

# REAL-TIME EDGE SOFTWARE & EIQ™ TOOLKIT(MPU)

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# Agenda

- Real-Time Edge Software
- eIQ™ Toolkit(MPU)

# Real-Time Edge Software

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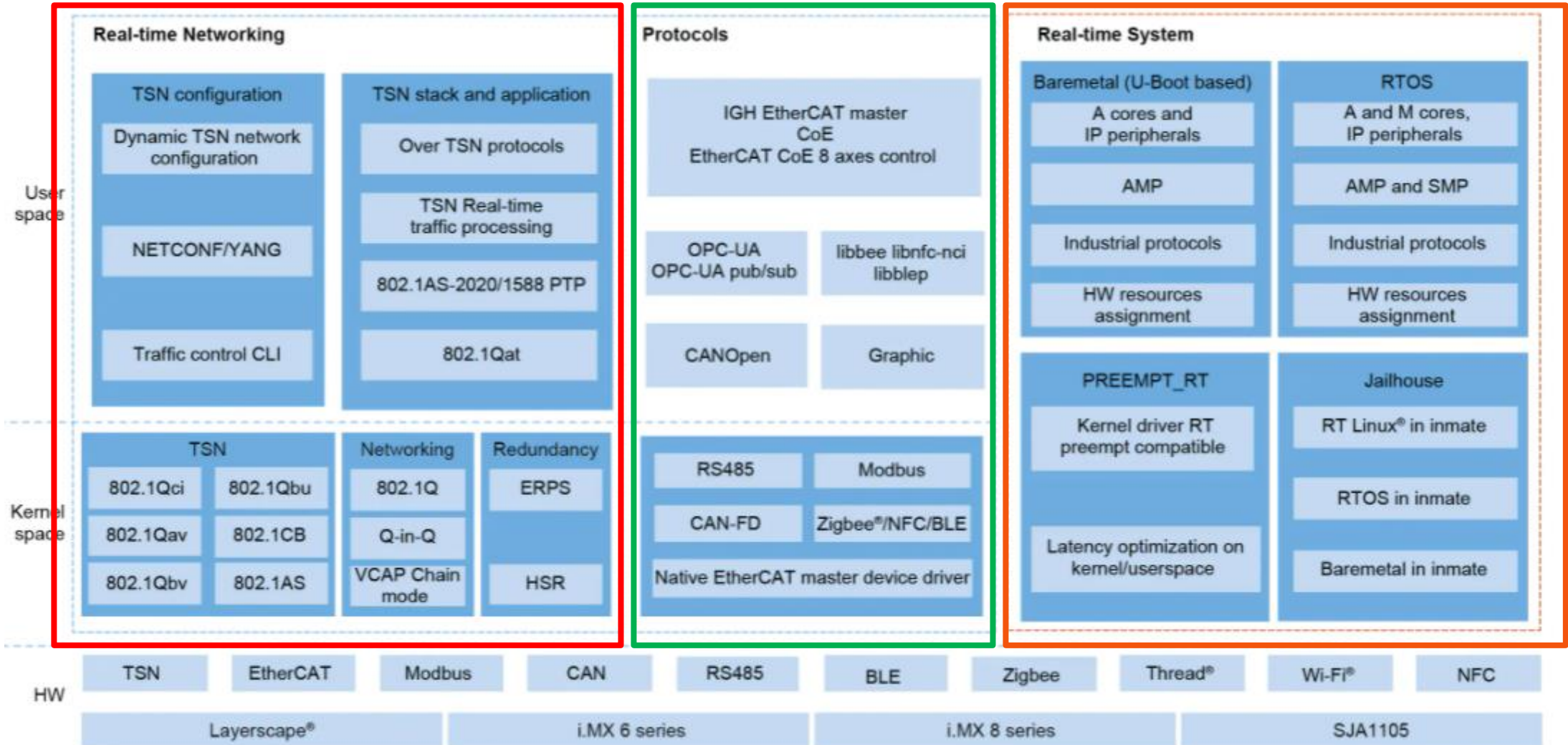
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## REAL-TIME EDGE SOURCE CODE AND RELEASE

