Sensor Toolbox: The Complete Hardware and Software Ecosystem for NXP Sensors
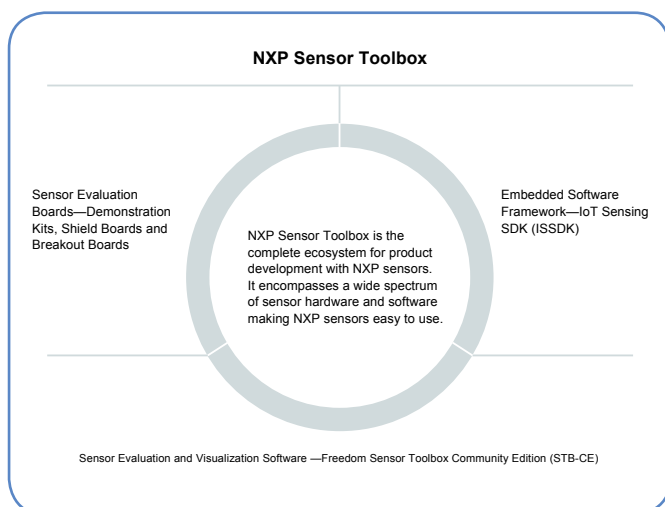
OVERVIEW

NXP Sensor Toolbox is a complete system for product development with NXP sensors. It encompasses a wide spectrum of sensor boards and software tools for various, compatible, Kinetis® microcontrollers. This enables easy to develop sensor demonstrations, evaluation, application development and prototyping. The variety and breadth of the NXP sensor and microcontroller portfolio means that the Sensor Toolbox can be used to address sensing needs across a wide range of use cases.

www.nxp.com/sensortoolbox

WHAT IS THE SENSOR TOOLBOX?

The Sensor Toolbox enables customers to achieve quick time-to-market products with NXP sensors. The Sensor Toolbox includes evaluation boards and an embedded software framework.

NXP Sensor Toolbox

Sensor Evaluation Boards—Demonstration Kits, Shield Boards and Breakout Boards

NXP Sensor Toolbox is the complete ecosystem for product development with NXP sensors. It encompasses a wide spectrum of sensor hardware and software making NXP sensors easy to use.

Embedded Software Framework—IoT Sensing SDK (ISSDK)

Sensor Evaluation and Visualization Software —Freedom Sensor Toolbox Community Edition (STB-CE)

HARDWARE: SENSOR EVALUATION BOARDS

Sensor Toolbox provides sensor enablement hardware including a demonstration kit, shield development board and breakout board. This hardware can be combined with different sensors from NXP:

Demonstration Kit (Shield + Microcontroller)

- Combination of a sensor shield development board and a Freedom development board
- Complete solution for quick sensor demonstrations and evaluations, using the Sensor Tool Box-Community Edition (STB-CE) software

Sensor Shield Development Board

- Pin compatible across most Freedom and Arduino® development boards
- Pins available as test points for evaluating pin signals such as VDD, GND, I^{2}C, SPI, INT etc.

Breakout Board

- Small form factor with identical shield design, ideal for product prototyping
- Test points not only for pin signal evaluation but also for wiring the board to the host MCU.
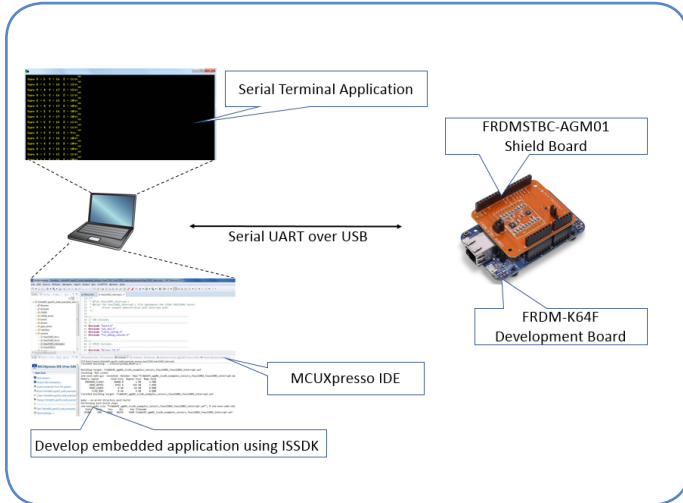
EMBEDDED SOFTWARE FRAMEWORK

IoT Sensing Software Development Kit (ISSDK) is the embedded software platform for the Sensor Toolbox. It is the go-to solution for convenient development of an embedded application/firmware on Kinetis MCUs with NXP sensors. It combines a set of robust sensor drivers and algorithms along with example applications to allow users to start using NXP sensors quickly. ISSDK is offered as a middleware option in MCUXpresso Configuration Tools **mcuxpresso.nxp.com**.

