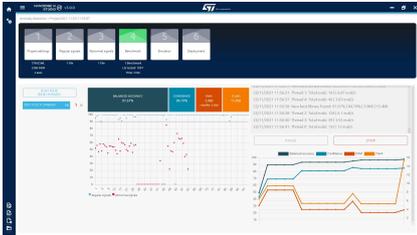


Free automated machine learning (ML) tool for STM32 microcontrollers



Product status link

[NanoEdgeAIStudio](#)



**NANOEDGE AI
STUDIO**

Features

- Desktop tool for the design and generation of STM32-optimized libraries with small datasets:
 - Anomaly detection libraries: Learn normality directly on the STM32 microcontroller and detect defects in real time
 - One-class classification libraries: Perform the acquisition during normal equipment operation and detect any abnormal pattern deviation
 - N-class classification libraries: Classify signals in real time
 - Extrapolation libraries: Predict discrete values based on data patterns never seen before
- Support for any type of sensor for a variety of physical quantities: multiaxis acceleration, current, magnetic field, voltage, temperature, acoustic pressure, and more
- Millions of possible algorithms are available to find the optimal library in terms of accuracy, confidence, inference time, and memory footprint
- Generation of very small footprint libraries running down to the smallest Arm® Cortex®-M0 microcontrollers
- Integrated tools such as:
 - Sampling finder tool to select the right data rate and the right data length easily
 - Datalogger generator to get ready to log data in a few clicks
 - Data manipulation tool for datasets
 - ML libraries benchmark to find the best combination between preprocessing and machine learning models
 - Embedded emulator to test library performance live with an attached STM32 board or from test data files
 - Inference time estimation to help users make an informed choice for model selection
 - Validation tool to compare the libraries given by NanoEdge™
- Native support for STM32 development boards, no configuration required, and easy portability across the various microcontrollers based on the Arm® Cortex®-M processor

1 Description

NanoEdge™ AI Studio (NanoEdgeAIStudio) is a new machine learning (ML) technology to bring true innovation easily to the end-users. In just a few steps, developers can create an optimal ML library for their project, based on a minimal amount of data.

NanoEdge™ AI Studio, also called the Studio, is a PC-based push-button development studio for developers, which runs on Windows® or Linux® Ubuntu®.

One of its significant advantages is that NanoEdge™ AI Studio requires no advanced data science skills. Any software developer using the Studio can create optimal tinyML® libraries from its user-friendly environment with no artificial intelligence (AI) skills.

The Studio can generate four types of libraries: anomaly detection, outlier detection, classification, and regression libraries.

These libraries can be combined and chained to create a complete edge AI solution: anomaly or outlier detection to detect a problem on the equipment, classification to identify the source of the problem, and regression to extrapolate information and provide real insight to the maintenance team.

The input signals can range from vibration to pressure, sound, magnetic, time of flight just to name a few, or even a combination of several signals. Multiple sensors can be combined, either in a single library, or using multiple libraries concurrently.

Both learning and inference are done directly inside the microcontroller by means of the NanoEdge™ AI on-device learning library, which streamlines the edge AI process and significantly reduces development effort, cost and therefore time to market.

2 General information

NanoEdge™ AI Studio (NanoEdgeAIStudio) provides libraries for all microcontrollers based on the Arm® Cortex®-M processor.

Note: Arm is a registered trademark of Arm Limited (or its subsidiaries) in the US and/or elsewhere.



2.1 Ordering information

NanoEdge™ AI Studio (NanoEdgeAIStudio) is available to download from the STM32 AI website at stm32ai.st.com/nanoedge-ai, as described in Table 1. It is available free of charge for every development on an STM32 microcontroller.

Table 1. NanoEdgeAIStudio free license

| License | Detailed information | Technical support | Target MCU |
|--------------|--|---|--|
| STNEAISTUDIO | Free of charge for evaluation purposes, and for production on STM32 microcontrollers | Basic support from STMicroelectronics field application engineers | On supported Cortex®-M microcontrollers, STM32 Nucleo boards, and Discovery kits |

For production on non-STMicroelectronics targets, contact STMicroelectronics sales office or distributors to purchase the NanoEdge™ AI Studio libraries right of use. The libraries generated with NanoEdge™ AI Studio can run on any Cortex®-M microcontrollers during development. They are subject to licensed conditions for commercial usage on other platforms than STM32 microcontrollers.

Table 2. NanoEdgeAIStudio commercial offer

| Order code | Detailed information | Technical support | Target MCU |
|------------|---|---|---|
| STNEAILIB | Right of use the NanoEdge™ AI Studio libraries for production on non-STMicroelectronics targets | Basic support from STMicroelectronics field application engineers | Any microcontrollers or target based on the Cortex®-M processor |

For more details and pricing information, contact the local STMicroelectronics sales office or distributors.

2.2 System requirements

- Personal computer
- Multi-OS support: Windows® or Linux® Ubuntu®

Note: Windows is a trademark of the Microsoft group of companies.

Linux® is a registered trademark of Linus Torvalds.

Ubuntu® is a registered trademark of Canonical Ltd.



3 License

For NanoEdge™ AI Studio (NanoEdgeAIStudio) license information, visit its resource page on the STM32 Edge AI website at stm32ai.st.com.

Revision history

Table 3. Document revision history

| Date | Revision | Changes |
|-------------|----------|---|
| 15-Sep-2021 | 1 | Initial release. |
| 5-Nov-2021 | 2 | Updated product ordering and associated license descriptions in <i>Description</i> and <i>Ordering information</i> . |
| 8-Dec-2021 | 3 | <p>Added library descriptions in <i>Features</i> and <i>Description</i>:</p> <ul style="list-style-type: none"> One-class classification libraries (outlier detection) Regression libraries (extrapolation) <p>Free evaluation license extended from two weeks to three months in <i>Ordering information</i>.</p> |
| 14-Feb-2023 | 4 | <p>Updated <i>Description</i>, <i>Ordering information</i>, and <i>License</i>:</p> <ul style="list-style-type: none"> Free development license and production right of use STM32 AI website (stm32ai.st.com) |
| 13-Jul-2023 | 5 | <p>Updated <i>Features</i>:</p> <ul style="list-style-type: none"> Updated the presentation of the features Added the integrated tools, including the sampling finder |
| 6-Dec-2023 | 6 | <p>Updated the conditions of use:</p> <ul style="list-style-type: none"> Updated the document title Updated the portability and added the inference time estimation in Features Updated Description with tinyML[®] and edge AI Updated the applicable targets and conditions in Ordering information |

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