- Real-time Edge Software
  - Source code:
    - <https://github.com/real-time-edge-sw>
- Real-time Edge Software 2.0 is ready since July 30<sup>th</sup>, 2021
  - <https://www.nxp.com/design/software/development-software/real-time-edge-software:REALTIME-EDGE-SOFTWARE>

# REAL-TIME EDGE SOFTWARE: OVERVIEW





# REAL-TIME EDGE SOFTWARE: LANDING PAGE

<https://www.nxp.com/design/software/development-software/real-time-edge-software:realtime-edge-software>



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## Real-Time Edge Software

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### Jump To

Overview & Features

Supported Devices

### Overview

The Real-time Edge software enables real-time applications for the i.MX and Layerscape products and can be easily integrated with the Yocto SDKs for these products. Real-time edge software enables real-time capabilities via support for Preempt-RT for low latency applications, Baremetal framework and support for real-time operating system (RTOS) on the cortex A or cortex M cores. Real-time edge software also supports real-time protocols and stacks for IEEE1588 PTP network

More

USER GUIDE

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### Features

- > Real-Time System
- > Real-Time Networking
- > Protocols

Diagram and  
Training Videos



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# REAL-TIME EDGE SOFTWARE: LANDING PAGE (CONT.)



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User Guide (2)

### User Guide (2)

Name/Description	Modified Date
<a href="#">Real-time Edge Yocto Project User Guide</a> PDF Rev 2.0 187.5 KB RTEYOCTOUG English	Jul 29, 2021
<a href="#">Real-time Edge Software User Guide</a> PDF Rev 2.0 8.0 MB REALTIMEEDGEUG English	Jul 29, 2021

News Aug 27, 2021 | NXP Semiconductors to Present at Upcoming Investor Conferences [Read More](#)



# REAL-TIME EDGE SOFTWARE USER GUIDE – SUPPORTED PLATFORM

## 1.3 Supported NXP platforms

The following table lists the NXP hardware SoCs and boards that support the Real-time Edge software.

Table 1. Supported NXP platforms

Platform	Architecture	Boot
i.MX 6ULL EVK	Arm v7	SD
i.MX 8M Mini EVK	Arm v8	SD
i.MX 8M Plus EVK	Arm v8	SD
LS1028ARDB	Arm v8	SD
LS1021AIOT	Arm v7	SD
LS1021ATSN	Arm v7	SD
LS1021ATWR	Arm v7	SD
LS1012ARDB	Arm v8	QSPI
LS1043ARDB	Arm v8	SD
LS1046ARDB	Arm v8	SD
LS1046AFRWY	Arm v8	SD
LX2160ARDB	Arm v8	SD
LX2160A Rev2	Arm v8	SD



# REAL-TIME EDGE SOFTWARE USER GUIDE – SUPPORTED FEATURE MATRIX

## 2.2 Feature Support Matrix

The following tables show the features that are supported in this release.

Table 3. Key features

Feature			i.MX 6ULL 14x14 EVK	i.MX 8M Mini EVK	i.MX 8M Plus EVK	LS10 28A RDB	LS10 21A TSN	LS10 21A IOT	LS10 21A TWR	LS10 12A RDB	LS10 43A RDB	LS10 46A RDB	LS10 46A FRW Y	LX21 60A RDB
Boot mode	SD		Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y
	QSPI									Y				
Real-Time System	Preempt-RT Linux		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Bare Metal	ICC		Y	Y	Y		Y			Y	Y		Y
		PCIe				Y		Y			Y	Y		
		Ethernet		Y	Y	Y					Y	Y		
		GPIO		Y	Y			Y						
		IPI		Y	Y	Y		Y			Y	Y		Y
		UART		Y	Y	Y		Y			Y	Y		Y
		USB						Y			Y	Y		
		SAI				Y								
		CAN						Y						
		I2C				Y		Y			Y	Y		

