

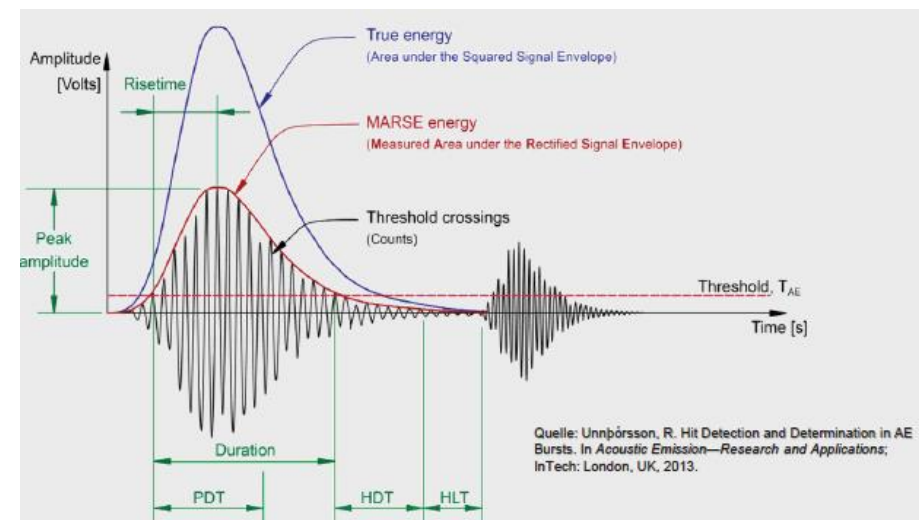
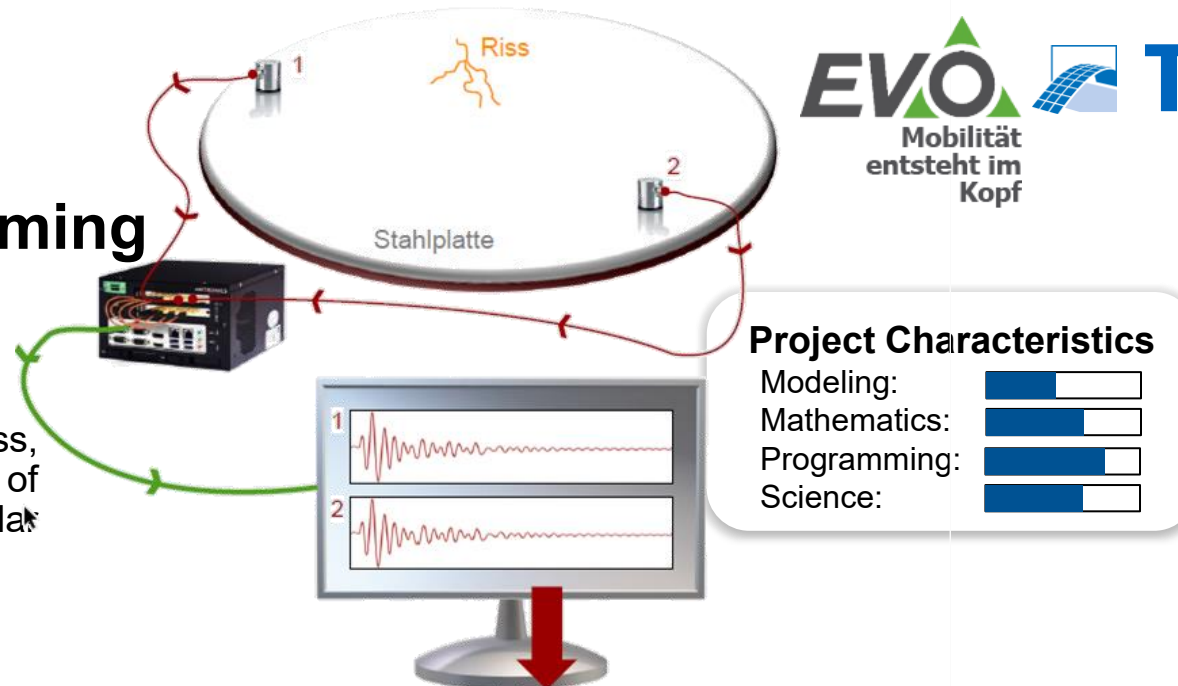
High-Frequency Sensor Data Streaming on Heterogeneous Architectures

Task

Acoustic Emission (AE) sensing is used to detect material stress, crack formation, and dynamic structural behavior. The objective of this project is to design, implement and evaluate a modular streaming pipeline for high-frequency sensor data.

GENERAL INSTRUCTIONS:

- Study existing streaming frameworks and identify requirements for high-rate data ingestion (>1 MS/s).
- Develop equivalent pipeline modules in for example Python, Rust, and C++
- Deploy and benchmark on x86 (desktop/server), ARM (Raspberry Pi / NVIDIA Jetson), and optionally GPU.
- Apply platform-specific optimizations (SIMD, async I/O, zero-copy buffers, real-time scheduling).
- Measure latency, throughput, CPU/memory footprint; document trade-offs.
- Document all components and produce a final system demo.



Unnpórrsson, Rúnar. "Hit detection and determination in AE bursts." *Acoustic emission-research and applications 1.1* (2013).