Edge AI Simplified

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In this webinar

- Overview of AI and deep learning
- Edge AI vs cloud-based AI
- How to simplify model development with Edge Al Studio
- Live demo showing how to build a model for defect detection





Applications and use-cases



Advanced driver assistance systems



Machine vision and defect detection



Security and home automation cameras



Speech recognition and text-analysis translation

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Al technology & methods

Conventional computer vision



Features:

- Domain-expertise required
- Application specific
- Longer development time
- Less computationally intensive

Classical machine learning

Features:

- No domain-expertise required
- ✓ Application specific but retrainable
- ✓ Moderate development time
- Somewhat computationally intensive

Deep learning



Features:

Uses generalized models
Robust to environmental changes
Shorter development time
Very computationally intensive



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The edge vs. the cloud

Edge AI: artificial intelligence in an edge computing environment, where computing is done close to where data is collected.

Edge Al Local processing	Cloud Al Cloud processing	
Local processing	Cloud processing	
Lower latency	Higher latency	
Higher privacy	Lower privacy	
No costs for network/cloud compute	Costs for network/cloud compute	
Lower performance	Higher performance	





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AI technology & methods

Neural network

Inspired by the nervous system. Designed as layers. Change weight to desired output. W₁ in₁ out W_2 in₂ in_n $out = f \sum in_i \times w_i + b$

Deep learning



Characteristics:

- Several layers of neurons
- Improved training algorithms
- ✓ Use large data to learn
- Learn sophisticated problems

Convolutional neural network



Characteristics:

- Weights (parameters) as filters
- ✓ Dimensions reduced over layers
- ✓ Learn simple features in early layers
- Learn sophisticated features in

deeper layers

https://www.mdpi.com/sensors/sensors-19-04933/article_deploy/html/images/sensors-19-04933g001.png

Deep learning model-development flow







Edge Al Studio

Edge Al Studio is a collection of tools that enable development, benchmarking and deployment of Al applications.

https://dev.ti.com/edgeaistudio/



Model Composer



Model Analyzer



Defect detection demo setup



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Defect Detection using Edge AI Studio

- Crucial part of quality assurance in the manufacturing process
- Inspect products and detect abnormalities such as irregular shape, broken parts, cracks, etc.
- · Filtering system to separate rejected units
- This demo focuses on vision-based inputs







Edge AI Studio: Live demonstration

https://dev.ti.com/edgeaistudio/

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Edge AI examples

Defect detection





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Smart retail scanner





Barcode detection





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License plate recognition





More examples at: https://www.ti.com/edgeaiprojects



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Key Points: Edge Al Studio

- Free, cloud based, and easy to use.
- No previous AI experience is required.
- Covers all steps to create AI models.
- EVM not required to start (but recommended).
- Preview and download models directly on the EVM



Build your own model with Edge Al Studio

- Pick a problem to solve with vision AI and build a proof-of-concept
 - Recognize a dog is on the couch
 - Birds on a tree/bush/garden
 - Your boss is near your desk
- Take 20-30 pictures and load into Model Composer
- Train and compile a model
- Run live inference to see how it performs

Getting started:

- Visit <u>https://www.ti.com/edgeai</u>
- Get an EVM for an Am6xA Edge AI SoC
- Go beyond proof of concept
- Application Code:



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AM6xA AI vision processor family

	AM62A	AM68A	AM69A
Description	Targeting battery-powered systems such as security cameras, vacuum robots and lawn mowers	Optimized for multi-inference real- time systems found in retail and factory automation	Built for high-performance sensor fusion systems such as autonomous mobile robots
Performance	2 TOPS	8 TOPS	32 TOPS
Power	As low as 1 W	As low as 6 W	As low as 15 W
Cameras	Up to 2 RGB-IR cameras	Up to 8 RGB cameras	Up to 12 RGB cameras
Maximum resolution	5 MP	12 MP	12 MP
4K frame rate	30 fps	60 fps	60 fps (two simultaneous streams)

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Visit https://dev.ti.com/edgeaistudio

Start your model training today



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