- Enables rapid prototyping and production applications using NXP sensors
- Leverages Kinetis SDK 2.2 drivers and project release infrastructure
- IDEs supported: MCUXpresso (RedEye), KDS, IAR, Atollic®, Kei®l, ARM® GCC
- Host OS supported: Windows®, Mac® and Linux® OS
- Supports bare metal development and FreeRTOS®
- Pedometer and sensor fusion algorithms supported
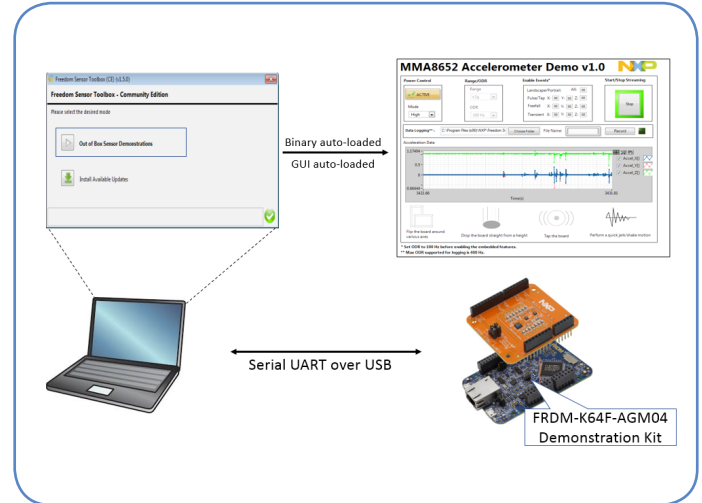- Supports sensor data visualization and data analysis using STB-CE software.

EVALUATION AND VISUALIZATION SOFTWARE

Sensor Toolbox-Community Edition (STB-CE) is visualization and evaluation software for Sensor Toolbox. It enables quick and easy sensor demonstration, evaluation, and sensor data analysis.

Quick demonstration and evaluation are enabled on the available sensor demonstration kits. The firmware and the GUI project are auto-loaded, providing a plug-and-play experience.

- Quick sensor demonstration: enables quick visualization of sensor data and other sensor outputs based on the pre-configured sensor settings in the firmware
- Real time sensor evaluation: enables easy changes to critical sensor settings (ODR, FSR, power modes) and data logging during sensor demonstrations
- Register Level Interface: provides a register map for the sensors allowing quick read and write of different register bits, enabling detailed sensor evaluation

EMBEDDED APPLICATION DEVELOPMENT USING ISSDK

Get started with embedded application development here:

Getting started with ISSDK

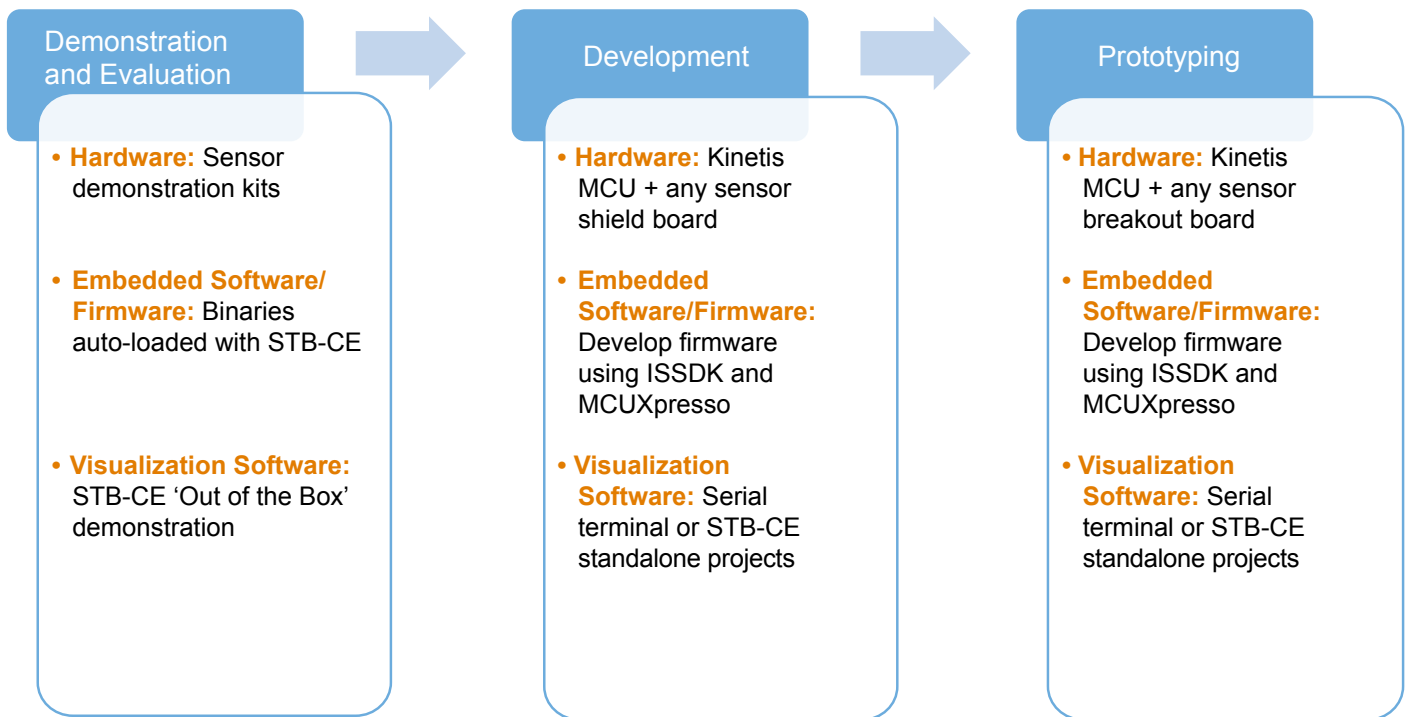## QUICK SENSOR DEMONSTRATION USING STB-CE

