InnovationFair

Share, Inspire, Innovate!

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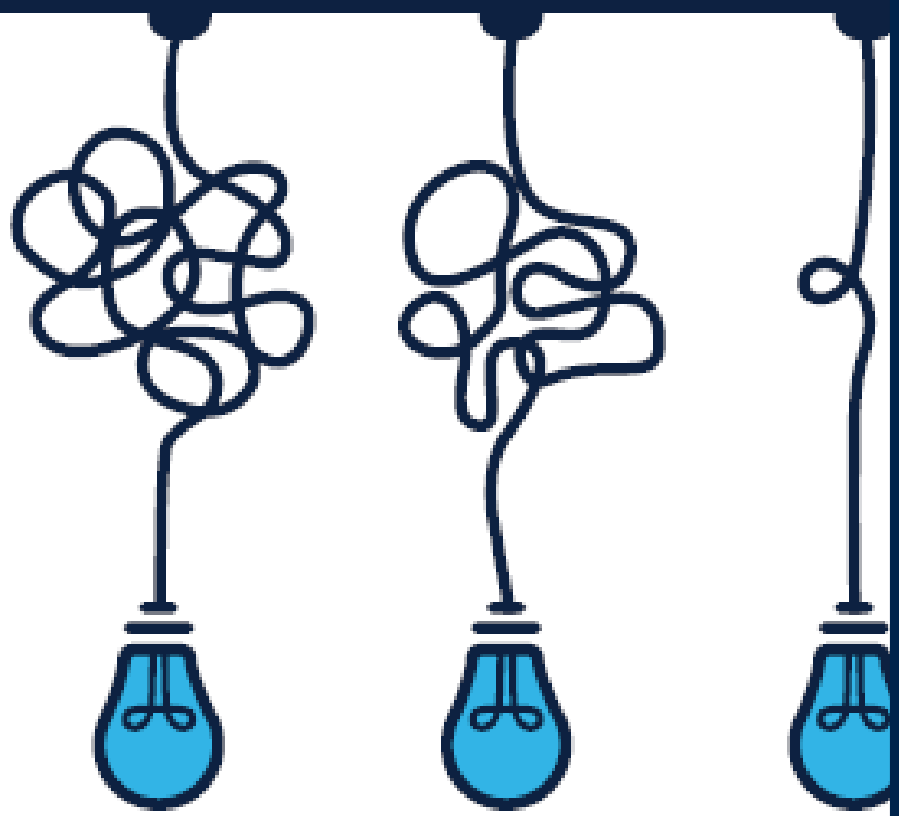

Orientation Session

26th September 2023

Agenda

- # InnovationFair-2024
- # STM32AI Model Zoo
- # Tools & Technologies
- # Questions & Answers

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InnovationFair-2024

- The theme of the contest is *AI Models on STM32*
- The objective is to use the STM32Cube.AI development tools and ecosystem to create and deploy embedded AI/ML based solutions to real world problems from the following domains: Healthcare, Agriculture, Battery Management, Industrial & Robotics, Smart Mobility & Environment

- Important dates
  - Idea Submission by : 9th October, 2023
  - Selected idea Announcement on : 16th October, 2023
  - Project Submission by : 5th February, 2024
  - Final Demonstration on : March 2024

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General Guidelines

- STM32L4 Discovery IoT Kit (B-L475E-IOT01A) will be used for the competition and ST will provide one kit to each shortlisted team.
- A team can have a maximum of four students led by a faculty member of an Indian University. A faculty member may lead more than one team with different team members.
- All idea proposals to be submitted on tech.connect@st.com.
- Support on getting started with ST tools will be provided based on the requests.