Table continues on the next page

# REAL-TIME EDGE SOFTWARE USER GUIDE – SUPPORTED PROTOCOL (I.MX8MP/LS1028A)

Feature			i.MX 6ULL 14x14 EVK	i.MX 8M Mini EVK	i.MX 8M Plus EVK	LS10 28A RDB	LS10 21A TSN	LS10 21A IOT	LS10 21A TWR	LS10 12A RDB	LS10 43A RDB	LS10 46A RDB	LS10 46A FRW Y	LX21 60A RDB
Real Time Networking	TSN Standards	Qbv			Y	Y								
		Qbu			Y	Y								
		Qci			N/A	Y								
		Qav			Y	Y								
		802.1AS		Y	Y	Y	Y	Y	Y		Y	Y	Y	Y
		802.1CB			N/A	Y								
		VCAP chain mode			N/A	Y								
		802.1 Q-in-Q				Y								
	TSN Configurations	Linux tc command			Y	Y								
		TSN tool			Y	Y								
		NETCO NF/YANG	Qbv		Y	Y								
			Qbu		Y	Y								
			Qci		N/A	Y								
			IP		Y	Y								
			MAC		Y	Y								
			VLAN config		Y	Y								
		Web based configuration	Qbv		Y	Y								
			Qbu		Y	Y								
			Qci		N/A	Y								
		Dynamic topology discovery			Y	Y								
	IEEE 1588/802.1AS			Y	Y	Y	Y	Y	Y		Y	Y	Y	Y

Table continues on the next page...

# eIQ™ Toolkit(MPU)

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- eIQ™ Software

- Partnership with ML experts AuZone.
- Application running on x86 PC(Windows) for AI model training/conversion.
  - eIQ Toolkit
    - Includes eIQ Portal – GUI Tool for model creation and conversion
  - eIQ DeepViewRT Model Runner
    - Allows for profiling of model layers on target device
  - eIQ DeepViewRT Inference Engine
- Released on July, 2021.

- Available on NXP website:

