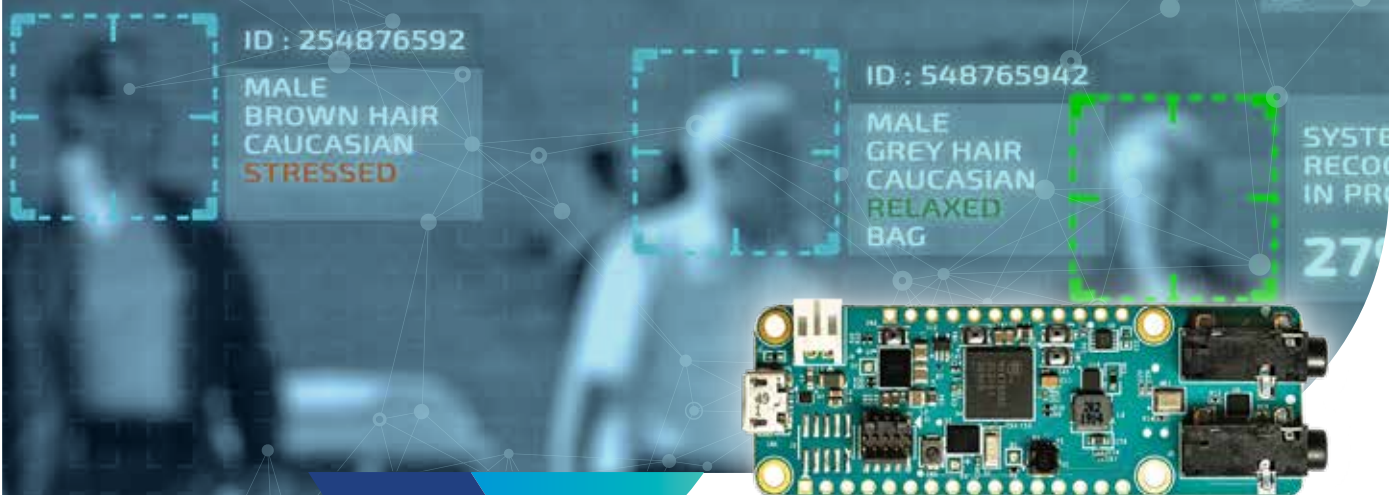


# Machine Learning at the Edge with ADI Microcontroller MAX78000

## Enabling True Low Power Edge Inference



**MAX78000FTHR Development Board**

 **3 and 4th Jan 2024**

 **09:00-17:00**

 **\$250** (inclusive of the MAX78000FTHR Development Board)

 **Level 5, PlanetSpark Training Room**  
**15 Changi Business Park Central 1**  
**#05-06/07, Singapore 486057**



**Register  
by scanning  
QR Code**

Closing date: 15 Dec 2023

## Course Synopsis

In today's AI-driven world, Machine Learning and Deep Learning have become essential technologies. But how can you easily grasp their concepts and leverage them effectively? This comprehensive course will provide you with a solid understanding of machine learning principles, as well as practical skills in deploying trained neural networks on microcontrollers—a field known as embedded machine learning or TinyML.

Designed with beginners in mind, this course will take you from the fundamentals to designing and implementing your own machine learning-enabled projects on Arm Cortex-M4 100MHz processor with FPU and RISC-V core, 32-bit RISC-V coprocessor and come with Convolution Neural Network Accelerator (CNN). This course provides a step-by-step guide for implementing and deploying artificial intelligence (AI) solutions onto an ADI MAX78000FTHR Development Board.

Hands-on exercises will help you gain proficiency in preparing data, developing and testing machine learning models, and deploying them to a real physical hardware, the MAX78000FTHR Development Board, and using the ai8x framework tools and Eclipse IDE in the process.

## Learning Objectives

- Define the basics of a machine learning system and explain the key processes involved.
- Train, test and deploy convolutional neural network models (CNN) specifically tailored for the MAX78000 microcontroller.
- Interpret machine learning information to make informed decisions and perform accurate predictions within embedded systems.
- Recall areas of knowledge expansion in AI and machine learning.

