Develop Innovations that Change the World

Integrated Development Environment for Intel® Quark™ Microcontroller Software Developers

Intel® System Studio for Microcontrollers, an Eclipse*-integrated software suite, is designed specifically to empower Intel® Quark™ microcontroller developers to create fast, intelligent things.

The Internet of Things (IoT) is the big growth wave in tech—from smart cities, homes, and classrooms to energy management, wearable devices, and much more. The Intel Quark microcontroller family extends intelligent computing to a new spectrum of devices requiring low power consumption for sensor input and data actuation applications.

What It Does

• **Speeds** time to market with an Eclipse-integrated development environment for Intel Quark microcontroller-based systems.

• **Optimizes** source code for power and system resource efficiency for IoT classes of small sensors and devices with proven compilers and libraries.

• **Strengthens** system reliability by quickly isolating complex source code issues with a system and application debugger.

What’s New

• **Support** for Arrow Panther*, Arduino/Genuino 101*, and tinyTILE* boards

• **Energy analysis** to measure system or software behaviors that influence the power consumption of the Intel Quark microcontrollers

• **More functions** in Intel® Integrated Performance Primitives for Microcontrollers to accelerate digital signal processing

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**COMPILERS & LIBRARIES**

- Optimized C, Floating Point, Sensor, Crypto & DSP libraries

**IDE & SOFTWARE**

- Eclipse®, Sample Code, HW Abstraction API, Board Support Package

**ANALYZER**

- Energy Analysis

**DEBUGGER**

- JTAG Debug & Flash Programming

OpenOCD*-based JTAG

Code running on bare metal or Zephyr® real-time operating system

Intel® Quark™ microcontroller-based systems
### Improved user interface design with workflow optimizations

#### Details

**Compilers and Libraries**

The included compilers and libraries offer standard features of the C and C++ languages. Extensions allow developers to benefit from Intel® architecture-specific capabilities. The compilers are:

- **Sensor library** (MRAA I/O Communication Layer and UPM Sensor and Actuator Library) to quickly add commonly used sensors and actuators to your project.
- **Support** for the latest Zephyr* RTOS version and Intel Quark Microcontroller Software Interface.
- **Improved architecture tuning and graphics engine offload**.
- **IDE integrated firmware manager** to conveniently update to new QMSI* and Zephyr releases independent of suite updates.

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<th>INTEL® QUARK™ MICROCONTROLLER D2000, INTEL® QUARK™ SE MICROCONTROLLER C1000, AND INTEL® CURIE MODULE, ARDUINO/GENUINO '101*, TINYTILE*, ARROW PANTHER BOARD*</th>
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• **Integrated** with other core software in the Eclipse IDE and build system.
• **Efficient**, with advanced, processor-specific optimizations for speed and memory footprint to allow generation of very efficient machine code.
• **Standards-based**, with support for the ELF/DWARF object format.
• **Versatile**, with object code that can be linked with assembler routines.
• **Precise**, with optimized digital signal processing (DSP), math, and floating point libraries to help optimize code.

**Sensor Library**

- The MRAA I/O Library is a low-level library that offers a translation from the pins available on Intel Quark microcontroller-based systems to the user application. MRAA makes it easier for developers and sensor manufacturers to map their sensors and actuators on top of supported hardware and to allow control of low-level communication protocols by high-level languages and constructs.
- The UPM sensor and actuator libraries are a collection of sensor representations, written in C and utilizing MRAA. A wide selection of devices covering various types are supported on the Intel Quark microcontroller. Each sensor provides a simple API that allows you to interface with it, along with project templates that show developers how to use them.

**System and Application Debugger**

The OpenOCD*-based JTAG Debugger is designed to be used with the provided build tools and libraries, completely integrated into the Eclipse IDE and complemented by the provided GDB* for source-level awareness, allowing seamless switching between development and debugging. It enables:

- **Efficient debug.** During a debug session, a developer can make updates directly into the same source code window that is used to control the debug session. Modifications will be ready for the next source code rebuild and flashing of the device.
- **Ability to attach** to a running application without resetting the target.
- **Simultaneous debug** of both source and assembly.

**Energy Analyzer**

- **Optimize** for power efficiency by profiling system-wide energy consumption to identify power-inefficient code.
- **Energy analysis** can be run on bare metal or Zephyr*-based systems and the collected metrics can be viewed as CSV file or visualized in Eclipse to pinpoint power-inefficient code.

**Zephyr** RTOS

- A small, scalable real-time operating system (RTOS) for use on resource-constrained systems, from simple embedded environmental sensors and LED wearables to sophisticated smart watches and IoT wireless gateways.
- **Wizard-driven Zephyr RTOS project creation** to quickly program an Intel Quark microcontroller-based IoT device.
- **Full Zephyr RTOS awareness** in the IDE and debugger.

**Documentation and Sample Applications**

- **Jump-start development** with comprehensive code examples and template projects.
- **Get scalability** for software reuse across the Intel Quark Microcontroller portfolio with the included Intel Quark Microcontroller Software Interface (QMSI), which abstracts and extends hardware features.