



**emmtrix**  
Technologies

# Embedded Software Engineering for Space Systems

Compiler and engineering expertise  
from early software assessment to  
target-specific implementation.

# Supporting Embedded Software Development



## Assess Architectures

Evaluate implementation strategies and target architectures before hardware integration



## Analyze Software

Identify dependencies, timing characteristics and implementation bottlenecks



## Optimize Code

Generate, parallelize or vectorize implementations for the intended target architecture



## Streamline Workflows

Integrate development steps like code generation, testing and performance tuning into existing toolchains, development processes and verification

**SOFTWARE TOOLS**  
**ENGINEERING SERVICES**  
**PROJECT COLLABORATION**

# Engineering Questions that Drive Design Decisions

- How will the application behave on the intended target?
- Which functions, dependencies or memory effects limit execution?
- Which parts of the code are suitable for multicore or SIMD execution?
- How can a trained AI model be integrated into an embedded C toolchain?
- How can functional safety be achieved throughout implementation?



Early insight into these questions helps identify implementation risks before integration and supports engineering decisions throughout development.

# Compiler Technologies for Embedded Software

Compiler technology is at the core of emmtrix engineering. The same expertise enables software analysis, code transformation, architecture-aware optimization and embedded AI deployment.

## Static Analysis

Software structure and dependencies

## Performance Estimation

Gain timing insight before your complete system runs on the hardware

## Source-to-Source Transformation

Code generation and structural code transformation (e.g. memory or loop optimizations)

## Target-Specific Code Optimization

Parallelization and vectorization for multicore and SIMD architectures

## Embedded Deployment

Model-to-C workflows for embedded targets

# Some Engineering Projects

Examples of compiler-based solutions developed and applied in commercial and research projects for safety-critical and high-performance embedded software.



## Early Software Testing

Development of a tool to create C++ stubs enabling early testing of source code when functionality is not completely implemented yet.



## Vectorized Math Library

Development of an automated test environment for an optimized arithmetic library for a vector processing unit.



## QSMA

## Avionics

Development of compiler technologies for multicore avionics software, including parallelization, qualification support and equivalence checking for a DO-178C demonstrator.

## ASSET-2 Satellite Onboard Processing

Parallelization and performance optimization of satellite onboard image processing, demonstrated on NXP PowerPC and LEON multicore platforms.

# Let's Talk about Your Project

Evaluating a target architecture, investigating timing behavior or bringing compute-intensive software to an embedded target?

We will be happy to discuss your project and its technical constraints and solutions.



[Discuss your Project](#)



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emmtrix develops compiler-based software tools and provides engineering services for the analysis, generation, transformation and optimization of embedded software.