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Enabling Designers to Become a Part of Tomorrow’s Connected World

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COVER STORY
Atmel Invests in IoT: Enabling Designers to Become a Part of Tomorrow’s Connected World
Designing Battery-backed MEMORY Using High-speed SRAM

By Vinay Manikkoth and Nilesh Badodekar
Cypress Semiconductor

Performance of an embedded system is determined by both its hardware and the software capability. A well-written piece of software can extract the maximum performance out of the hardware by utilizing all its capabilities. Similarly, inefficient hardware can hinder the performance of a system irrespective of how well the software is designed.
The structure of a conventional embedded system has not changed for many decades. Figure 1 shows the block level diagram of a typical embedded system. A microcontroller or microprocessor is at the heart of the system. Depending upon the application, system designers add or remove interfaces and peripherals as needed. If the internal memory of the controller is not sufficient, external memories like Flash, SRAM and DRAMs are used. Typically, Flash holds the code that is executed by the controller while SRAMs are used to store run-time temporary variables and retain critical blocks of application data.

Power budget and performance have always been two of the defining criteria for selection of system components, be it the controller or any peripherals. If performance is critical, designers tend to select the fastest components, trading off for a higher power budget. Similarly, if power is the most important criteria—like in a battery-backed system—then designers tend to select components with the least power consumption. As a result, embedded systems are generally classified into three categories:

1. Always "ON" Systems: These systems guarantee that they will always be powered from an uninterrupted power source. These are high performance systems designed to operate at the highest frequency of operation.

2. Battery-powered Systems: an on-board battery is the only source of power for these systems (i.e. a mobile phone). While performance is an important criteria for such systems, having longer battery life tops the priority list. Hence these systems are designed with components that consume the lowest power.

3. Battery-backed Systems: These systems must be able to operate reliably even if they lose their on-board power supply. To avoid the loss of critical data during these power failures, system designers provide a small battery (typically a 240mAh coin battery) to provide back up for critical functions like SRAM retention and maintaining the real-time clock (RTC). A battery-backed system operates on the available power supply during normal operating conditions. Depending on the memory mapping, it can execute code from Flash and then store results in SRAM. It becomes critical to store this data even during power failures.

To address this issue, the SRAM is connected to an alternate onboard battery. During normal operation, the on-board supply powers the system, and during power failure, a supervisor chip will switch the SRAM supply to the onboard battery and place the SRAM in its standby mode of operation. Refer to “Design Recommendation for Battery-Backed SRAMs” for more details on specific battery-backed system implementation techniques.

Figure 2 shows the typical power usage of SRAM in a battery-backed system. The supervisor routes the board power supply during normal modes of operation. On power failure, the SRAM is switched to the on-board battery and is disabled by the supervisor chip. The system can remain in this mode for as long as the battery lasts. Once board power supply resumes, the supervisor chip will gradually resume powering the SRAM.

Figure 1. Block diagram of a typical embedded system

Figure 2. Power consumption pattern of a battery-backed system
A low power SRAM, on the other hand, will offer a battery life of only 12 hours. To understand the effect of this choice on performance, consider a system that executes a piece of code in a 1ms loop with the microcontroller executing code 70% of the time and storing the result (critical variables) in SRAM for the remaining 30% of time. Use of a faster controller should ensure that this execution time is reduced dramatically.

The performance of any system is governed by Amdahl’s law. In simple words, Amdahl’s law states that a system can be as fast as the slowest component in the system. Over the past couple of decades, microcontroller manufacturers have come up with controllers that are capable of running at speeds greater than 150MHz. Many of these controllers have built-in low power and/or deep sleep modes that allow faster operation and lower power consumption when the system needs to be backed up by battery.

