arm

Open-CMSIS-Pack

Technical Project Meeting

(This meeting is recorded)

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2026-04-07

Agenda

- Project Boards
- Issues for Review and Feedback
- Edge AI Frameworks for Cortex-M and Ethos-U targets
- Proposal for a MLOps Workflow: Generate ML Model Layer (for CMSIS and Zephyr)
- How to add CMSIS-Pack Components to Zephyr
- Wrap Up

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Project Boards

- Released:
  - CMSIS Solution 1.67.1 - all links updated to Open-CMSIS-Pack/vscode-cmsis-solution
  - CMSIS Debugger 1.5.1 - basic set of Core Peripheral Views
    - pyOCD 0.44.0 - extended support for specified debug sequences

- CMSIS-Toolbox 2.14.0 Project Board

- VSCode CMSIS Debugger Project Board 1.6

- VSCode CMSIS Solution Project Board 1.68

- Open-CMSIS-Pack Specification Issues

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Issues for Review and Feedback

- [Open-CMSIS-Pack Spec] Added Dnpu and DnpuMacs processor attributes and conditions
- [packchk] Device feature validation fixed for type LGA #2363, and type NPU #388
- [CMSIS Debugger: `show` command without any argument crashes GDB #950

- [csolution] Changing `target-` / `build-type` should keep out directory #102 / #331

```
output-dirs:
  tmpdir: tmp/$TargetType$/$TargetSet$
```

- Discussion on 3rd party compilers (Ashish Mahanth - Microchip)
  - See example repo: Open-CMSIS-Pack/vcpkg-ce-registry
  - Drawback - user needs to specify the registry in local vcpkg-configuration.json
  - Reason - Arm must not take ownership and maintain 3rd party tool versions in Arm registry
  - There does not seem to be a vcpkg-shell command to add a registry globally
  - Proposal - include CMSIS Solution template with vcpkg-configuration.json in CMSIS DFPs

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Edge AI Frameworks for Cortex-M and Ethos-U targets

LiteRT (TensorFlow Lite Runtime)

Production-grade inference runtime optimized for Cortex-M microcontrollers optional with Ethos-U

- Proven for Cortex-M only and Cortex-M + Ethos-U
- Optimized kernels for constrained memory
- Stable operator coverage for classic ML models
- Strong ecosystem, ready today

ExecuTorch (Lightweight PyTorch Runtime)

Dominant framework in research, making new ML model development and sharing easier.

- Strong for LLMs, vision, multimodal, generative AI
- ML developer friendly with modern tooling
- Rapidly growing eco-system momentum
- Maturing for Cortex-M + Ethos-U targets

Industry momentum shifts towards **PyTorch-first workflows**, with deployment maturing

