VLSID-2024 : Design Contest Orientation Session

21st August 2023
# 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 : 10\(^{th}\) September, 2023
  • Selected idea Announcement on : 18\(^{th}\) September 2023
  • Kit Dispatch by : 21\(^{st}\) September 2023
  • Project Submission by : 5\(^{th}\) December , 2023
  • Selected Demo Announcement on : 12\(^{th}\) December 2023
  • Final Demonstration on : 9\(^{th}\) 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)
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
• 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)
Resources

- Webpage aggregating all ST AI tool solution
- [MOOC](#) on ST AI developer tool
- ST sensor [portfolio](#)
- [MOOC](#) on Intro to STM32 microcontroller
• 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

1. Power Consumption Calculator
2. MCU / board / Example Selector
3. Code Generation
4. Pinout Configuration
5. Software Components Parameters
6. Clock Tree Initialization
7. Peripherals Configuration

- CAN
- I2C
- SPI
- UART
MCU / MPU selection

MCU / MPU SELECTOR

BOARD SELECTOR

EXAMPLE SELECTOR
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
One tool for all your STM32 development

Chipset / Board Configuration

Code Development

Validation Debug
Free multi-platform development tool

Eclipse/GCC Based
Free for Commercial Development
Multi-OS Support
Our technology starts with You

Find out more at www.st.com