A faster controller on its own, however, cannot improve performance if the peripheral components cannot match it in speed. The external memory interface is one of the key high-speed links and a low performing Flash or SRAM can become a bottleneck. Flash memories have an initial access time of around 60 to 80ns. But with the introduction of various modes like Page, Burst, eXecute In Place (XIP), Flash chips have improved their read access time by a factor of three. This allows controllers to read from Flash in 20-30ns (i.e., 2 to 3 clock cycles of a 150MHz controller). But the choice of low power SRAM means the controller still has to access the SRAM with speeds of 45 to 70ns (4 to 10 clock cycles).

The faster you drive a car, the worse the gas mileage you get. Simple principle applies to embedded systems as well, with the SRAM being the car and battery life being the mileage. In the scenario described above, a system designer can either choose a Fast SRAM (with access time of 10ns) to improve system performance, but sacrifice battery life, or they can select a low-power SRAM and sacrifice system performance.

Memory manufacturers have identified the need for SRAM memories that provide faster power combined with lower power. In addition to their regular modes of operations—active and standby—these SRAMs have an additional low-power operating mode called ‘deep-sleep.’ Deep-sleep is controlled by an additional input signal that, when asserted, transitions the device into deep-sleep mode. Cypress’s PowerSnooze SRAM, for example, provides an access speed of 10ns, compared to 45 to 55ns for a low power SRAM. In terms power, its deep sleep current is on the order of 10 to 20μA, compared to the substantially higher 30 to 40mA standby current of a 16M fast SRAM. Table 2 shows a comparison of key parameters like speed and current consumption between the three types of SRAM.

System designers can control the deep-sleep mode entry through a GPIO or control the switching automatically using supervisor chip. In the case of GPIO control, the software can exploit the deep-sleep mode of SRAM by analyzing SRAM accesses. For more details on interfacing requirements, see “Power Saving with Asynchronous SRAM.”

Flash can match up to the speed due to its improved modes of operations and reduce the code execution time by a third (from 700 to 230μs). However, the choice of a low-power SRAM means no improvement in SRAM access time. Ideally, this system should have seen a 300% improvement in execution time (from 1ms to 330μs) but instead, due to the low power SRAM, it achieves only a 200% improvement in execution time (1ms to 550μs).

The need for longer battery life makes selection of a Fast SRAM almost impossible. With an on-board 240mAH coin battery, a 16Mb Fast SRAM becomes a bottleneck. Flash memories have an initial access time of around 60 to 80ns. But with the introduction of various modes like Page, Burst, eXecute In Place (XIP), Flash chips have improved their read access time by a factor of three. This allows controllers to read from Flash in 20-30ns (i.e., 2 to 3 clock cycles of a 150MHz controller). But the choice of low power SRAM means the controller still has to access the SRAM with speeds of 45 to 70ns (4 to 10 clock cycles).

There is a trade-off regarding power consumption of a low-power SRAM. In terms power, its deep sleep current is on the order of 10 to 20μA, compared to the substantially higher 30 to 40mA standby current of a 16M fast SRAM. Table 2 shows a comparison of key parameters like speed and current consumption between the three types of SRAM.

Table 1. SRAM portfolio for 16Mb SRAM

<table>
<thead>
<tr>
<th>SRAM Type</th>
<th>Access Speed</th>
<th>Active Current (ICc max)</th>
<th>Standby Current (ISB2) (typical)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast SRAM</td>
<td>10 ns - 15ns</td>
<td>110 mA</td>
<td>20 mA</td>
</tr>
<tr>
<td>Low-power SRAM</td>
<td>45 ns - 70ns</td>
<td>36 mA</td>
<td>5.5 µA</td>
</tr>
</tbody>
</table>