Idea Submission Template

- **Overview of the idea:**
  Minimum font size: 10pt, Times New Roman font. Maximum two pages including tables, diagram, references (if any).
- **Example of its application:**
  Describe an example consisting of potential application/Future application. This will enable usage model towards its market acceptance), Maximum one page.
- **Benefits and Value addition:**
  Explain what the key benefits of your idea/implementation are. You should describe key value addition of your idea as this will explain why your idea has value in presence of other competitor(s) OR Players. In a way it will show uniqueness/Unique selling point/key differentiator). Maximum half a page.
- **Miscellaneous:**
  List your Faculty mentor and team members' names, branch, affiliation, and contact emails. Include the name of your university/college and your shipping address. The board will be shipped to faculty member's attention

About STM32 Model Zoo

- STM32 Model Zoo : [GitHub - STMicroelectronics/stm32ai-modelzoo: AI Model Zoo for STM32 devices]

https://github.com/STMicroelectronics/stm32ai-modelzoo

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STMicroelectronics / stm32ai-modelzoo Public

Notifications Fork 22 Star 89

Code Issues 3 Pull requests Actions Projects Security Insights

main 1 branch 2 tags Go to file Code

YHASTM Update in common/stm32ai_dc: ... f70a045 last month 20 commits

audio_event_detection	Release AI-ModelZoo-1.3.0:	2 months ago
common	Update in common/stm32ai_dc:	last month
hand_posture	Release AI-ModelZoo-1.3.0:	2 months ago
human_activity_recognition	Release AI-ModelZoo-1.3.0:	2 months ago
image_classification	Release AI-ModelZoo-1.3.0:	2 months ago
object_detection	Update Object Detection:	last month
tutorials	Release AI-ModelZoo-1.3.0:	2 months ago

About

AI Model Zoo for STM32 devices

ai stm32 stm32f4 st stm32f7 stmicro modelzoo stm32l4 stmicroelectronics stm32h7 stm32mp1 stm32u5

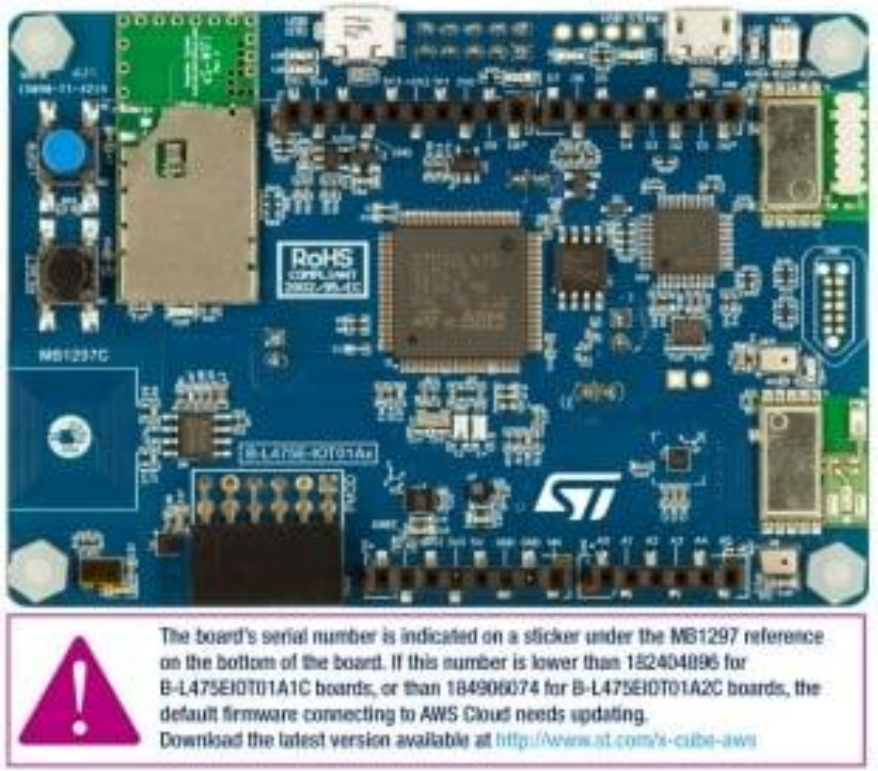
Readme
View license
Code of conduct
Security policy
Activity

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)



STM32

aws qualified device

arm MBED Enabled

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GitHub

- https://innovationfair-2024.github.io/

InnovationFair-2024

General

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A team can have a maximum of four students led by a faculty member of an Indian University. A faculty member may lead more than one team with different team members.
ST will organize information session/s about the Model Zoo and share the links to relevant documents, repositories, and guidelines for submission. The date, time and link for the webinar will be shared with all who express their interest to participate at tech.connect@st.com.