Get started with out of the box sensor demonstrations here:

Getting started with STB-CE

HOW DOES THE SYSTEM COME TOGETHER TO DEVELOP YOUR PRODUCTS?

Sensor Toolbox combines hardware and software to facilitate product development.

Demonstration and Evaluation

- **Hardware:** Sensor demonstration kits

- **Embedded Software/ Firmware:** Binaries auto-loaded with STB-CE

- **Visualization Software:** STB-CE 'Out of the Box' demonstration

Development

- **Hardware:** Kinetis MCU + any sensor shield board

- **Embedded Software/Firmware:** Develop firmware using ISSDK and MCUXpresso

- **Visualization Software:** Serial terminal or STB-CE standalone projects

Prototyping

- **Hardware:** Kinetis MCU + any sensor breakout board

- **Embedded Software/Firmware:** Develop firmware using ISSDK and MCUXpresso

- **Visualization Software:** Serial terminal or STB-CE standalone projects

NXP provides a wide range of sensor boards for different NXP sensors. The table below covers all boards with complete software support for different phases of product development with various NXP sensors and their combinations.

Sensor Toolbox Name	Board Type	Board Name	Accelerometer							Gyroscope	Magnetometer		Pressure			Software	
			FXLC95000CL	FXLS8471Q	FXOS8700CQ	MMA8451Q	MMA8491Q	MMA8652Q	MMA9553L	FXAS21002C	FXOS8700CQ	MAG3110	FXPQ3115BVTI	MPL3115A2	MPXV5004DP	ISSDK	Sensor Toolbox-CE
Sensor Toolbox for 9-Axis Solution (1)	Demo kit	FRDM-K22F-AGM01			✓					✓						✓	✓
	Demo kit	FRDM-K64F-AGM01															
	Shield board	FRDM-STBC-AGM01															
	Breakout board	BRKT-STBC-AGM01															
Sensor Toolbox for 9-Axis Solution (2)	Demo kit	FRDM-K64F-AGM04						✓		✓		✓				✓	✓
	Shield board	FRDM-STBC-AGM04															
	Breakout board	BRKT-STBC-AGM04															
Sensor Toolbox for FXLC95000CL Intelligent Motion Sensor	Demo kit	FRDM-K22F-SA9500	✓													✓	✓
	Shield board	FRDM-STBC-SA9500															
	Breakout board	BRKT-STBC-SA9500															
Sensor Toolbox for MMA8451 3-Axis Linear Accelerometer	Demo kit	FRDM-KL25Z FRDM-KL27Z				✓										✓	✓
	Shield board	FRDMSTBC-A8451															
	Breakout board	BRKTSTBC-A8451															
Sensor Toolbox for FXLS8471Q 3-Axis linear Accelerometer	Demo kit	FRDMKL25-A8471		✓												✓	✓
	Shield board	FRDMSTBC-A8471															
	Breakout board	BRKTSTBC-A8471															
Sensor Toolbox for MMA8491Q 3-Axis Digital Accelerometer	Demo kit	FRDMKL25-A8491					✓									✓	✓
	Shield board	FRDMSTBC-A8491															
	Breakout boards	BRKTSTBC-A8491															
Sensor Toolbox for MAG3110	Demo kit	FRDM-KL27Z										✓				✓	✓
Sensor Toolbox for FXPQ3115BVT1 High Precision Biocompatible Pressure Sensor	Demo kit	FRDMKL27-B3115 Q42017											✓			✓	✓
	Shield board	FRDMSTBI-B3115 Q42017															
	Breakout board	BRKTSTBI-B3115 Q42017															
Sensor Toolbox for MPL3115A2 Pressure Sensor/ Altimeter	Demo kit	FRDMKL25-P3115												✓		✓	✓
	Shield board	FRDMSTBC-P3115															
	Breakout board	BRKTSTBC-P3115															
Sensor Toolbox for MPXV5004DP Analog Pressure Sensor	Shield board	FRDMSTBCDP5004													✓		✓
	Breakout board	BRKTSTBCDP5004															
Sensor Expansion board for multiple sensors	Shield board	FRDM-FXS-MULT2-B		✓	✓		✓	✓		✓		✓	✓			✓	✓
10 axis data logger Reference design	Reference design	RD-KL25-AGMP01			✓					✓	✓			✓		✓	✓

Find all the above sensor boards here: **nxp.com/sensorevaluationboards**