Table 2. Comparison of the three types of SRAMs

<table>
<thead>
<tr>
<th>SRAM Type</th>
<th>Access Speed</th>
<th>Active Current (maximum)</th>
<th>Standby Current (ISB2) (typical)</th>
<th>Deep-Sleep Current (ISB2) (typical)</th>
<th>Battery life++</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast SRAM</td>
<td>10 ns</td>
<td>110 mA</td>
<td>20 mA</td>
<td>-</td>
<td>24 hours</td>
</tr>
<tr>
<td>Low-power SRAM</td>
<td>45 ns</td>
<td>36 mA</td>
<td>5.5 µA</td>
<td>8 µA</td>
<td>&gt;3 years</td>
</tr>
<tr>
<td>PowerSnooze SRAM</td>
<td>10 ns</td>
<td>110 mA</td>
<td>20 mA</td>
<td>8 µA</td>
<td>&gt;3 years**</td>
</tr>
</tbody>
</table>

++ Battery life is calculated considering a 240 mAH coin battery and typical standby current consumption
** Battery life for PowerSnooze SRAM is calculated by considering typical Deep-sleep current consumption.
Battery-backed Low-power SRAMs

The need for additional circuitry to battery-backed memory stems from the fact that during power failures, controllers lose the drive on their I/Os. This results in intermediate logic levels on the signal lines that gradually get discharged to LOW voltage through board capacitance and leakages. This loss of control means that even if the SRAM is alternately powered by a battery, the chip enable signal (CE) will go to logic low, thereby enabling the SRAM. To avoid this, system designers use a supervisory chip to monitor the board power supply and control the SRAM chip enable signal.

Figure 3 takes a closer look at the SRAM, processor interface, and the supervisory chip. All address, data lines, and control signals are driven by the processor. The active LOW chip enable of the SRAM is driven by the supervisor chip that, in turn, is driven by the chip enable signal from the controller. During normal operations (i.e., when the board power supply is available), the supervisory chip is completely transparent to the controller and SRAM. However, during a power failure, the supervisor chip takes over the control of the chip enable signal to the SRAM by driving it logic high and ignoring the controller chip enable signal. This supervisor chip seamlessly switches from the board power supply to the battery supply and disables the SRAM, thereby preventing data loss. The second chip enable signal being an active high signal is driven directly by controller with a weak pull-down. This weak pull-down makes sure that during power failure, the second chip enable signal is pulled down to logic low and disables the SRAM.

Battery Back-up with Fast, Low-power SRAMs

The low deep sleep current of fast, low-power SRAMs makes them a good candidate for use in applications using battery back-up during a power failure. During normal operation, the SRAM can be operated at fast speeds, while during a power failure the SRAM can be automatically switched to deep-sleep mode by asserting the deep-sleep signal to logic low. Figure 4 illustrates the usage of an SRAM with deep sleep without altering the existing design of a low-power SRAM.

When a power failure happens, the supervisor chip disables the SRAM whereas the pull-down on the deep-sleep pin will automatically pull-down the signal to logic low, allowing the part to enter into deep-sleep mode. The supervisor chip makes sure that the SRAM is disabled throughout the period with no board power. On power resumption, the supervisor will continue to keep the SRAM disabled until the power-on-reset timeout period of the supervisor. This timeout period can vary from 1 to 100ms, depending on the choice of supervisor chip. The timeout period allows the controller to boot successfully after which it can start controlling the deep-sleep signal and drive it to logic high. This takes care of the deep-sleep exit timing sequence of the fast, low power SRAM and allows it to be ready for access by the controller.

Fast, low-power SRAMs provide battery-back times equivalent to conventional low-power SRAMs while meeting the performance improvements of system designers by speeding up SRAM accesses.

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It's the virtual reality headset that is making waves in the industry. The immense hype for the Oculus Rift began when a prototype of the headset debuted on Kickstarter back in 2012 in development kit form. In 2014, the company released the updated DK2 platform for users to start developing virtual reality games and apps before the headset became available for commercial release. The Oculus Rift boasts unprecedented low-latency visuals and stereoscopic 3D screens that offer the most immersive virtual reality experience to date. So what's behind the success of the Rift? In today's TechXposed Teardown, we will take a look at what makes this virtual reality headset work so effectively.
To see what makes this virtual reality headset work, you will need to remove the USB and HDMI cables, which provide power and video to the headset.