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 Introduction to STM32 microcontroller

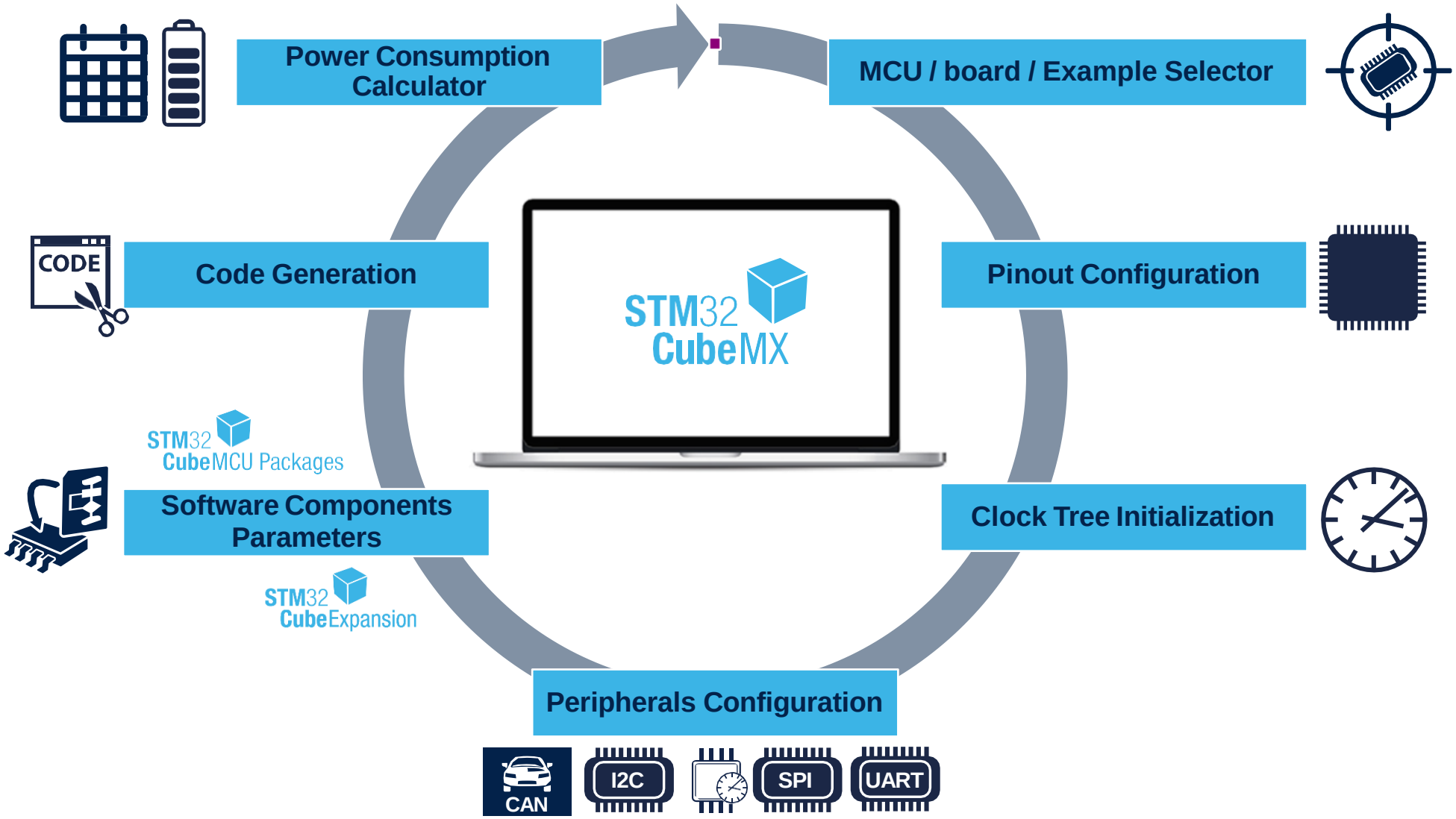
Tools & Technology

- STM32CubeMx :STM32CubeMX - STM32Cube initialization code generator - STMicroelectronics
  - Video : STM32CubeMX - STM32Cube initialization code generator – STMicroelectronics

