

COEVOLVE

Co-Evolution of Software and Hardware



Pro²Future

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MOTIVATION & GOALS

Challenge: Embedded software is strongly coupled to its underlying hardware. Porting low-level software between heterogeneous architectures is therefore manual, time-consuming, error-prone, and dependent on specialized expertise.

Goal: Develop an Agentic AI framework that progressively automates embedded software porting, from AI assisted analysis and code generation to a fully autonomous system capable of analyzing, planning, implementing, verifying and documenting the complete porting process, while involving human experts whenever necessary.

Project FactBox

Project Name COEVOLVE
Project ID MFP II Prod.1
Duration 44 Months

Area 4.1
Cognitive Products

Project Lead
DI Dr. Amer Kajmaković

APPROACH

Our proposed methodology structures the manual embedded system software porting workflow into **six consecutive steps**:

(1) Requirements and Scope Analysis, (2) Origin and Target Information Collection, (3) Hardware Variation Analysis, (4) Dependency and Impact Analysis, (5) Port Planning, (6) Port Implementation

Verification, documentation, and traceability are applied throughout all six steps to ensure correctness and completeness.

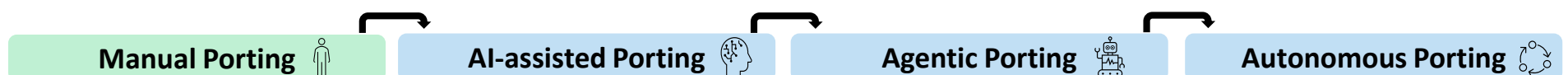
CONTRIBUTION

Scientific contribution

- Structured porting methodology
- Agentic decomposition of porting activities
- Integration of heterogeneous technical knowledge sources.
- Hardware-aware AI-assisted code transformation

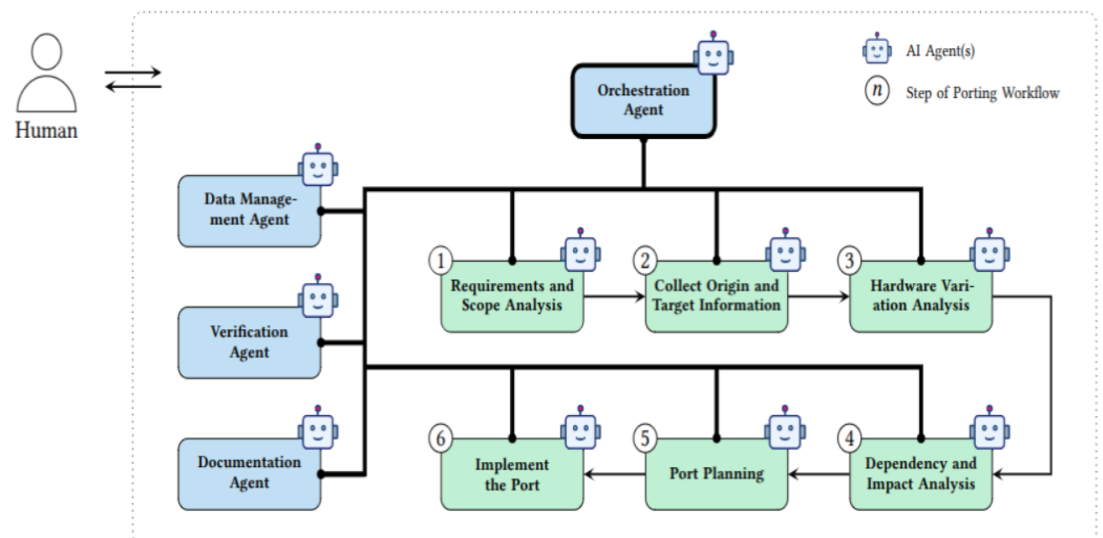
Economic contribution

- Reduced manual engineering effort and porting time.
- Scalable support additional hardware platforms.
- Potential reduction of development costs.
- Improved software reuse and reduce energy (sustainability)



SYSTEM ARCHITECTURE

An **agentic AI system architecture** structured around the manual embedded software porting workflow, designed to support the transformation between heterogeneous hardware platforms. The approach integrates diverse data sources, specialized AI agents, and human expertise to enable context-aware analysis, code generation, verification, and traceable porting decisions.



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