Inside the headset, a set of lenses can be twisted out, and then you’ll need to remove the four screws holding the headset together. Four more screws are under plugs that can be pried out.

Separate the plastic shell to reveal the electronics and disconnect the flex circuit holding the two pieces together. You can see the flex circuit covers nearly the entire outer shell. The flex circuit powers 40 infrared LEDs used by the positioning tracking camera.

The logic board is held in place by three screws and a flex circuit threaded through it that connects to the display. The HDMI signal is passed through a Toshiba HDMI interface bridge and then to the display. Five STMicroelectronics low-voltage constant current LED sink drivers drive the 40 IR LEDs. An STM32L100 ARM Cortex-M3 and a Cypress USB 2.0 hub controller round out the logic board. Other than the Oculus logo, there’s not much to see on the back.

Removing a few more screws frees the display from its housing and exposes a few Samsung logos and a Synaptics touch controller. After peeling off the rubber enclosure, we find a complete Samsung screen from the Galaxy Note 3, a 5.7-inch full HD super AMOLED capacitive touchscreen.

Finally, to get inside the positional tracker, pull off the stand, pry off the faceplate, twist off the IR lens filter, and remove some screws. Inside, you’ll find the imager, lens, and an LED board.

For more product teardowns and overviews, visit: http://www.eeweb.com/videos/browse/product_overview/

Oculus Rift DK2

Product Features

• Built-in Latency Tester
• Positional Tracking
• Low Persistence OLED Display
• USB/HDMI Cables

OCULUS RIFT DK2

Lens Assembly Board
Logic Board
Capacitative Touch Screen

To watch the video teardown of the Oculus Rift DK2, click the image above.
Nearly ten years ago, I was watching a Nova special, the 2005 DARPA Grand Challenge, where DARPA was offering a lot of money to the fastest team that could successfully have an autonomous vehicle drive a little over a hundred and thirty miles in the desert. While it was incredibly fascinating to see the thought process the different teams put into their vehicles and all of the challenges I’d never considered, the craziest thing to me is that the 2005 Grand Challenge happened only because the 2004 Grand Challenge didn’t have a single vehicle finish the course. The farthest vehicle made it less than ten miles. Now, ten years later, we have autonomous vehicles driving on public roads in cities—significantly more difficult situations than an empty desert.
It wasn’t an immediate jump from no autonomy to complete autonomy. Cars have seen increased autonomy for years now, and researchers have been working on various forms for decades. Even the ubiquitous cruise control is really a form of autonomy. But now automatic braking, lane correction, and automatic parking aren’t really uncommon. Even hearing the latest exploits of Google’s Self Driving Car, unsurprisingly led by the team leader of the 2005 Grand Challenge’s winner, is pretty normal news.

However, despite the incredibly fast progress of the last decade, there are still concerns that need to be addressed. Autonomous cars don’t do well with variations in the road—poor visibility, policemen giving signals, construction or temporary signs. And as Jeep has demonstrated very recently, any security flaws could be incredibly scary. Also, legal liability is still a quagmire that has yet to be sorted out—is it the car manufacturer’s fault for a crash or the owner’s? These are just a few of the problems still faced by autonomous cars.

There are some people who are saddened by this loss of control and I can understand that sensation. Personally, though, I have two big reasons I’m very much looking forward to this. First—I’m lazy and I’d love to be able to read or take a nap instead of driving. Second—my oldest is turning eight very soon, so I have another eight years before I become the typical worrying dad of a driving teen. Here’s crossing my fingers that I can get her a driverless car by that time.

Legal liability is still a quagmire that has yet to be sorted out—is it the car manufacturer’s fault for a crash, or the owner’s?
Rittal Enables the Industry 4.0 Revolution

In the 1700s, man harnessed water and steam to start the industrial revolution. The second industrial revolution brought us mass production, while the third increased industrial output through automation. We are now on the cusp of the fourth industrial revolution, Industry 4.0, where industrial decision-making and logistics moves to the cyber-physical level.
Previously, every step of design and production for electric, hydraulic, and pneumatic control systems was separate and autonomous.