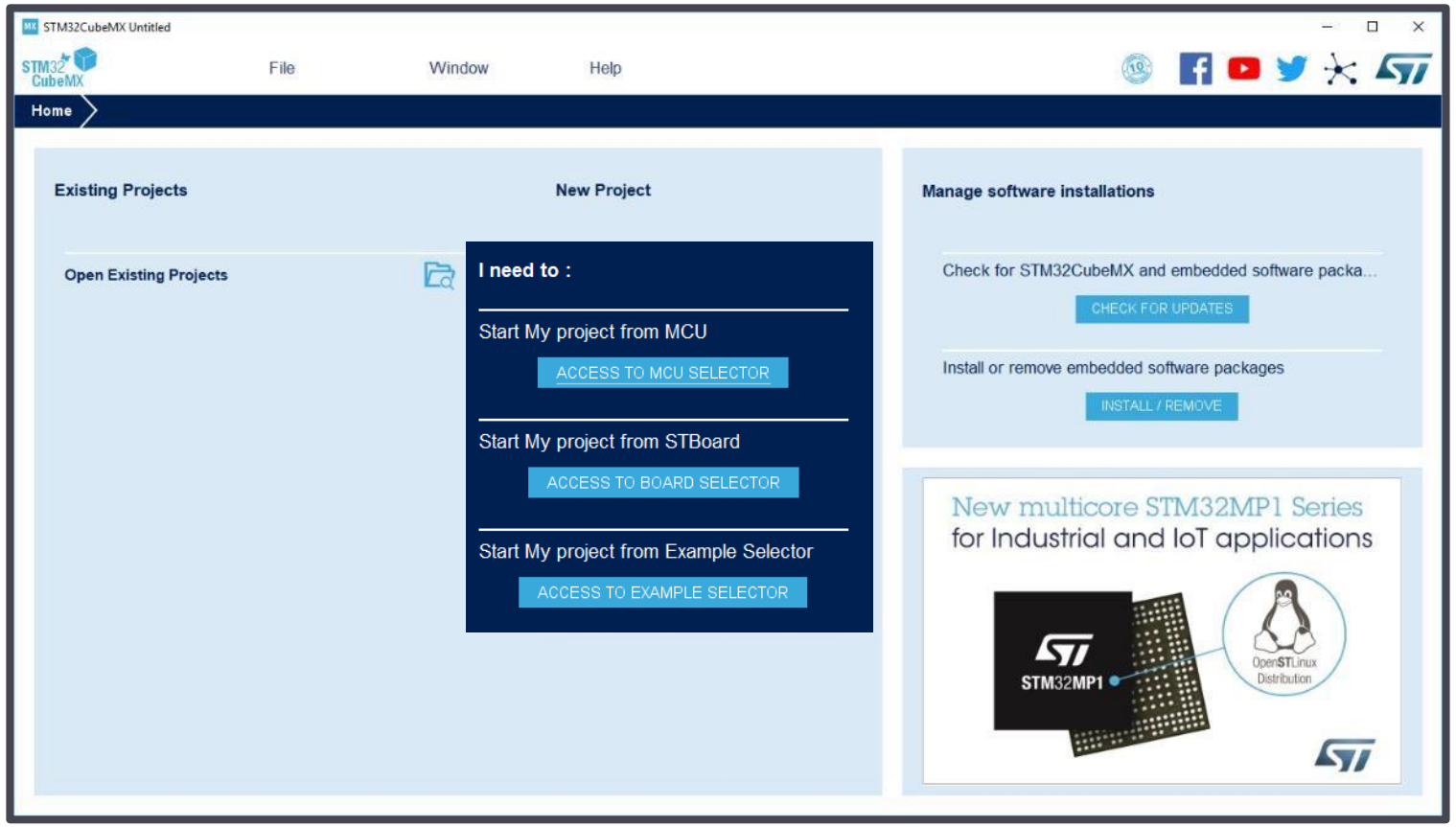
- STM32CubeIDE :STM32CubeIDE - Integrated Development Environment for STM32 - STMicroelectronics

