW (115 versus 82).

In addition to the N650, Andes has introduced the E830 along with a new version of the AndeStar V3m instruction set, the V3m+, which delivers 10 percent smaller code size while boosting performance 15 percent over the V3m. The new E830 available in the fourth quarter this year will be the first core to utilize the V3m+ ISA. The E830 provides the extensibility that IoT applications demand through the Andes Custom Extension™ (ACE) framework. With the easy-to-use ACE language,

customers can create instructions specific to their applications and optimize the performance and power consumption in a much shorter timeframe. Using ACE, C, and Concise Verilog special instructions can be automatically generated along with the housekeeping codes, thus allowing the designer to focus on his/her instruction design. Using Verilog also allows designers to keep their familiar CAD tools for simulation, waveform viewing, code coverage, etc.

To further facilitate the design of new IoT solutions, Andes is offering new interconnect and platform IP as part of its AndeShape offering, the AE100 AHB platform IP and AE300 platform IP with AXI Fabric and AHB/APB bridges. Available now the AE100 has basic a AHB bus plus bridges to APB. It is a configurable fabric with 25-bit address width and 32-bit data width. To eliminate the time-consuming task of integrating components required by the CPU, it includes commonly required peripherals: AHB-Lite Master Multiplexer, AHB-Lite Decoder, AHB-to-APB Bridge, Low-latency RAM Bridge, GPIO, Watchdog Timer, Programmable Interval Timer, and UART.

To address the final requirement of simplified access to third party IP, Andes is launching its Quick-Start Design Package. The package includes the N650 core IP, the AndeShape SoC Start Kit, AE100 Peripherals IP Platform, and AndeSight IDE Software Development Tools. To further help the IoT design effort, Andes is providing optional development boards and service and support.

For the configurable E830, Andes is offering the new AE300 AXI Fabric and AHB/APB bridges available the fourth quarter of this year. The fabric includes AXI Bus Matrix with up to 16 masters and 31 slaves, an address bus width of 24 to 64 bits and a data bus with 32/64/128-bit width options. It also comes with AXI Up-sizer and Down-sizer. Also available the fourth quarter this year, the AE300 platform IP comes with additional bridges and APB bus to allow connection to AXI masters, the Andes core, and slaves.

Recognizing the need for IoT designers to build not only a semiconductor device, but also a larger ecosystem for the chip, Andes has created its Knect.me community of partners to provide the all the other elements and IoT design requires. Andes contribution to the community is its Andes-Embedded IoT Software Stack. It provides the ecosystem part of the software that supports IoT applications. For example, Andes provides some of these components: AndesZ

(ZigBee), uIP (IPv6/ 6LoWPAN), lwIP, AndesWRT, Embedded SSL, Contiki, and eCos. Other elements of the software stack, such as Bluetooth Low Energy, IPv4/v6, WiFi, and others are provided by Andes partners.

In addition, Andes software stack supports the popular frameworks needed for IoT implementation: OpenThread, Microsoft Azure, Acer BYOC, Orbweb GoToMyThings, and TUTK Kalay. Andes has ported to Microsoft Azure and Acer BYOC and are developing OpenThread.

Thus, Andes recognizes the requirements of designers building IoT applications that go well beyond a single CPU core. To respond to that need, Andes is providing the peripherals and bus fabric to surround the core. It has developed the software tools to create the applications that will run on the core. And it continues to develop the software stack and connection to the popular frameworks needed to implement a successful IoT solution. Working with partners in the Knect.me community, IoT designers can find a complete solution for developing a successful IoT product.

Weltrend Adopts AndesCore™ in WT8893 Around View Monitor Video Processor Shipping in a Major Sports Utility Vehicle

*Andes Solution Enables Weltrend WT8893 a More Cost Effective,
Lower Power Alternative to DSP-Based Around View Monitor Designs*

【Hsinchu, Taiwan】 Andes Technology Corporation, the leading Asia-based suppliers of small, low-power, high performance 32-bit embedded CPU cores, announced Weltrend Semiconductor, Inc. a leading fabless semiconductor company based in Hsinchu, Taiwan adopted AndesCore for their WT8893 Around-View Monitor (AVM) chip. The Andes 32-bit CPU core enables the Weltrend WT8893 AVM chip a more cost-effective, lower power alternative to the DSP core typically found in other AVM chip designs—a competitive advantage in a fast growing AVM processor market.