This was a labor-intensive process with multiple opportunities for errors and tremendous rework required for simple design changes:

- Mechanical or process engineers created designs requiring actuators for automated actions and installation steps.
- Electrical engineers created schematics with wiring and connectivity information for the devices to be installed in these automated steps.
- Between engineering and purchasing, all devices defined in the electrical schematics were ordered. Bills of material were generated, with purchasing departments often recreating orders for each device and supplier.
- Shop workers printed all necessary internal, wire, and cable labels according to end customer specs.
- A panel builder or electrician identified the devices required, designed how to fit components in the smallest enclosure possible, and manually cut holes based on schematics.
- Panel builders or electricians utilized the schematics to assemble and wire the components inside the enclosure. Each wire was handled and marked off so all wires were installed correctly, or the controls would not work.
- Finally, everything outside the enclosure was wired to field devices.

The Friedhelm-Loh group of companies works together to simplify and unite the design and manufacturing process—a major portion of Industry 4.0. EPLAN’s Computer Aided Engineering Environment enables designers to pull in an actuator along with its manufacturer-provided attributes—auto-populating the electrical and mechanical design with parts as well as creating a bill of materials that interacts with supply chain and inventory software.

Component interferences within the enclosure can then be simulated to ensure proper interaction and operation and the design can be thermally simulated for excessive heat loads between components and within the enclosure, ensuring that finished products will function exactly as intended upon installation.

Once the design is completed, a modular Rittal enclosure is selected for its ease in hardware and cooling systems installation. Adding custom holes and installing enclosure electronics is automated thanks to Kiesling’s panel cutting and wiring machines. This interconnection simplifies the original design and enables automatic updating of the complete design if the first step ever changes. From wiring diagrams to custom holes—automatic updates tremendously decrease design iteration time.

EPLAN also interacts with other manufacturer’s equipment to increase efficiencies—like the Clip Project from Phoenix Contact that automatically selects correct terminals and marks labels. EPLAN, Kiesling, and Rittal’s tools can be used separately, but their greatest benefit is when used together synergistically.

Spend less engineering time dealing with repetitive details and iterations, and have faster production turn-around times via the innovative Industry 4.0 tools of the Friedhelm-Loh group. To learn more, read Rittal’s white paper.
As your design work on your great new project is wrapping up, you realize that you need an enclosure. In the past, when time was tight you would have to purchase a standard box and then send it out to either your local job shop or the shop in the back of your facility to have the holes and slots put in for such things as connectors, power cords, readouts, or whatever else might be needed. This was either expensive or pulled your employees away from other jobs that they could be doing, but you really didn’t have a choice because getting a custom product out of a typical enclosure manufacturer was harder than getting a bill through Congress.

Today, you have a great alternative—Bud Industries has pioneered rapid turnaround for modifications to its broad line of standard enclosures. Here are the quick steps to making it happen:

First, use Bud’s product selector to choose the product that best matches your needs. Then, check with Bud or your local distributor to be sure it is in stock. Once you’ve found the right enclosure, send us a drawing of required modifications to the box. Of course CAD or 3D models are great, but Bud can also work with as little as a sketch.

When Bud receives your information, they will quickly get a quote out to you; then, as soon as you place your order, Bud will rapidly create a detailed drawing for you to approve. Once you confirm the drawings, Bud will complete your customized order in 6 days for the first run, and 5 days for repeat orders. This is two to three times faster than most enclosure suppliers, which cover holes, slots, or other cutouts in the enclosure at no additional cost. Additional modifications are also available and include silk screening, plating, special colors, and even special dimensions. Just note that these might add a bit more time to your order.