For both Edge AI Frameworks CMSIS-Packs will be available

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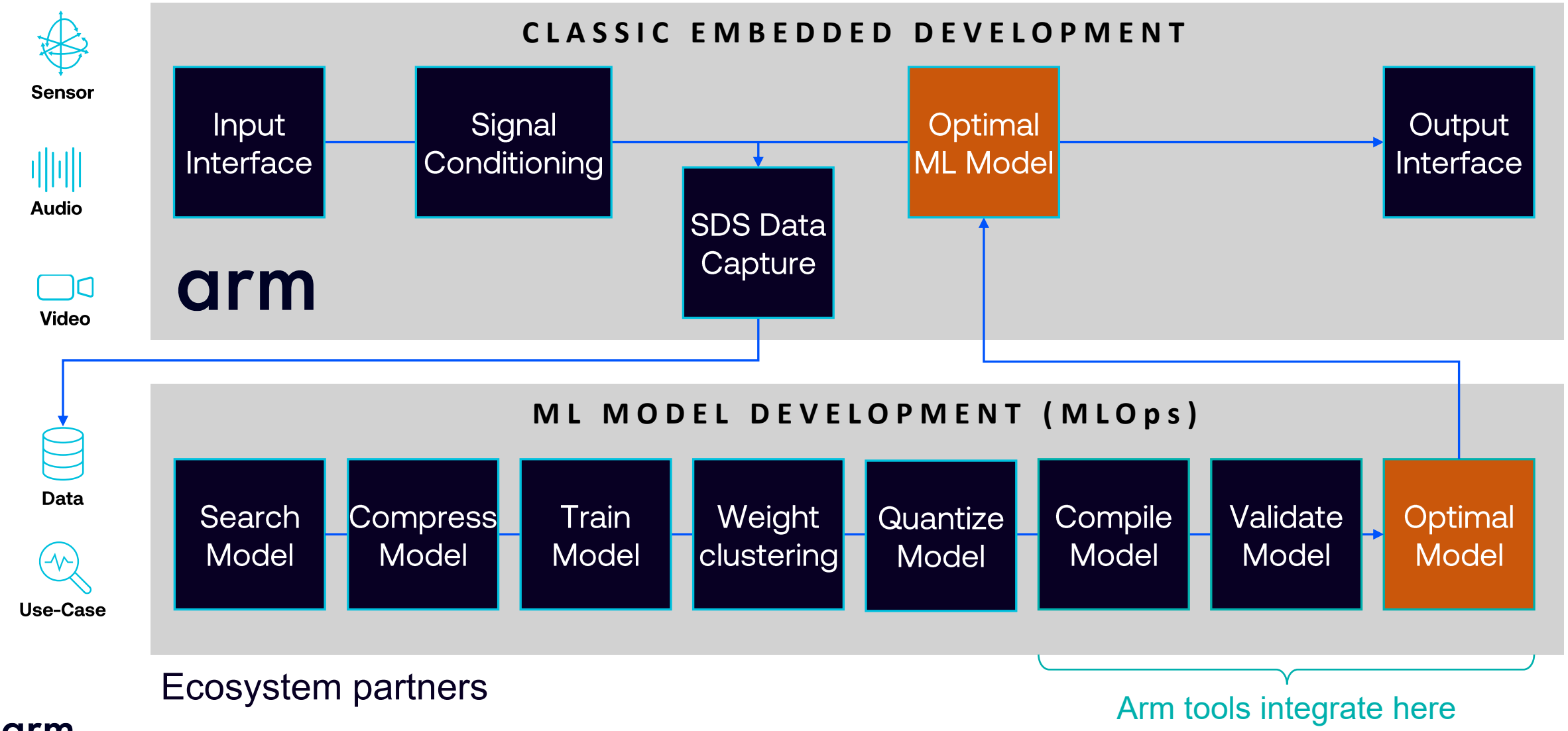
MLOps Workflow: Generate ML Model Layer

Arm provides tools for classic embedded and back-end tools for MLOps



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Possible MLOps Workflow: Generate ML Model Layer

Open-CMSIS Pack

1. MLOps system needs information about the available NPUs and Processors
   - A template project may contain already a clayer.yml file for the ML model
   - Possible solution: add `processors:` element to cbuild-idx.yml `cprojects:`
     - Provide `core:` and `npu:` information (note that more than one npu: might be available)
     - This allows MLOps systems to display the available processor elements for a project
   - This solution should work for CMSIS and Zephyr projects

2. For the MLOps process a `core:` or `npu:` needs to be selected
   - This selection should be also possible manually
   - Relevant targets are listed here

3. LiteRT or ExecuTorch MLOps build step outputs the generated model
   - For Ethos-U the build step uses Vela (but this is part of the MLOps system)
   - It should be possible to select different layer names as multiple ML models may be exported
   - For each layer a Zephyr compatible west module (external project) should be generated

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How to add CMSIS-Pack Components to Zephyr

- In the ModelNova repo a local pack PyTorch::ExecuTorch is introduced - this shall become a public CMSIS Software Pack
- The AI models are captured in a Layer directory, described by *.clayer.yml file provided by an ML DevOps flow and specifying the required components from the ExecuTorch packs
- While this solves the CMSIS Solution build flow, there is a need to bridge to Zephyr/west:
- => CMSIS to Zephyr Concept proposal:
  - Requirements for conversion step
  - Manually crafted example
- As the result of this flow:

  Any CMSIS-Pack Component can be added to a Zephyr application as an external module

- **Things to verify**
  - When multiple ML models are used different operators in each layer may be selected. The CMSIS systems overlays these requirements. It needs to be checked if this works also for west modules (external project)

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Wrap Up

Is anyone preparing a topic to present and discuss in the coming weeks?

- Please contact Joachim.Krech@arm.com ahead of the meeting

- Upcoming Technical Project Meetings (every other week)
  - 2026-04-21
  - 2026-05-05
  - 2026-05-19
  - 2026-06-02
  - …

Next Open-CMSIS-Pack meeting: April 21st, 2026 @ 16:00 CET (15:00 UK)

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Merci
Danke
Gracias
Grazie
谢谢
ありがとう
Asante
Thank You
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Kiitos
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תודה
ధన్యవాదములు
Köszönöm

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