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VLSID-2024 : Design Contest Orientation Session

21st August 2023

Agenda

About Design Contest

About STM32 Model Zoo

Tools & Technologies

Question & Answers

About Design Contest

- The theme of the contest is Artificial Intelligence on the Edge
- The objective is to use the STM32Cube.AI Edge AI development tools and ecosystem to create and deploy embedded AI/ML based solutions to real world problems from the following domains: Robotics, Healthcare, Agriculture, Battery Management, Digital Power, and Renewable Energy Management Systems.
- Important dates
 - Idea Submission by : 10th September,2023
 - Selected idea Announcement on : 18th September 2023
 - Kit Dispatch by : 21st September 2023
 - Project Submission by : 5th December ,2023
 - Selected Demo Announcement on : 12th December 2023
 - Final Demonstration on : 9th Jan 2024

About STM32 Model Zoo

- STM32 Model Zoo : [GitHub - STMicroelectronics/stm32ai-modelzoo: AI Model Zoo for STM32 devices](https://github.com/STMicroelectronics/stm32ai-modelzoo)

The screenshot shows the GitHub repository page for `STMicroelectronics/stm32ai-modelzoo`. The repository is public and has 22 forks and 89 stars. The main branch is `main`, with 1 branch and 2 tags. The repository contains several folders, each representing a different AI model category. The 'About' section provides a brief description of the repository and lists various tags and links.

Folder Name	Description	Last Commit
<code>audio_event_detection</code>	Release AI-ModelZoo-1.3.0:	2 months ago
<code>common</code>	Update in common/stm32ai_dc:	last month
<code>hand_posture</code>	Release AI-ModelZoo-1.3.0:	2 months ago
<code>human_activity_recognition</code>	Release AI-ModelZoo-1.3.0:	2 months ago
<code>image_classification</code>	Release AI-ModelZoo-1.3.0:	2 months ago
<code>object_detection</code>	Update Object Detection:	last month
<code>tutorials</code>	Release AI-ModelZoo-1.3.0:	2 months ago

About
AI Model Zoo for STM32 devices

Tags: `ai`, `stm32`, `stm32f4`, `st`, `stm32f7`, `stmicro`, `modelzoo`, `stm32l4`, `stmicroelectronics`, `stm32h7`, `stm32mp1`, `stm32u5`

Links: [Readme](#), [View license](#), [Code of conduct](#), [Security policy](#), [Activity](#)

X-CUBE-AI : AI Tool Features

- Generation of an STM32-optimized library from pretrained neural network and classical machine learning models
- Native support for various deep learning frameworks such as Keras and TensorFlow™ Lite, and support for all frameworks that can export to the ONNX standard format such as PyTorch™, MATLAB®, and more
- Support for various built-in scikit-learn models such as isolation forest, support vector machine (SVM), K-means, and more
- Support for 8-bit quantized neural network format (TensorFlow™ Lite and ONNX Tensor-oriented QDQ)
- Support for deeply quantized neural networks (down to 1-bit) from QKeras and Larq
- Relocatable option enabling standalone model update during product lifecycle by creating a model binary code separated from the application code
- Possibility to use larger networks by storing weights in external flash memory and activation buffers in external RAM
- Easy portability across different STM32 microcontroller series through STM32Cube integration
- With a TensorFlow™ Lite neural network, code generation using either the STM32Cube.AI runtime or TensorFlow™ Lite for Microcontrollers runtime



