Intel® Joule™ Platform

Big Compute in a Small Package to Drive IoT Innovation

Aug. 16, 2016 – Intel Corporation today announced the availability of the Intel® Joule™ platform, a high-end compute platform capable of delivering human-like senses to a new generation of smart devices Created for the Internet of Things (IoT), the Intel Joule platform enables developers and entrepreneurs to build out an embedded system or take a prototype to commercial product faster, while also minimizing development costs.

The Intel Joule platform starts with a compute module featuring high-end compute, 4K video and large memory in a tiny, low-power package. The platform incorporates a vast software and hardware ecosystem, enabling developers to choose from multiple operating systems and take advantage of off-the-shelf libraries and sensors. The platform also includes support for Intel® RealSense™ technology, making it particularly well suited for products and industrial systems requiring advanced computer vision or high-end edge computing.

The Intel Joule Advantage

- **Big compute in a small package:** High-end computing and large memory in a tiny package and low power footprint, making it ideal for applications requiring abundant compute power but with limited space for compute hardware, like autonomous robots and drones.
- **Human-like senses:** Support for Intel® RealSense cameras and libraries enables developers to build devices that capture rich depth of field (DOF) information, which can be processed to create a high level of computer intelligence about the environment and objects within it, making a "thing" capable of autonomous behavior.
- **Communications:** Laptop-class wireless comms, with 802.11ac for extended range and bandwidth.
- **Development ecosystem:** Intel® and its partners have created a robust software development ecosystem, which offers developers their choice of operating systems.
- **Certification:** Intel Joule platform is pre-certified for distribution and sale into more than 80 countries, enabling significant savings in the time and expense of pursuing certification.
- **Scalability:** Because the Intel Joule platform is based on an Intel® Atom™ SoC, transitioning a product design to high-volume production can be done with modest engineering expense, providing a mature platform for companies who require the option to scale down the road.

About the Intel Joule Platform

The Intel Joule compute module is available in two high-performance configurations: the Intel® Joule™ 550x and the higher-performance Intel® Joule™ 570x. The complete, low-power solution comes with high-performance compute and graphics, large memory and storage, power management, Bluetooth*, Wi-Fi and an IoT tailored Linux*-based OS.

The Intel Joule 570x module features:
- High-performance, 64-bit, 1.7 GHz quad-core Intel® Atom™ T5700 processor with burst up to 2.4 GHz
- 4GB LPDDR4 RAM and 16GB eMMC memory
- Intel® HD Graphics with 4K video capture and display
- 802.11ac Wi-Fi with MIMO and Bluetooth 4.1
- USB 3.0, MPI* CSI and DSI interfaces, and multiple GPIO, I2C, UART interfaces
- Linux-based OS tailored for IoT and smart devices
- Enhanced support for the Intel® RealSense cameras and libraries

The Intel Joule 550x module features:
- High-performance, 64-bit, 1.5 GHz quad-core Intel® Atom™ T5500 processor

- 3GB LPDDR4 RAM and 8GB eMMC memory
- Intel® HD Graphics with 4K video capture and display
- 802.11ac Wi-Fi with MIMO and Bluetooth 4.1
- USB 3.0, MPI CSI and DSI interfaces, and multiple GPIO, I2C, UART interfaces
- Linux-based OS tailored for IoT and smart devices
- Support for the Intel® RealSense cameras and libraries

How Does the Intel Joule Platform Complement the Inventor Product Lineup?

For entrepreneurs working on a new smart device or intrapreneurs building out embedded industrial systems, the Intel Joule platform is the most advanced compute platform to join Intel's innovator portfolio – that spans from the entry-level maker boards Arduino 101* and Intel® Galileo through advanced compute modules, Intel® Edison and Intel® Curie™, targeted at inventors and entrepreneurs. Aside from delivering significantly more compute power, the Intel Joule module offers larger memory and storage, 4K video capture and display, a wider variety of high-speed physical interfaces, all in a package only slightly larger than the Intel® Edison module. With broader OS support and a substantial step up in capability, the Intel Joule platform is significantly more multipurpose than its cousins.