- <https://www.nxp.com/eiq>

eIQ™ TOOLKIT: DATA/MODEL

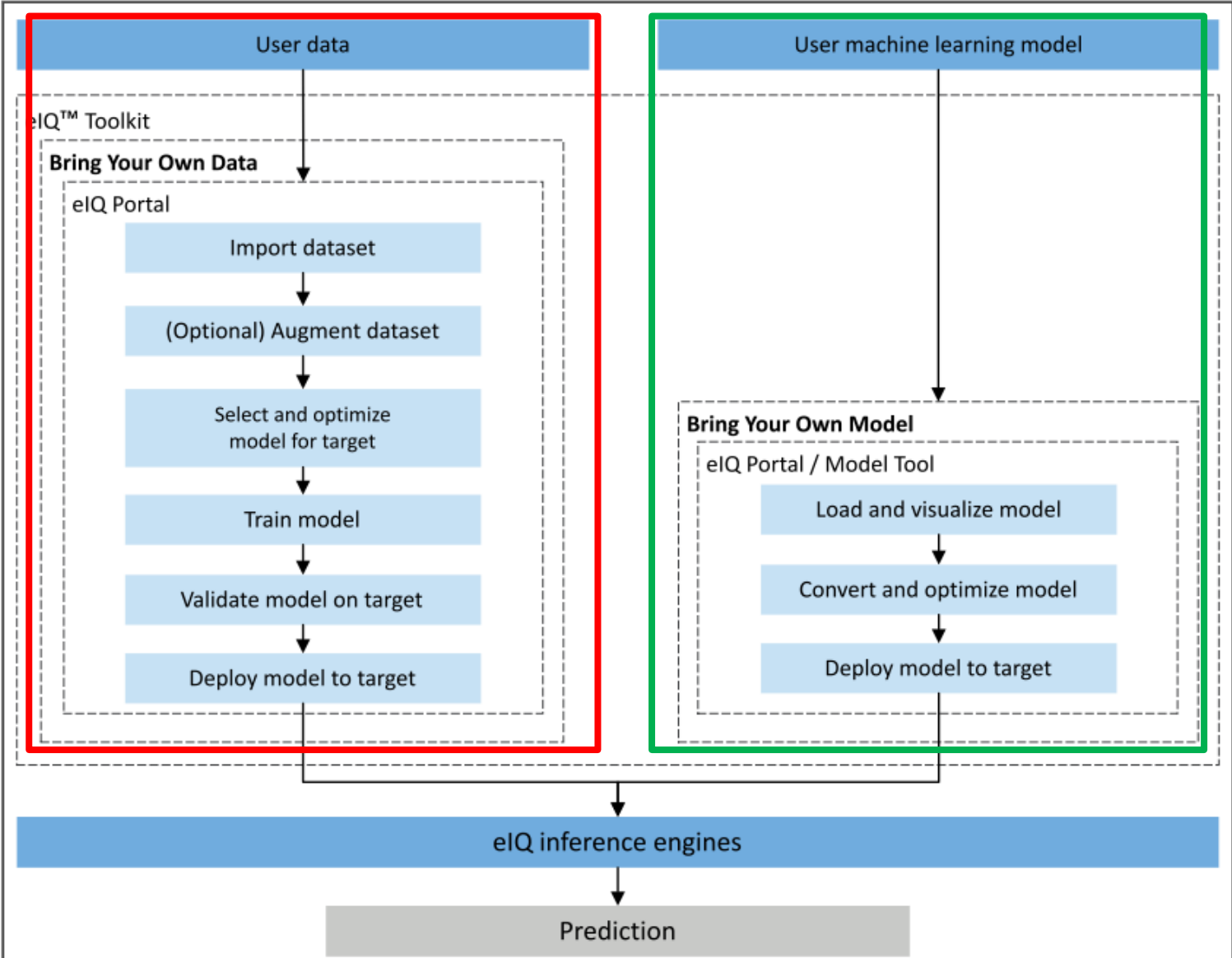


Figure 1. BYOM and BYOD workflows

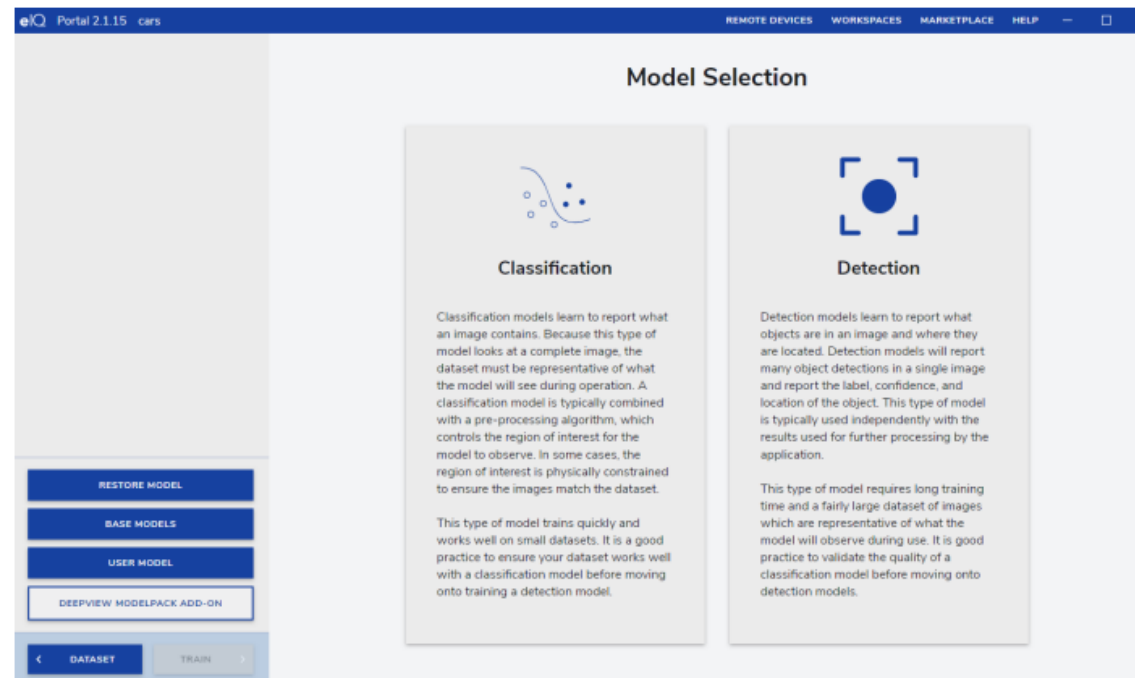
## eIQ™ TOOLKIT: BRING YOUR OWN DATA(BYOD)