STM32 IoT Kit

- Ultra-low-power STM32L4 Series MCUs based on Arm® Cortex®-M4 core with 1 Mbyte of Flash memory and 128 Kbytes of SRAM, in LQFP100 package
- 64-Mbit Quad-SPI Flash memory
- Bluetooth® V4.1 module (SPBTLE-RF)
- Sub-GHz (868 MHz or 915 MHz) low-power-programmable RF module (SPSGRF-868 or SPSGRF-915)
- 802.11 b/g/n compliant Wi-Fi® module from Inventek Systems (ISM43362-M3G-L44)
- Dynamic NFC tag based on M24SR
- 2 digital omnidirectional microphones (MP34DT01)
- Capacitive digital sensor (HTS221). 3-axis magnetometer (LIS3MDL)
- 3D accelerometer and 3D gyroscope (LSM6DSL)
- 260-1260 hPa absolute digital output barometer (LPS22HB)
- Time-of-Flight and gesture-detection sensor (VL53L0X)



The board's serial number is indicated on a sticker under the MB1297 reference on the bottom of the board. If this number is lower than 182404896 for B-L475EIOD1A1C boards, or than 184906074 for B-L475EIOD1A2C boards, the default firmware connecting to AWS Cloud needs updating. Download the latest version available at <http://www.st.com/s-cube-aws>

Resources

- Top level ST page on AI, https://www.st.com/content/st_com/en/about/innovation---technology/artificial-intelligence.html
- Webpage aggregating all ST [AI tool](#) solution
- [MOOC](#) on ST AI developer tool
- ST sensor [portfolio](#)
- [MOOC](#) on Intro to STM32 microcontroller



Tools & Technology

- STM32CubeMx : [STM32CubeMX - STM32Cube initialization code generator - STMicroelectronics](#)
 - Video : [STM32CubeMX - STM32Cube initialization code generator – STMicroelectronics](#)
- STM32CubeIDE : [STM32CubeIDE - Integrated Development Environment for STM32 - STMicroelectronics](#)