STM32CubeMX

STM32CubeMX key steps



MCU / MPU selection



MCU / MPU SELECTOR

BOARD SELECTOR

EXAMPLE SELECTOR

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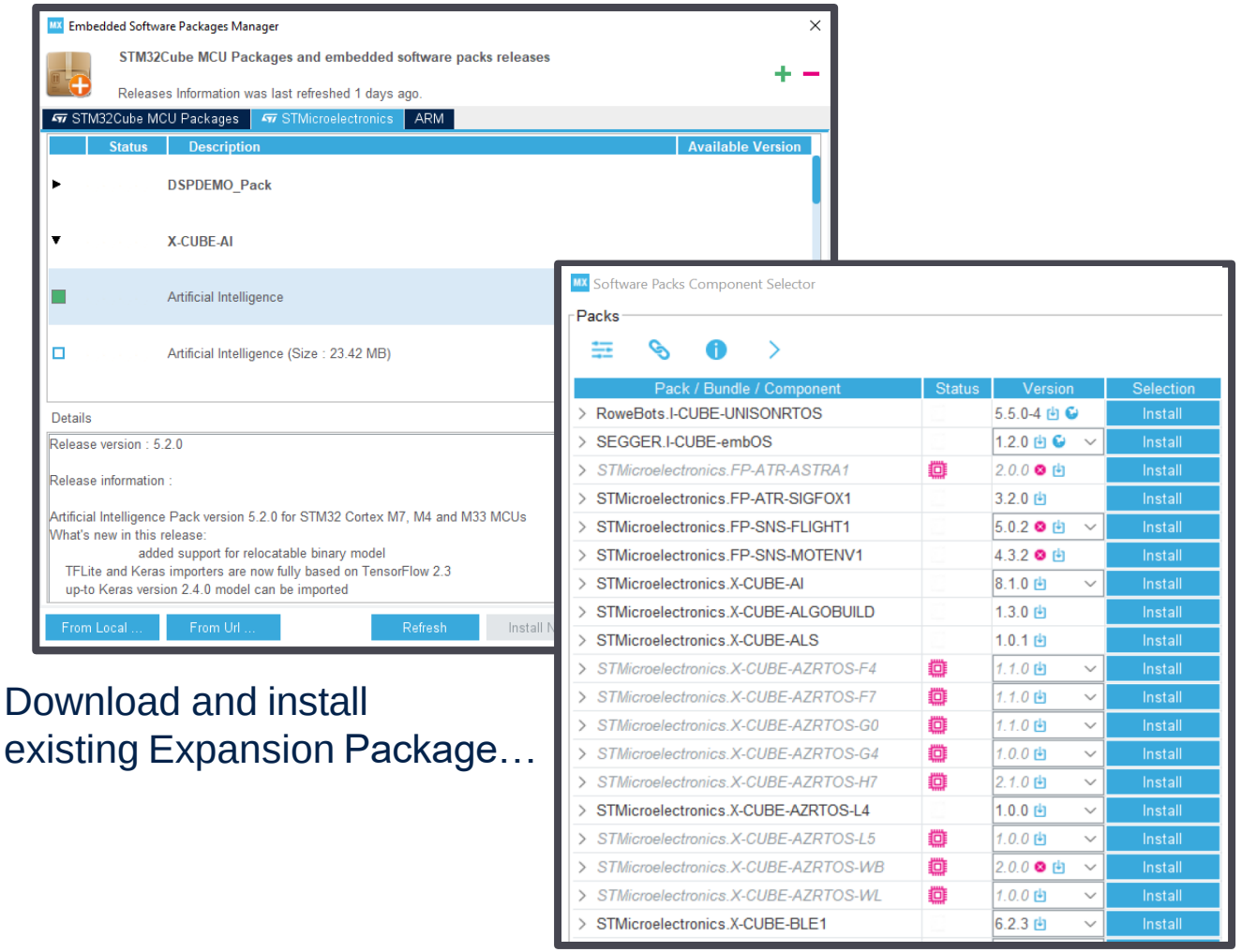
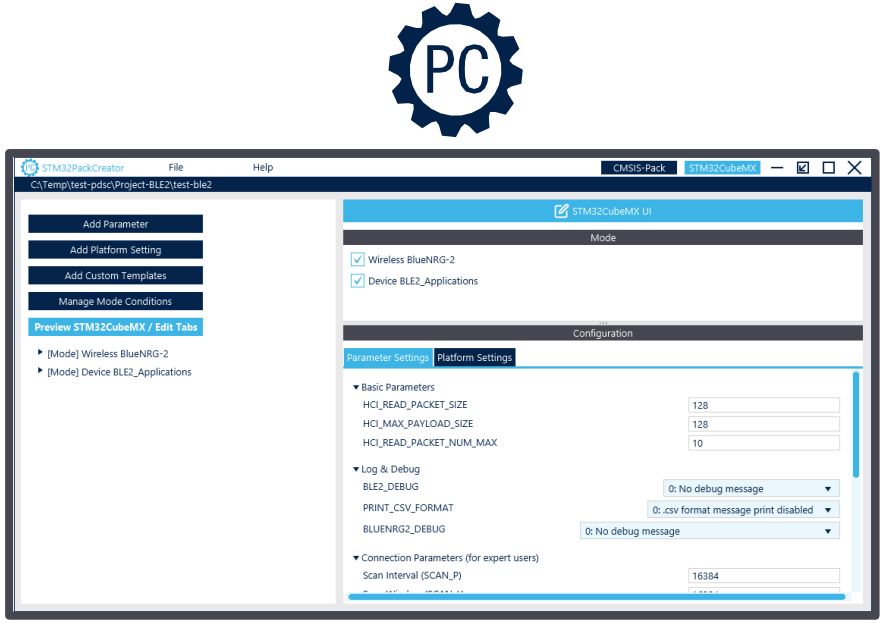
Add Expansion Middleware and build your own