- USE PRE-CREATED MODEL AND TRAINED BY YOUR DATA

- Can choose between two main types of visual models:
  - Image Classification – Simpler model to analyze entire image and provide estimate on main object in image
  - Object Detection – More complex model that can identify bounding box for specified classification

- eIQ Toolkit comes with **4 pre-created model** templates written in Keras

- Mobilenet v1
- Mobilenet v2
- Mobilenet v3
- Mobilenet SSD





## eIQ™ TOOLKIT: BRING YOUR OWN MODEL(BYOM) – MODEL CONVERT/QUANTIZATION

- Not all formats can be converted to other formats
- See Table 2 in eIQ Toolkit User Guide for Details (**q** is for quantized)

Table 2. Converter Support

Source\Destination	RTM	TFLite (MLIR/TOCO)	ONNX	RTM q	TF:OTE q	ONNX q
1.x Pb	Y	Y	Y	N	Y	Y
Saved Model (Folder/TAR)	Y	Y	Y	Y	Y	Y
Keras (h5)	Y	Y	Y	Y	Y	Y
RTM	N/A	N	N	N/A	N	N
TFLite (MLIR/TOCO)	Y	N/A	Y	N	N	Y
ONNX	Y	Y	N/A	N	Y	Y
TFLite q (MLIR/TOCO)	Y	N/A	Y	N	N/A	N/A
ONNX q	Y	Y	N/A	N	N/A	N/A



# eIQ™ Toolkit for End-to-End Model Development and Deployment

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IDE and Build Tools (1)

## IDE and Build Tools (1)



eIQ™ Toolkit

The eIQ™ Toolkit enables machine learning development with an intuitive GUI (eIQ Portal) and development workflow tools, along with command line host tool options as part of the eIQ ML software development environment.

EXE Rev 1.0.5 2021-07-01 13:32:00 886081 KB EIQ\_TOOLKIT

Including user guide and setup.exe for PC running Windows system.

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## What do you need help with?

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### RECOMMENDED COMMUNITIES

[eIQ Machine Learning Software](#)

### SUGGESTED LINKS

[Machine Learning Training Videos](#)

[Professional Support for Processors and Microcontrollers](#)

← eIQ training videos.



# eIQ™ TOOLKIT: community page for eIQ support and materials

- <https://community.nxp.com/t5/eIQ-Machine-Learning-Software/bd-p/eiq>

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## eIQ Machine Learning Software

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### Get started with eIQ on


#### i.MX Applications Processors

- [Getting started on eIQ if you have an i.MX Applications Processors](#)
- [eIQ download information](#)
- [eIQ sample applications for i.MX Applications Processors](#)
- [eIQ frequently asked questions \(FAQ\)](#)

#### Microcontrollers

- [Getting started on eIQ if you have a microcontroller](#)
- [eIQ download information](#)
- [eIQ porting guides for MCUs](#)
- [eIQ demo input guide for MCUs](#)
- [eIQ frequently asked questions \(FAQ\)](#)

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Discussions





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