## Requirements

- Basic coding experience
- Basic understanding of software file structure
- No prior Machine Learning knowledge required

## Why you should take this course

- **Gain Key Knowledge:** This course provides you with sufficient understanding of the development process and enabling learners to delve into and adjust necessary parameters of their machine learning models. By programming models, learners will significantly enhance their understanding of machine learning principles.
- **Develop Your Own AI Model:** By enrolling in this course, learners will acquire the skills and knowledge necessary to create your own AI model. From defining a problem to gathering data, training neural networks, and deploying the model on microcontrollers, they will be given an opportunity to build and showcase their own machine learning project.
- **Build an End-to-End Machine Learning Project:** This course takes learners beyond theoretical concepts and guides them through the entire process of building an end-to-end machine learning project.
- From data preparation to model development and deployment, learners will gain practical experience in executing each step and witness the tangible outcomes of your work.

## Programme Outline

Time	Day 1 Activity
09:00 – 10:00 (1 hr)	<b>Introduction</b> <ul style="list-style-type: none"><li>• TinyML</li><li>• ADI MAX78000FTHR board</li></ul>
10:00 – 10:15	<b>Break</b>
10:15 – 12:15 (2 hrs)	<b>Overview of ai8x Development Phases</b> <ul style="list-style-type: none"><li>• Model Training, Synthesis, Deploy pipeline</li><li>• Maximum SDK, Dependencies, Eclipse</li></ul>
12:15 – 13:15	<b>Lunch Break</b>
13:15 – 15:00 (1.75 hr)	<b>Resource Preparation</b> <ul style="list-style-type: none"><li>• Computer Dev Preparation / Readiness check</li></ul>
15:00 – 15:15	<b>Break</b>
15:15 – 16:45 (1.5 hr)	<b>Hands-on: Model development</b> <ul style="list-style-type: none"><li>• Project Overview</li><li>• Model Training (small-scale)</li></ul>
16:45 – 17:00	<b>Summarization &amp; QnA</b>

Time	Day 2 Activity
09:00 – 10:00 (1 hr)	<b>Hands-on: Model development (continue)</b> <ul style="list-style-type: none"><li>• Re-cap Day 1 learning</li><li>• Model Quantization</li></ul>
10:00 – 10:15	<b>Break</b>
10:15 – 12:00 (1.75 hr)	<b>Hands-on: Model development (continue)</b> <ul style="list-style-type: none"><li>• Model Evaluation</li><li>• Model Synthesis</li><li>• Summarization of Model Development</li></ul>
12:00 – 13:00	<b>Lunch Break</b>
13:00 – 14:00 (1 hr)	<b>Hands-on: Embedded Programming</b> <ul style="list-style-type: none"><li>• Eclipse Navigation</li></ul>
14:00 – 15:00 (1 hr)	<b>Hands-on: Embedded Programming (continue)</b> <ul style="list-style-type: none"><li>• C-code Deployment to device</li><li>• Testing of project</li></ul>
15:00 – 15:15	<b>Break</b>
15:15 – 16:30 (1.25 hr)	<b>Hands-on: Embedded Programming (continue)</b> <ul style="list-style-type: none"><li>• GPIO programming</li><li>• Testing of project</li></ul>
16:45 – 17:00	<b>Summarization &amp; QnA</b>

## Who this course is for

- Whether you're a software engineer, embedded systems developer, or technology enthusiast, this course will equip you with the knowledge and skills needed to harness the power of embedded machine learning and unlock new possibilities for your projects.
- Though an in-depth programming skill is not a pre-requisite, a basic understanding of software file structuring is preferred as this course involves invoking of functions via scripts. However, we will deal only at the functional block level with explanations given along the way. You will be supported throughout the learning process in order to have a complete understanding of the development flow.
- Perfect for Integrators: This course covers anyone who needs to integrate both machine learning models and hardware interface programming. At the end of the course, you will be able to have a smooth, seamless understanding of how to integrate both skill sets to complete an embedded project.
- Get Started in Machine Learning: If you've been eager to dive into the exciting world of machine learning for a deployable end device, this course is the perfect starting point. You will receive comprehensive guidance, hands-on exercises, and practical knowledge to help you kick-start your journey in this rapidly growing field.