"The competition to win designs in advanced driver assistance system (ADAS) with major automotive electronics system supplier is intense and requires a technical edge," said Chao-Chee Ku, Ph.D., Senior Director of Product Marketing of Weltrend Semiconductor. "Our WT8893, for example, includes CVBS (color, video, blanking and sync) input from four channel video decoders, four individual contrast/brightness adjustment function, input image position adjustment function to correct the camera assembling error, video image processing, fisheye correction, perspective adjustment, capability to combine front/rear/left/right four images to top view with adjustable image size and boundary fusion processing, as well as other functions. Andes exceeded our expectation in product and service. The core provides savings on area, power and better performance compared to the competitive offerings based on a digital signal processor to perform the same operations. We achieved a technical advantage with Andes' 32-bit RISC CPU core."

"From our founding, Andes Technology has architected its AndesCore processors based on input from customers, including Weltrend Semiconductor, a customer since 2009," said Frankwell Lin, President of Andes. "Our synthesizable general purpose 32-bit embedded processor core N1337 used in WT8893 reflects this response to customer requirements. It comes with a coprocessor interface for FPU unit and software management multi-core instructions and with variety of configuration options including MMU, cache and local memory. It can be configured for performance sensitive applications running embedded Linux or other advanced operating systems. It can also be configured with a memory protection unit (MPU) for real-time operating system (RTOS) applications."

Growing Market for ADAS

In an article from Electronics360, "Outsiders' Make Inroads in ADAS Market," Akhilesh Kona, analyst for automotive semiconductors at Englewood, Colo. market research firm IHS, Inc. stated. "Chipmakers are developing solutions that will cut down the costs of semiconductor components for mass market volume." As a result, the article noted that ADAS features such as around-view cameras for self-parking, once offered as a luxury vehicle option, are rapidly becoming standard in most cars across the globe. With this widespread adoption, IHS forecasts ADAS revenue from semiconductors and sensors will reach \$4.0 billion by 2020. ADAS chip and sensor revenue was forecasted to grow to \$1.9 billion in 2015, up from \$1.6 billion in 2014.

About Weltrend Semiconductor

Founded in 1989 in the "Silicon Valley of Taiwan", the Science-Based Industrial Park (SBIP) in Hsinchu, Weltrend (TAIEX: 2436) is a leading fabless semiconductor company, also known as IC design house, specializing in the planning, design, testing, application development and distribution of mixed-signal/digital IC products across multiple applications.

For more information about Weltrend Semiconductor, please visit

<http://www.weltrend.com>

Cyberon and Andes Collaborate on Voice Interface Solutions for IoT Devices

【Hsinchu, Taiwan】 Conversational assistant or chatbot, an emerging application of Internet-of-Things, comprises microphones, SoCs for processing, connectivity, and the most important part – its cloud counterpart to serve as a big database and machine learning engine for its intelligent capability. This indicates a new way of interaction between machines and human beings and makes us excited about envisioning future applications. Its fundamental technology, voice recognition, benefits from the rise of computing power and technology developments, and is capable to run on a 32-bit MCU with kilobytes of memory footprint.

A technology partner of Andes Technology, Cyberon Corporation, develops CSpotter which is specifically designed for a new generation of always-on mobile and IoT devices, listening to ambient speech to detect and respond to a set of predefined words and/or trigger commands. CSpotter supports 34 languages, based on phoneme acoustic models. Developers can quickly create customized voice commands simply with text input, without requiring cumbersome voice data collection process.

"We aim to help developers quickly and easily add voice commands to a wide range of applications from smartphones, smart toys, wearables, automotive to IoT," said Tai-Hsuan Ho, founder and CEO of Cyberon. "Over the past few years, Cyberon's voice solutions have been shipped with embedded devices for more than 150 million units. One of the key factors to our success is that we are running on the most powerful yet cost-effective platforms, which is why we picked those powered by Andes cores. Secondly, CSpotter is one of the most accurate, noise-robust, and small footprint voice recognition engines, especially suitable for IoT and mobile devices of voice-activation capability. Finally, we offer multi-language flexibility which support 34 commonly used languages, enabling developers to create voice-enabled products that can be shipped around the world."

"Many of our fabless customers have mass produced AndesCore-embedded solutions for touch panel controllers, gesture recognition, and sensor fusion applications," said Charlie Hong-Men Su, Ph.D., Andes Technology CTO and Senior Vice President of R&D. "Our synthesizable 32-bit embedded processor cores and compiler technology address a wide range of requirements of minimum power consumption and memory usages, providing good power-performance-area tradeoff for a variety of IoT applications. For applications requiring voice interfaces, we provide solutions ranging from compact processors (such as AndesCore N705) for voice command processing to advanced processors with DSP/SIMD capabilities (such as AndesCore D1088) for noise reduction and echo cancellation. By joining forces with Cyberon on natural language interfaces, we are enabling user convenience with our technologies and hoping to boost the market penetration of intelligent electronics."