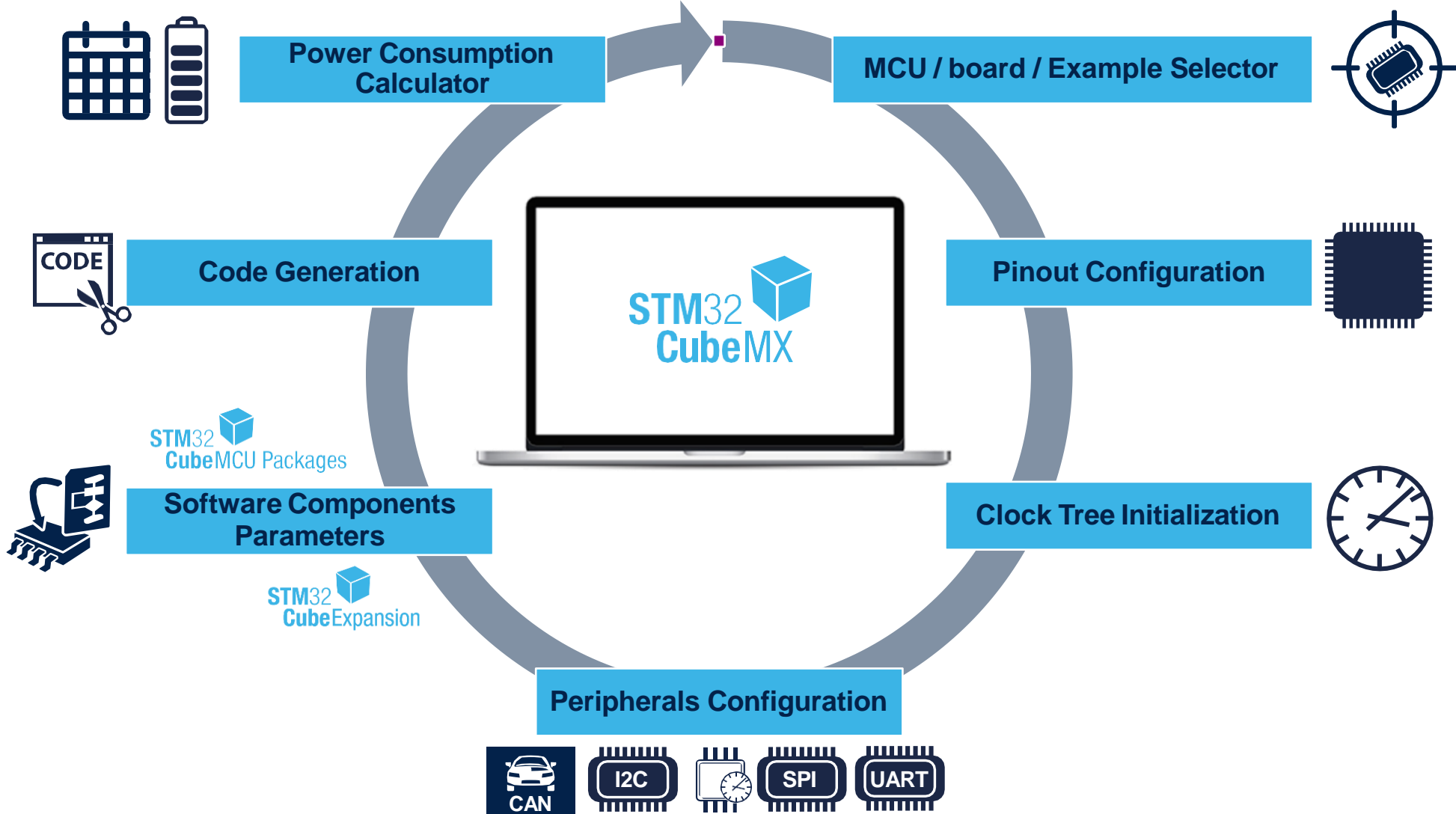
STM32CubeMX

STM32 
CubeMX



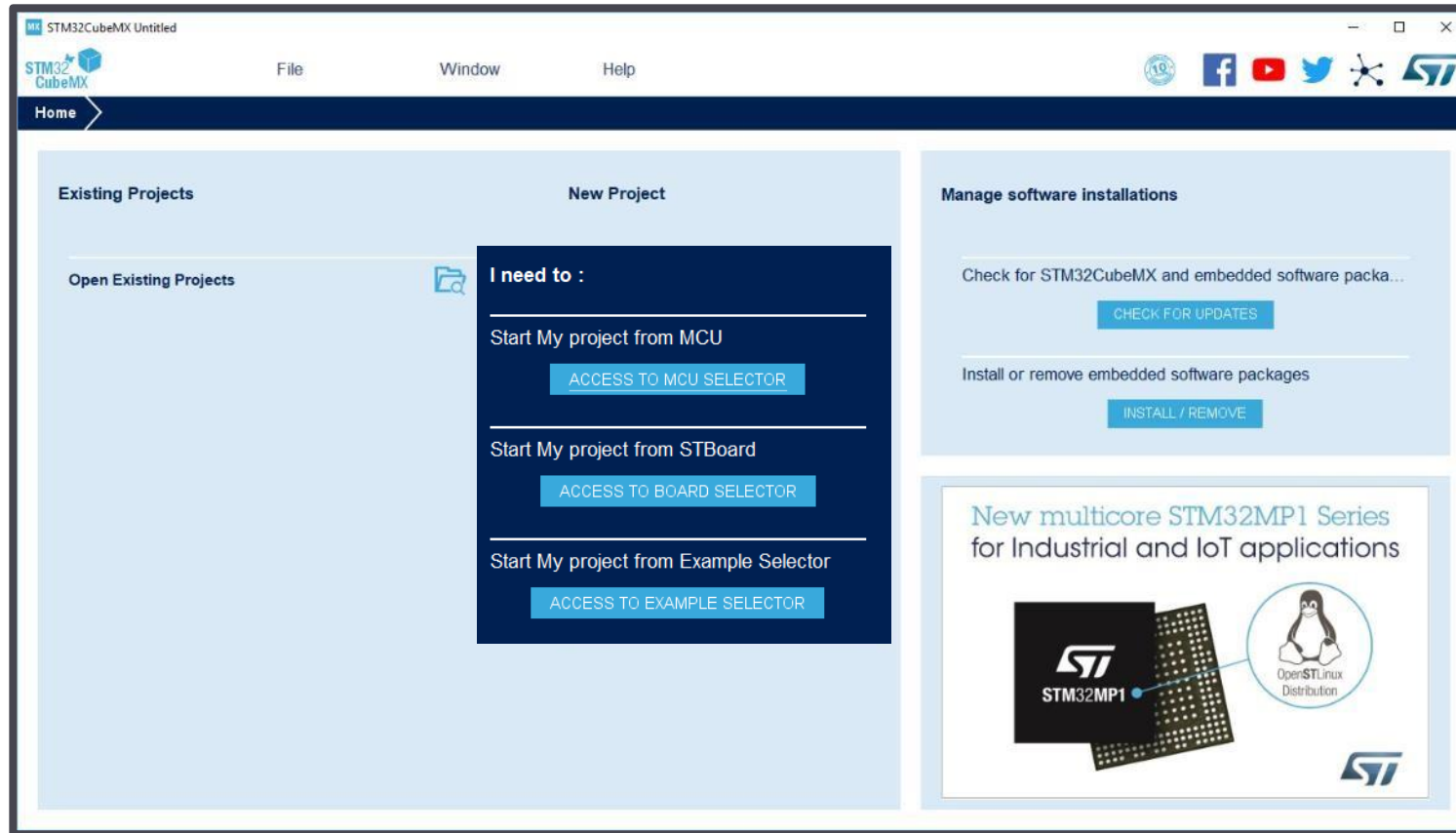
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STM32CubeMX key steps