Download and install existing Expansion Package…

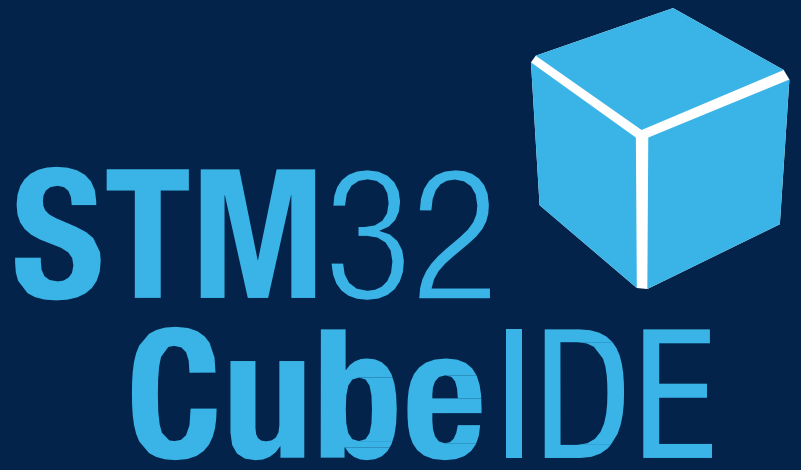
or



Build your own Expansion Package with **STM32PackCreator**

…and select components to add to your project

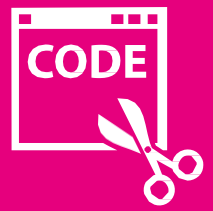
STM32CubeIDE



One tool for all your STM32 development

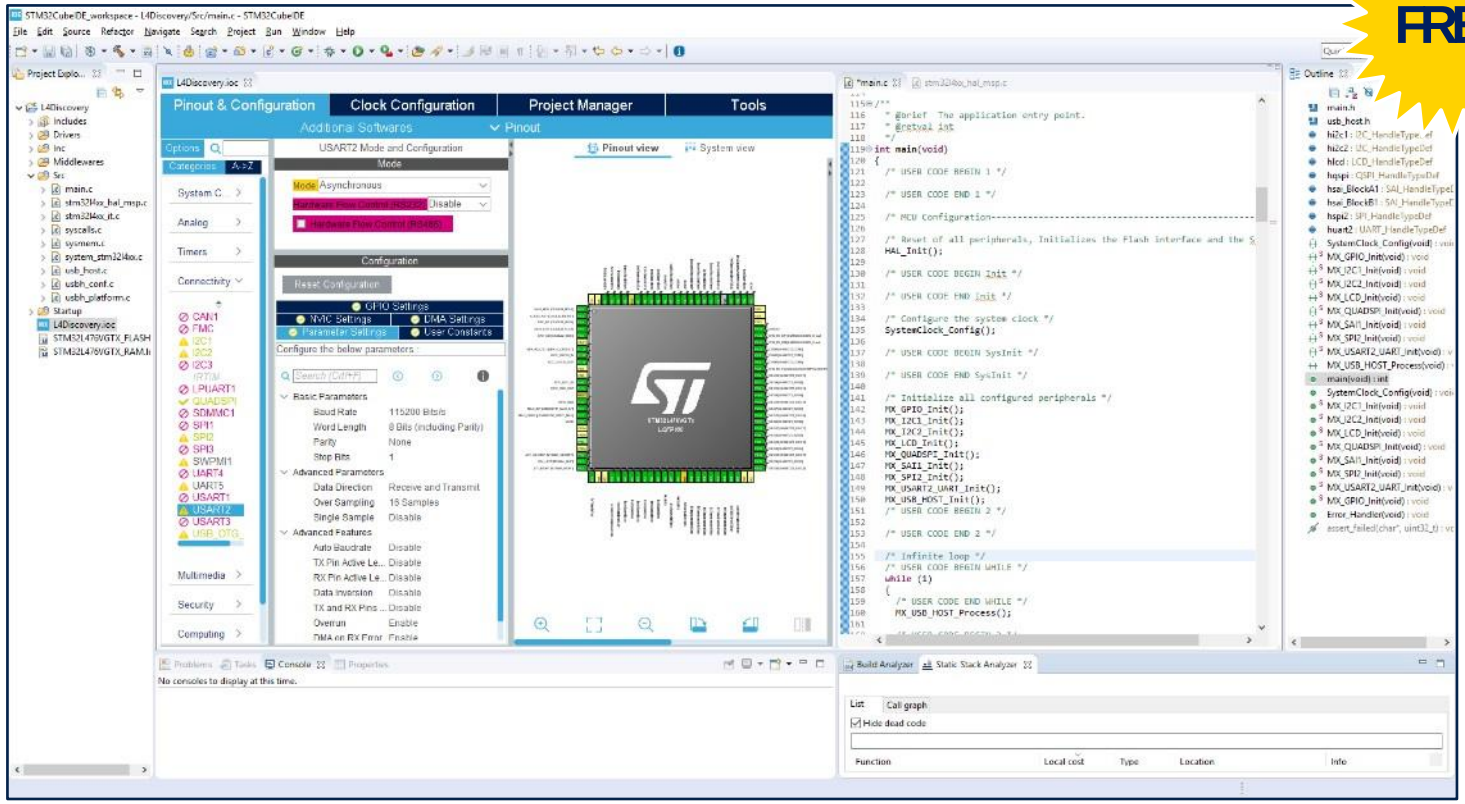
Chipset / Board Configuration

Code Development



Validation Debug

Free multi-platform development tool



eclipse

GCC

Windows

macOS

Eclipse/GCC Based

Free for Commercial Development

Multi-OS Support

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Our technology starts with You

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