If you’d like more information on rapid turnaround enclosures or other enclosure modifications, please contact your local Bud distributor or the Bud factory sales team.

Discover the Bud difference at www.BudIND.com.
While certain trends in the advancement of modern technology are predictably sure to demand the majority of public attention, most industry professionals understand that the most important advancements are still taking place in the trenches of the basics. While a lot of buzz-generating advancements are making most of the headlines recently, things like the prevalence of sleek new forms and dynamic new functions made possible with the increasing help of flashy innovations like flexible circuitry and intelligent automation, essential underlying principles like power management, processing speed, and simple durability still stand as pillars of the platforms of tomorrow.
After more than 25 years in those trenches, and in the memory business in particular, California’s Rambus, Inc. today finds itself in a better position than ever to demonstrate to the public sphere its longtime role as a memory innovator with a lot of experience in the industry. Through its existence, Rambus has played an undeniably central, and certainly very tumultuous, role in shaping the modern memory industry as it stands both in technical and business terms. Now, recent changes to both management attitudes and long-term ideals have brought the company into a new era of positive focus on specific new innovations and more personalized connections within today’s multifaceted market.

Currently, we find Rambus in the late stages of developing an all-new, game-changing chipset design for DDR4 memory modules, which focuses on the advantages offered by highly advanced buffer technology. Rambus’ formative experience in creation and implementation of DDR4 is definitely substantial, and since DDR4 now makes up a serious majority of the driving force behind data center systems, there are few better candidates to step forward with chipsets that can take things to the next level that’s being demanded by today’s ‘big data’ systems. In getting to know a bit more about Rambus’ new R+ DDR4 Server DIMM Chipset, EEWeb spoke with Ely Tsern, the company’s Chief Technologist within the Memory & Interfaces division, and absorbed a lot of interesting details about where memory is heading these days with Rambus’ help.

“Today’s data sets are growing very quickly,” Tsern underlines, “which means, of course, that more memory needs to be used, and must further be capable of high speed access.” In basic terms, he explains, that means that more modules are being used, and that, technically speaking, “more buffers are required on the modules to get the capacity and bandwidth that these applications need.” The company’s new family of chips is strongly geared toward addressing these issues more specifically than any other currently available devices, and to carry the advantages of buffered chips to new heights.

Recently, Rambus has introduced its family of R+ DDR4 server memory chipsets for both RDIMMs (Registered Dual Inline Memory Modules) and LRDIMMs (Load-Reduced DIMMs), which are focused on “delivering superior performance and capacity for server markets” by introducing buffered technology that allows for impressive increases in speed and system integrity on a wide, commercially-viable basis. Tsern specifies that the first in the series, the RB26, “is a leading-edge memory module chipset designed to accelerate data-intensive applications like real-time analytics, virtualization and in-memory computing with increased speed, reliability and power-efficiency.” With the demands of today’s highly advanced analytical systems, the prevalence of cloud-style storage, and what Rambus calls “the looming prospect of the Internet of Things,” the company feels that it’s clear that the time for a new standard is in order, and that they’re just the ones to bring it to reality.

According to official company specs, the fully JEDEC-compliant RB26 DDR4 chipset itself includes a DDR4 Register Clock Driver and Data Buffer that together are standard at 2666 Mbps and operational up to 2933 Mbps. Optimized
for superior frequency-based low-power functionality and convenient integration, Rambus also prides itself on the fact that the R+ chips come equipped with innovatively built-in support systems for diagnostic, repair, and custom upgrade. According to official release information, these "integrated tools and added device flexibility provide a robust system while delivering ease-of-integration and enhanced testability for server OEMs," and also play a large part in putting the R+ series in a league of its own. Bringing the previously competing worlds of speed and capacity to a more mutual arrangement, Rambus seems more than ready to make some waves in the server industry.