MCU / MPU selection



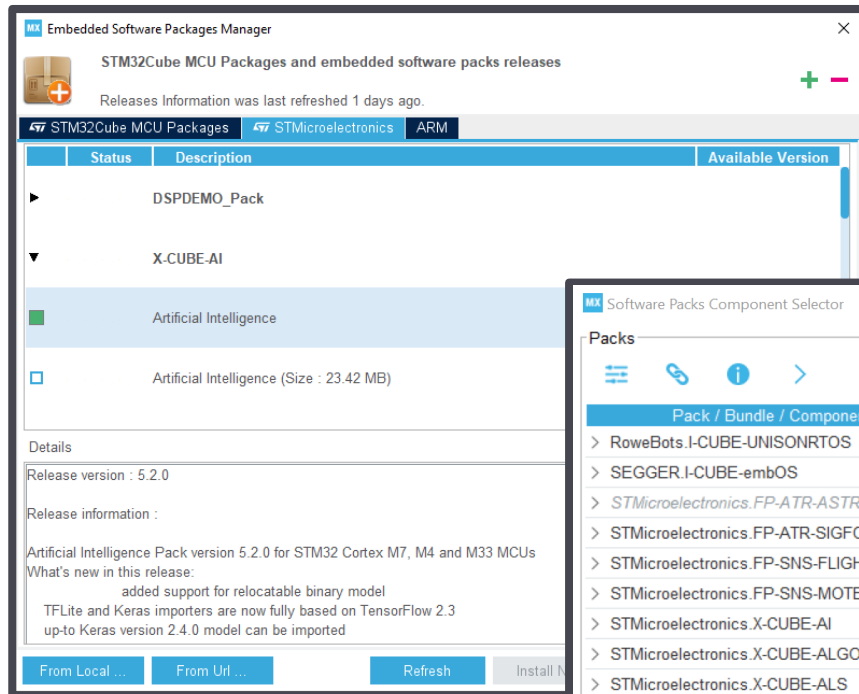
MCU / MPU
SELECTOR

BOARD
SELECTOR

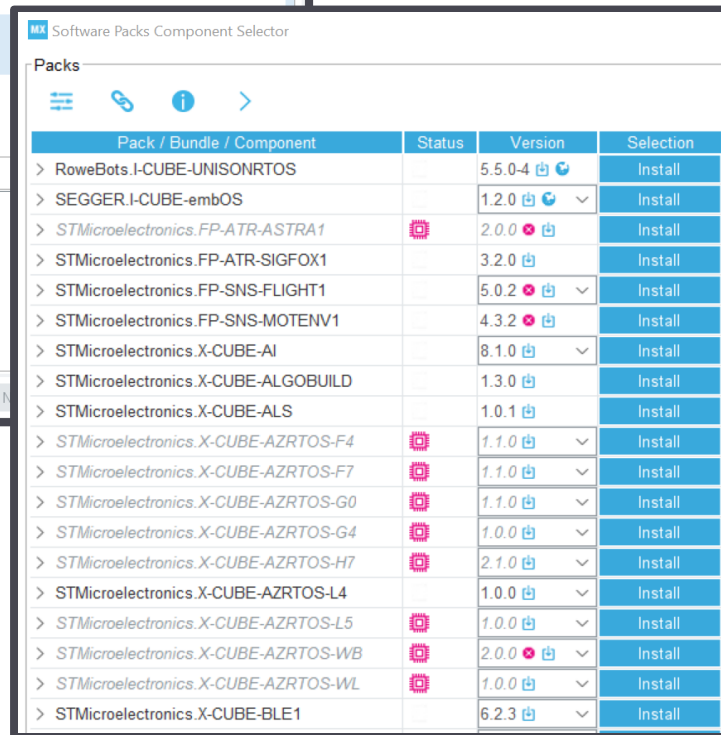
EXAMPLE
SELECTOR



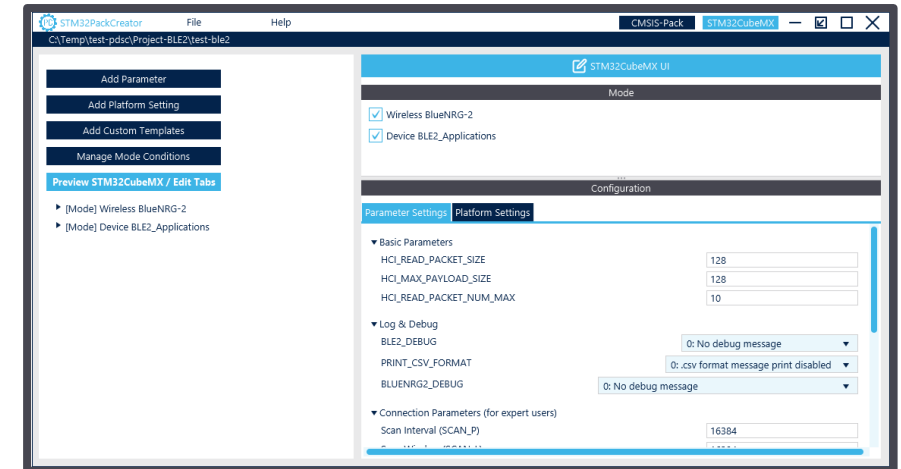
Add Expansion Middleware and build your own



Download and install existing Expansion Package...




...and select components to add to your project



or

Build your own Expansion Package with **STM32PackCreator**

STM32CubeIDE

STM32 
CubeIDE



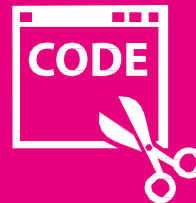
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One tool for all your STM32 development

