



Machine Learning at the Edge with Microchip Microcontrollers

SAMD21 ML Kit

Course Code: EAEML-M001



 **1 Mar 2024**

 **09:00-17:00**

 **\$88** (inclusive of SAMD21 ML Kit)

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



**Register
by scanning
QR Code**

Closing date: 21 Feb 2024

Connect with a program advisor
 academy@excelpoint.com.sg

Course Description

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 SAMD21G18 Arm® Cortex®-M0+ based MCU. This course provides step-by-step guide for deploying Edge Impulse Studio project onto a Microchip Arm® Cortex®-based 32-bit microcontroller on the SAMD21 ML Kit with the MPLAB® X IDE.

Hands-on exercises will help you gain proficiency in preparing data, developing and testing machine learning models, and deploying them to real physical hardware, the SAMD21 ML Kit and using a user-friendly graphical programming tool of MPLAB® X & Edge Impulse.

Learning Objectives

- Define the basics of a machine learning system and explain the key processes involved.
- Train, test, deploy and adjust deep neural network models specifically tailored for SAMD21G18 Arm® Cortex®-M0+ core based microcontrollers.
- 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

- Willingness to learn
- Basic coding experience
- No prior Machine Learning knowledge required
- SAMD21 ML Kit with TDK IMU Board, (Part Number: EV18H79A) for the practical application

Programme

09:00	Introduction to TinyML, ML/DL and Embedded MCU (ARM M0+)
10:00	Break
10:15	Motion Recognition with Accelerometer Overview of Materials used: Hardware and Software Tools Project Overview & Theory Preparation of your Microcontrollers Kit
11:15	Project 1: Practice Setup your Edge Impulse MPLAB® X IDE & Plug-In Data Acquisition Impulse Creation
12:15	Lunch Break
13:15	Project 1: Practice (Continue) Model Training & Testing Model Deployment Firmware Integration in MPLAB® X
15:15	Break
15:30	Use it to recognize shake using NN and K-Means Anomaly Detection from Edge Impulse View Embedded Classification Results
16:30	Summarization & QnA

Why you should take this course

- **Gain In-Depth Knowledge:** This course provides you with a comprehensive understanding of the codebase, enabling learners to delve into all the parameters and fine-tune 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 Deep Learning Project:** This course takes learners beyond theoretical concepts and guides them through the entire process of building an end-to-end deep 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.

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.
- Perfect for Beginners: Designed with beginners in mind, this course assumes no prior knowledge of machine learning or programming skills. It provides a solid foundation for individuals who are new to the field and are eager to embark on their machine learning journey.
- Ideal for Basic Programming Skills: This course is suitable for anyone interested in learning some basic programming skills. Whether you have limited programming experience or are completely new to coding, this course will guide you through the essentials, enabling you to grasp the concepts and apply them effectively.
- Get Started in Machine Learning: If you've been eager to dive into the exciting world of machine learning, this course is the perfect starting point. You'll receive comprehensive guidance, hands-on exercises, and practical knowledge to help you kickstart your journey in this rapidly growing field.

Trainer Profile

Rick Law

Rick is the subject matter expert in the fields of electronics - Embedded Microcontrollers, IoT Applications and Software Development, combining teaching pedagogy with experience. 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).

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.

Prerequisites

- Learners are required to read/write/speak at WPLN 4 or an equivalent level.
- Learners are required to be proficient in operating a computer.
- Learners are required to bring their own laptops/computers for the hands-on exercises.

*These must be running windows OS (Windows 8.1 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 Microchip



Microchip Technology Inc. is a leading provider of smart, connected and secure embedded control solutions. Its easy-to-use development tools and comprehensive product portfolio enable customers to create optimal designs which reduce risk while lowering total system cost and time to market. The company's solutions serve more than 125,000 customers across the industrial, automotive, consumer, aerospace and defense, communications and computing markets. Headquartered in Chandler, Arizona, Microchip offers outstanding technical support along with dependable delivery and quality. For more information, visit the Microchip website at www.microchip.com.

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.