With every incremental speed upgrade the industry sees, Tsern relates, it’s getting harder and harder to maintain the robustness that the enterprise data center markets need. But, he says, “that issue, the problem of needing faster speeds that can keep up with the inevitable increases in demand, really hits to the heart of our core competency as a company.” In the company’s labs, Tsern says that Rambus has developed systems capable of running at up to eight times the speed of current DDR4 standards. “Obviously we have a lot of expertise in what is needed to make these systems run fast,” he asserts. Pouring their proven expertise into what the company calls a “truly enterprise-grade product for the marketplace,” Rambus plans for the RB26 to be in full production in 2016.

Tsern observes that many customers have been pushing for Rambus to develop next-generation chipsets like the R+ series for some time, looking to them as essential innovators in a field that finds itself in need of some decided steps forward. In following the natural increase of processing demands, the industry-wide implementation of DDR4-style memory is also hitting a sweet spot, Tsern adds. “We actually see recent trends suggesting a fast-growing adoption curve for DDR4 over the next year, with the industry moving more from DDR3 to DDR4,” he reveals. Currently, Rambus says, about 25% of servers are shipped with DDR4 systems, and the company is confident in its projected analysis that the adoption rate will reach 80 to 90 percent of the market by 2017. With their sights officially set on a more personally engaged, specialized development focus led by a very promising new product line, Rambus’ leading approach to memory is clearly no distraction from the company’s dedication to a positive future.
San Jose's Atmel Corporation certainly stands at the top of an impressively diverse portfolio of both products and services. Leading the electronics industry in the production of microcontrollers, non-volatile memory, and RF components, among a host of others, Atmel stands out by commanding a remarkably extensive network of complete system solutions, offering not only an array of products, but also an integrated web of software and services that extend the company’s expertise into the earliest stages of design and development.

In digging a little deeper into what Atmel is putting their substantial focus on these days, EEWeb spoke in depth with Reza Kazerounian, Atmel’s SVP and GM of Microcontroller and Wireless Solutions Business Units driving IoT solutions and strategy, about some recent projects that find the company investing heavily, like many in the industry, into the burgeoning world of the Internet of Things.
Notably, Atmel was among the first companies to license the now widely used ARM® architecture for their products, starting in 1995 with the successful AT91 family of devices. Now integrated with a full selection of Cortex®-enhanced designs, Atmel currently sports a very wide portfolio of ARM-based devices, and continues to develop the architecture with more complex and inclusive products at a leading pace.

Atmel also has a wide range of ultra-low-power microcontrollers (MCUs) and microprocessors (MPUs). These solutions include 8-bit AVRs with a significant community base and BOSIs to higher performance Atmel | SMART ARM-based products including its award-winning Cortex-M7-based MCUs and Cortex-A5-based MPUs.

When it comes to the basics, such as enabling wider use-case scenarios through scaling and lower-power solutions, Atmel leads the charge in simple terms with products like the new Atmel | SMART BTLC1000 Bluetooth chip, a system-on-chip that Kazeroniun describes as the “lowest power, smallest Bluetooth-Smart solution in the industry.” The 2.2mm x 2.1mm ‘Wafer Level Chipscale Package’ presents a versatile option to help drive new innovations in connectivity, but is also specifically intended as a direct approach to the emerging IoT and wearables markets.

The sophistication of the BTLC1000, which contains an integrated Atmel | SMART ARM® Cortex®-M0 MCU and Bluetooth transceiver, provides for a diverse functionality from low-energy (BLE) link control to capable independent processing with external memory, and makes the device ideal for a range of connective applications in smartphones, medical tracking, and interfacing, just to name a few. Powered by a wide array of standard battery types and without the need for external power management, the BTLC1000 certainly seems to demonstrate Atmel’s drive to empower the newest segments in the industry.