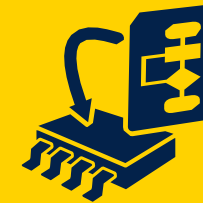
Chipset / Board
Configuration



Code
Development

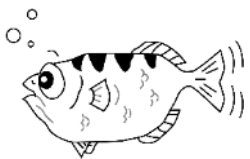
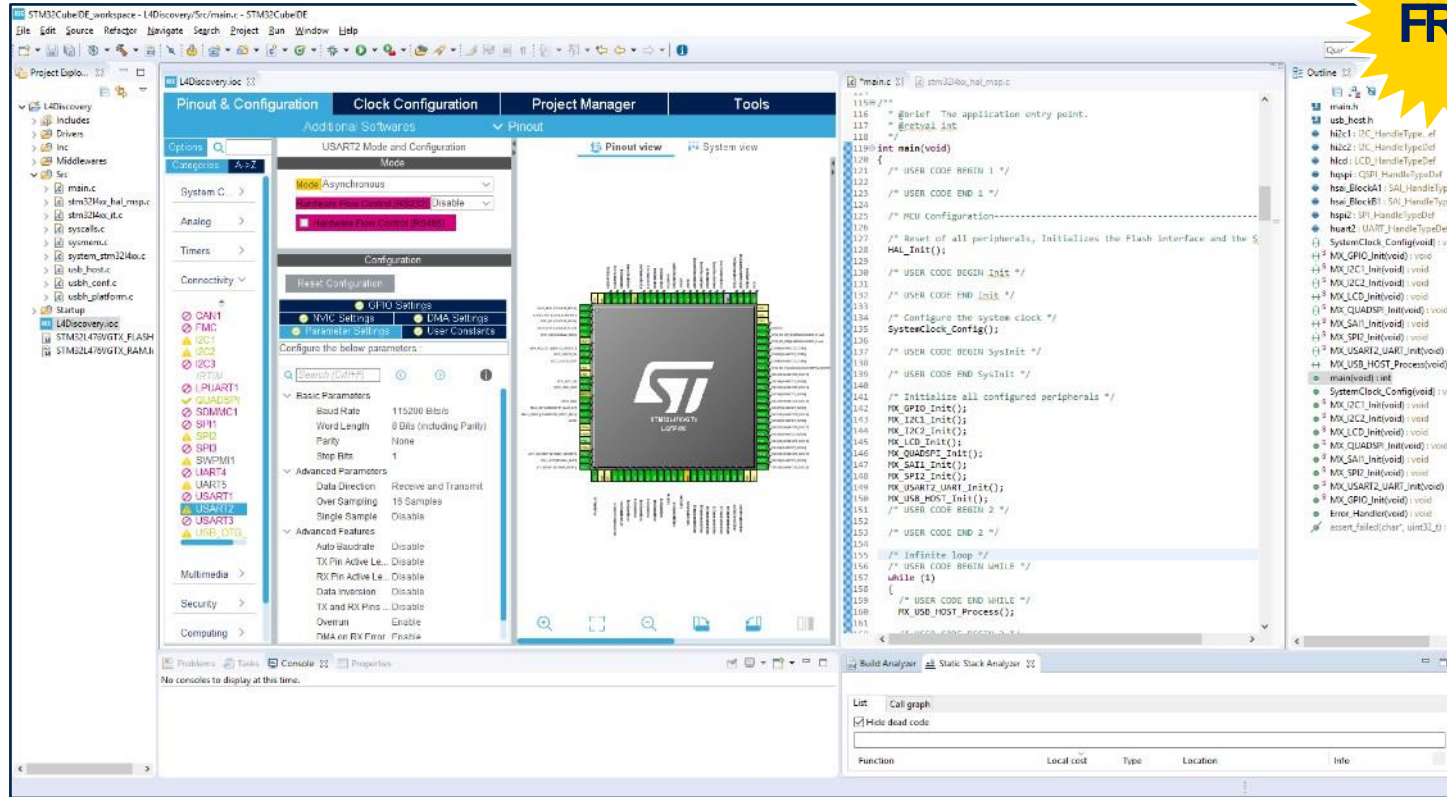


Validation
Debug



Free multi-platform development tool

FREE



macOS

Eclipse/GCC Based

Free for Commercial Development

Multi-OS Support

Our technology starts with You



Find out more at www.st.com

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