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IzoT Device Stack EX Features

• Provides an IzoT Protocol stack for applications on 32-bit or 64-bit processors

• Supports devices that communicate on Ethernet IIzoT/EN) and Wi-Fi (IzoT/Wi-Fi) media

• Supports complex controllers with support for up to 32,767 address table entries and 32,767 simultaneous outgoing and incoming transactions

• Devices based on IzoT Device Stack EX can interoperate with IzoT and LonWorks® devices on multiple channels including IzoT/EN, IzoT/Wi-Fi, IzoT/FT, IzoT/RS-485, LonWorks/FT, LonWorks/PL, and LonWorks/RS-485

• Compatible with Raspberry Pi with Raspbian and BeagleBone Black with Ubuntu; may be ported to other processors and operating systems

• Free Edition without support is available for download

• Premium Edition with support and expanded rights available

Internet-ready Control Networking

The IzoT Device Stack EX enables developers to build networks of communicating devices, as part of the Industrial Internet of Things, using a 32-bit or 64-bit processor and operating system as the processing engine for connected devices. With the IzoT Device Stack EX, your devices can exchange data with each other on an easy-to-use, publish-subscribe data model over IP. Your IzoT devices can collect data from physical sensors built to monitor things including temperature, humidity, light-level, power-consumption, or moisture, and make the data available to other IzoT devices within the community. Using data received from other IzoT devices or local sensors, your IzoT devices can also control physical actuators such as LED dimmers, motor controllers, damper controllers, and solenoids. And with the IzoT Server, you can build Web pages on which to monitor and control all of your IzoT devices simultaneously.

A reference implementation of the IzoT Device Stack EX is available for Linux that is compatible with the popular Raspberry Pi and BeagleBone Black processor boards. Reference example source code and hardware schematics are also available for the Raspberry Pi.

Application Development with Python

The IzoT Device Stack EX includes the IzoT Python Package, built in the Python 3 programming language, which allows you to build device application software. The IzoT Python Package makes it easy for your Python applications to define their input and output datapoints in relation to other IzoT devices in local networks. Using the IzoT Python Package, your devices notify other devices about all the available datapoints and discover datapoints on other devices so no data slip through the cracks.

Device Communication with Datapoints

The IzoT Device Stack EX includes a rich set of data types and profiles that simplifies defining the network inputs, outputs, and properties for your IzoT applications. You can use the IzoT Analog Input profile to create analog sensors for tasks including power consumption, temperature, humidity, or light-level monitoring. You can use the IzoT Load Control profile to design myriad load control devices such as LED controllers, lamp dimmers, fan controllers, sunblind actuators, or pool pump controllers. You also have the option to choose from one hundred other standard profiles to rapidly implement a wide variety of devices. IzoT profiles automatically define many useful input and output datapoints for sensors and actuators. They also define many useful network-accessible properties that you can use to configure your applications. The implementation of a typical profile takes no more than a single line of Python code.

Network Organization

The power of the IzoT Platform comes from its ability to easily create communities of interacting devices. You can use the IzoT Commissioning Tool to create IzoT communities, or you can use the IzoT Interoperable Self-Installation (ISI) protocol implemented within the IzoT Device Stack EX to create devices that do not require a separate tool for installation. Every IzoT-capable device with ISI automatically joins the community on your local IP sub-network, all the while notifying all the devices in the community of possible datapoints to collect. When compatible IzoT device discover one another, they automatically reconfigure themselves to exchange data without requiring the use of any additional servers or tools.

IzoT Device Examples

Source code and hardware schematics for the Raspberry Pi are included with the IzoT Device Stack EX for three example IzoT devices. The example devices are: a 2-channel, 3-color LED controller; 2.8" TFT touchscreen display, and an environmental sensor. These examples offer a platform for building your own applications and devices. You can build the example devices using Raspberry Pis and I/O hardware shown in the schematics, or you can adapt and port the examples to an alternative

processor and operating system. You can also build the LED Controller using a Raspberry Pi and a PiFace I/O board, should you wish to avoid building new hardware. A simple example for the PiFace I/O board is also included.

LED Controller

The LED Controller is a 2-channel, 3-color 3W LED controller. It can be controlled from other IzoT devices, or from Web pages via an IzoT Server. The LED Controller accepts network input datapoint updates to turn the LEDs on or off, or to manage the brightness or color of the LEDs. The LED Controller also supports scenes, meaning a single scene input from a device like a Touch Keypad or Web page can appear as a unique pattern or sequence of colors and brightness supporting smooth transitions from one scene to the next. Used alongside the Touch Keypads and Environmental Sensors, the LED Controller demonstrates a sophisticated multi-color LED lighting control system with scene and occupancy control.

Touch Keypad

The Touch Keypad is a 2.8" TFT touchscreen display controller that implements a multi-button keypad. This keypad can be used to control other IzoT devices like the LED Controller. The Touch Keypad displays touch buttons, which control the scene, light level, and color. When you touch a button on the Keypad, it generates a network output datapoint providing an update to connected LED Controllers. The compact touchscreen is ideal for use as a wall mounted lighting control keypad, with an easy-to-use touchscreen display.

Environmental Sensor

The Environmental Sensor is a multi-sensor with a passive-infrared occupancy sensor, temperature sensor, humidity sensor, and light-level sensor. Multiple Environmental Sensors in an area work together to determine occupancy of the area based on inputs from all the sensors, and can be used to control the LED Controllers in the area based on area occupancy and light-level. Example Web pages included with the IzoT Server provide an example of how to monitor and configure sensors, and how to display charts that display sensor values over time.

IzoT SDK

IzoT Device Stack EX is included as part of the IzoT SDK. The IzoT SDK is available in two editions: 1) a free edition that does not include support, does not include IzoT Device Stack DX and network interface firmware, and limits modifications to the protocol implementation; and a premium edition that includes a year of support that may optionally be renewed annually, and also includes IzoT Device Stack DX, network interface firmware for developing network interfaces with Echelon Smart Transceivers, and expanded rights for modifying the protocol stack. The free edition is available as a free download from **http://iiot.echelon.com/get-started.** The download includes ready-to-run software for the Raspberry Pi and BeagleBone Black, as well as full source code for the IzoT Device Stack. You can either modify the current source code for the Raspberry Pi or BeagleBone Black, or port it to other compatible processors and operating systems.

Specifications

Reference Implementation Target Platforms

- Raspberry Pi Model B with 512 MB RAM and Raspbian Linux

- BeagleBone Black with Ubuntu Linux

- The source code may be ported to other compatible processors running Linux, Microsoft Windows, or other operating systems with POSIX services

Reference Implementation Target Flash Memory

- 8 GB minimum SD flash card

Available Application Development Languages

- Python 3.2, C++, and C

Stack Limits

- 32,767 address table entries

- 32,767 simultaneous outgoing transactions

- 32,767 simultaneous incoming transactions

Ordering Information

- IzoT SDK Free Edition (download)

- IzoT SDK Premium Edition