## Trainer Profile

### Lim Ee Hai

Ee Hai has practical experience in electronic hardware and software design plus project development in the analogue audio processing, micro-controller and IoT applications. He has over 12 years of industrial experience dealing with various projects ranging from Intelligence Image Controlled Lighting, Smart key-less Locker, Autonomous Library Book Shelf Scanning Robot and Smart IoT Toilet.

He has also been in the technical teaching professional for 22 years and has done a few rounds of curriculum development which included producing theory notes and practical worksheets from technician certificate to diploma level.

Ee Hai graduated from National University of Singapore (NUS) with a Bachelor of Engineering (2nd Upper Honours). He has also graduated from two Specialist Diplomas in Embedded System Design and in IoT Development and Applications programs. He holds a Certificate in Technical Education Pedagogy.

### Rick Law

Rick has matter experience in the electronics - Embedded Microcontrollers, IoT Applications and Software Development with teaching pedagogy. He has over 20 years of professional experience in electronics industry supporting customers implement applications ranging from LCDTV, PLC, Wireless Technologies, IoT Devices, Smart Home, Cloud, Mobile Apps development and IoT projects. As a trainer, he has developed and conducted courses in Electronics, Embedded Microcontrollers, IoT Applications, EdgeAI and TinyML.

Rick graduated from The National University of Singapore (NUS) Bachelor of Technology in 2002 with First Class Honours. He holds a WSQ Advanced Certificate in Learning and Performance (ACLP), and Advanced Certificate in Technical Education Pedagogy (ACTEP).

## Pre-requisites

- Learners are required to read/write and speak at WPLN 4 or an equivalent level.
- Learners are to be proficient in operating a computer.
- Learners are to bring their own laptops/computers (no admin rights) for the hands-on exercises.
- Installation of application software and its dependencies

\*These must be running **windows OS** (Windows 10.0 and above) as IOS and macbooks and other OS are not supported.

	Minimum	Recommended
CPU Cores	2 x 1.8 GHz 32-bit (x86)	4 x 2.4 GHz 64-bit (x64)
RAM	4GB	8GB
Disk Space	3.5 GB for new installations, 5 GB for upgrades (including temporary files required during installation)	N/A

## About Analog Devices



Analog Devices (NASDAQ: ADI) is a world leader in the design, manufacture, and marketing of a broad portfolio of high performance analog, mixed-signal, and digital signal processing (DSP) integrated circuits (ICs) used in virtually all types of electronic equipment.

## About Excelpoint Academy



Empowering a  
**Future-Ready** Tomorrow

EPACA is committed to continuous quality improvement by helping to upgrade the skill sets of stakeholders and public by adopting the standards of the National Skills Future Singapore (SSG) frameworks and working closely with the industry.

By leveraging on its strength in the Electronics sector, Excelpoint Academy is able to develop bite sized and short courses that are industrially validated.

Through a hands-on approach of learning, EPACA equips course graduates to with the skills to thrive in the digital economy.

EPACA champions the SMART nation initiative of Singapore government, in partnership with various government and corporate agencies, statutory boards, vendors and suppliers to meet the vision of a future-ready workforce.



### Upskilling

Work closely with industries to upgrade the skill sets of stakeholders and public.



### Industrially Validated

Utilise our experience as a leader in the field of electronics, we take a hands on approach in developing and delivering bite sized industrially validated short courses.



### Enabling the Future

We partner with government, and partner with government, corporate and vendors to meet the vision of a future-ready workforce.