Looking toward some more specialized products joining the charge into a new era in Atmel’s portfolio, the company’s new WILC3000 Wireless Link Controller presents a comparable addition to the stable, helping to expand connectivity for more demanding design innovations in the era of IoT. A miniscule 4.1mm x 4.1mm WLCSP with leading low-power capabilities of its own, the WILC3000 continues Atmel’s dedication to industry-leading power and scale solutions. The company has also recently announced WINC3400, a network controller equipped with flash memory that enables it to host network stacks along with Bluetooth Smart profiles to greatly minimize CPU demands. As well as enabling a new era of applications, the accessibility of the WINC3400 demonstrates Atmel’s additional dedication to enabling design and development on the most fundamental levels.

In fact, Atmel has recently stepped their development support game up in serious fashion, releasing an all-new IDE program called Atmel Studio 7. With the increasing complexity of the development stages in modern embedded systems, the company says, the use of IDEs, or independent development environments, is helping to ease the burden on developers by providing a streamlined software environment for constructing and evaluating designs in their earliest stages. Based on Microsoft’s Visual Studio shell and featuring convenient support for Arduino projects as well as the Arduino Zero embedded debugger, Studio 7 is designed to greatly enhance the development workflow with a considerately modern and easy-to-use interface and capable, performance-enhanced debugging.

As Kazeroniun summarizes, Atmel Studio 7 crowns a decided effort to "bridge the gap between the maker space and the marketplace," and a strong network of support services, like the company’s new ‘Atmel Start’ tool, proves the company’s drive to provide leading service at every level of development. Atmel Start complements Atmel Studio 7 with a web-based interface application that provides a large library of customizable software components, and can be employed by developers in a visual environment to test for either Atmel’s provided evaluation boards or the user’s own custom boards. Allowing developers working in Atmel’s environment to quickly move their focus beyond the basics of initial software configuration and
Atmel Start complements Atmel Studio 7 with a web-based interface application that provides a large library of customizable software components, and can be employed by developers in a visual environment to test for either Atmel’s provided evaluation boards or the user’s own custom boards.

integration by providing quick and easy construction of drivers, middleware, and real-time operating systems, the company’s efforts to enhance the efficiency of development with Atmel Studio 7 is certainly considerable.

Representing perhaps the most ambitious of Atmel’s forays into the emerging IoT network arena, the company has also recently announced a large partner project that it hopes will help to connect as many of its resources as possible for easy access and customization by designers of all kinds. The new Atmel Internet of Things Cloud Ecosystem Partner Program allows developers working with any of Atmel’s SMART MCU devices (of which there are many), to take full advantage of the company’s cloud partners and their services the offer. Together, Atmel’s web of software-as-a-service partners represent a wide network of specialized software tools for managing connected devices, collecting and processing data analytics, and visualizing relevant data for study, and access to the system through the Partner Program provides users with a large range of customizable services that all serve specialized roles in helping to better organize and enhance the function of devices for a new era of connectivity. With these services also comes the convenient availability of production-ready software stacks, further proving Atmel’s truly standout efforts to enhance the IoT development environment across the board.

Considering what the company anticipates to be a market of “billions of devices in the IoT market by 2020,” a statement echoed in similar terms by many others, it’s no surprise that an industry leader like Atmel has decided to jump confidently into the deep end of the Internet of Things. Approaching from just about every imaginable angle to provide designers and developers of all varieties to become a part of the development of tomorrow’s unprecedentedly connected world, there’s definitely much more to come on this impressive wave of invention from Atmel as they empower not only their own designs, but an entire new ecosystem of innovation.

Click the image above to view a video demonstration of Atmel Studio 7.
Happy Thanksgiving

Hurry, dinner's late! There's no time to carve... set the centrifuge to full power!

It all looks great, but where's the turkey?

Would you like us to pour you a glass of light or dark meat?

Red Alert

Well Stan, looks like this project might finally be finished!

Not so fast Chip? You've forgotten one critical issue...

The interns have arrived!

Lucky Winner

Wow! This place is awesome! These cubes are cool!

Which one of you gets to be my mentor?

Flip a coin, Stan!

Sure, just give me a moment.

So if I flip a coin with a momentum of six...

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