Intel Joule Platform in Action

CEO Brian Krzanich announced the Intel Joule platform at the 2016 Intel Developer Forum, where Intel and its partners presented over a dozen demonstrations and workshops featuring the new platform. During the keynote, Krzanich demonstrated industrial safety glasses with augmented reality, developed by French company PivotHead*. Created for PivotHead's customer Airbus*, the glasses pair the tiny Intel Joule module with a miniature built-in camera to monitor tasks performed by a factory operator and provide immediate audio feedback for real-time quality control. The glasses also provide remote visual assistance, enabled by the Intel Joule module's built-in Wi-Fi.

- **Bartending Robot from VStone*:** Japanese robotics company VStone develops robots with vision and conversational abilities as companions to Japan's elderly population. To illustrate some of the capabilities of their next-generation robotic platform, Sota II*, VStone and Intel have created for IDF a conversational bartending robot. Sota II runs on Reference Linux* operating system for IoT, and takes advantage of several Intel technologies, all-running simultaneously on the Intel Joule platform. These include Intel® RealSense technology to track a person's face, and Intel® Intent Express and natural language processing, to discern meaning in complex dialog and respond meaningfully.
- **Highway Patrol Motorcycle Helmet Display:** In order to improve the safety of highway policemen in France, EyeLights* has developed a heads-up display for motorcycle helmets. The unit's computer vision capabilities allow it to autonomously capture information in the user's environment, such as license plate numbers of

other vehicles, and allow the user to view relevant information on the heads-up display. The small size of the Intel Joule platform enables the EyeLights device to attach to any motorcycle helmet.

- **Microsoft* Bamboo Robotic Companion:** To help parents of children with diabetes, Intel partner Microsoft has created a demonstration of a companion robotic panda, Bamboo, which allows parents to set reminders remotely and reminds children to check their sugars. Running Windows 10 IoT Core* on the Intel Joule compute platform, Bamboo connects to cloud-based Microsoft Azure* and Cognitive Services, which provide sentiment analysis and translation, so you can speak to Bamboo in any language and it can translate into its native English and understand your mood. Bamboo can move about and build an understanding of its environment with the compute platform and an Intel® RealSense camera, and is animated via the EZ-Robot EZ-B control system.
- **Canonical* Robots:** To demonstrate some of the possibilities of the Intel Joule platform running Ubuntu* Core and the Robot Operating System (ROS*), Intel partner Canonical has developed two mobile robots integrating Intel® RealSense technology.
- **Gumstix* Custom Carrier Boards:** For developers creating products based on the Intel Joule platform who need a custom carrier board for their specific application, Gumstix has created an easy web-based tool called Geppetto*. With Geppetto, a developer can easily design a board to meet their own specification by visually placing drag-and-drop modules such as displays, connectors and sensors. Geppetto takes care of the rest behind the scenes and delivers the board within 15 days.
- **EZ-Robot*:** a Canadian maker of robotic kits for the education market, has developed prototypes of their next-generation robots, which are based on the Intel Joule module running Windows 10 IoT Core*. Because the entire system and OS are contained in the module, which is embedded inside the robot, these new robots eliminate the need for a companion PC, resulting in significant cost savings for education customers deploying fleets of robots in the classroom.

Hardware and Software Ecosystem

Developers on the Intel Joule platform can take advantage of a vast hardware and software ecosystem. Created for the Intel Joule platform, the new open-source Reference Linux OS for IoT is designed specifically for IoT and includes security features commonly required by IoT applications. Developers who create products using Reference Linux OS for IoT can avoid force-fitting a desktop Linux OS into an IoT device, or having to create their own OS. Developers can also choose to develop on Ubuntu/Ubuntu Core (Snappy*) or Microsoft Windows 10 IoT Core, and can take advantage of off-the-shelf libraries and peripherals to accelerate development.

Availability

Intel will offer a developer kit for each of the two module models. Intel Joule 570x developer kits are available immediately through Intel's worldwide distribution network and reseller partners including Mouser* and Newegg*. Intel Joule 570x and 550x platforms as well as the Intel Joule 550x developer kit will be available in Q4 2016. Modules and developer kits will be initially certified and available for sale in more than 80 countries around the world – including the United States, Canada, Japan and most of Europe – with availability expected to extend to over 100 countries by the end of Q4.

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