About Cyberon Corporation

Cyberon Corporation, with its headquarter in Taipei, Taiwan, is a leading embedded speech solution provider and supported by experts experienced in Speech Recognition and Text-to-Speech technologies for tens of years. Cyberon's speech solution is developed specifically for mobile devices, MCU, and DSP to provide users a convenient, natural and reliable user experience. For more information about Cyberon and CSpotter, please see: <http://www.cyberon.com.tw>.

ASolid Adopts AndesCore™ N9 for its AS2726 eMMC Controller to Deliver Competitive Market Advantage

【Hsinchu, Taiwan】 Andes Technology Corporation, the leading Asia-based supplier of small gate count, low-power and high performance 32-bit embedded CPU cores, announced that ASolid Technology Co., Ltd., the leading NAND flash controller provider based in Hsinchu, Taiwan, has adopted the AndesCore™ N9 for its AS2726 eMMC chip. The Andes 32-bit CPU core enables the ASolid AS2726 eMMC chip to achieve a cost-effective and low power consumption flash controller solution, which allows ASolid a significant competitive advantage in the fast growing eMMC market.

“Our comprehensive solutions have enabled customers to realize enriched and stable performance enhancement in their products.” said Andy Yen, Senior Vice President of ASolid Technology. “For example, our AS2726 controller supports eMMC4.5, eMMC5.01 and eMMC5.1. Its high-performance asynchronous mode operation can reach up to 50MB/s and an even faster synchronous mode operation of 400MB/s. With its small footprint and low-power competitive advantage, the AS2726 provides an excellent product with high cost-performance value. During our engagement, Andes exceeded our expectation in product and service. The core provides savings on area, power and better performance compared to competitive CPU offerings performing the same operations. We achieved a technical advantage with Andes' 32-bit RISC CPU core.”

“Andes is honored to provide our N9 CPU core to ASolid and to be their partner,” said Frankwell Lin, President of Andes Technology Corporation. “The N9 delivers high performance in a small gate count and on a low power budget. Andes will constantly provide high-quality customer service and precise technical support to maximize benefits for our customers.”

About the eMMC Market

The eMMC is an ideal flash storage solution for today's mobile devices such as smart phones, digital cameras, multi-media, wearable devices, and tablets. According to the Global Industry Analysts, "The global market for eMMC is expected to reach 2.1 billion units by 2020, driven by the rapid growth in mobile device sales and robust increase in data consumption on mobile devices."

About the N9

The AndesCore N9 Family of CPU cores implement v3, the AndeStar™ patented 32-bit RISC-style CPU architecture. The designer can configure certain parameters to adjust the CPU's size, power, and performance. For example, the N9 core can be configured with 16 or 32 general registers, two or three read ports on the register file, one or two write ports, a fast or a small multiplier, a 24-bit or 32-bit address space, and different bus (APB, AHB, AHB-Lite, AXI) interfaces to connect to the rest of the system.

About ASolid Technology Co., Ltd.

ASolid Technology Co., Ltd. is a NAND flash controller provider and the top leaders in the flash controller market. ASolid's product lines cover a wide range of SD/microSD controller and USB flash drive controller solutions, combined with the latest Wear-Leveling Algorithm, ECC and Bad Block Management technologies.

For more information about ASolid Technology, please visit <http://www.asolid-tek.com/>

About Andes Technology Corporation

Andes Technology Corporation was founded in Hsinchu Science Park, Taiwan in 2005 to develop innovative high-performance/low-power 32-bit processor cores and associated development environment to serve worldwide rapidly growing embedded system applications. The company delivers the best super low power CPU cores with integrated development environment and associated software and hardware solutions for efficient SoC design.

Andes Technology Corporation Attends IPro Group Technology Day in Israel

Andes and NetSpeed held a joint Technology Day in Israel. Representatives of more than 20 different companies in Israel came to hear presentations from us, and reported a high level of satisfaction regarding the information presented and the networking opportunity at the event. Lots of valuable information has been exchanged between Andes and the participants during the breaks and lunch time.

Andes presented its vision of IoT and how Andes is best suited to secure a complete silicon-to-cloud IoT solution to its customers. Presenters were KY Hsieh from Andes Sales and distinguish speaker from Architecture R&D Division of Andes.

Following the event, KY and team visited several companies in Israel that were interested to hear more about Andes and its products.

