Bridging the Neuromorphic Simulation-to-Hardware-Gap with YANA

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Neuromorphic computing still faces a persistent simulation-to-hardware gap: while many groups can prototype algorithms in software, far fewer can iterate through full hardware/software co-design because accelerator IP, deployment tooling, and hardware-specific runtimes are often closed or fragmented. We present YANA as a readily available, open-source framework that lowers this barrier by providing an end-to-end stack for event-driven SNN acceleration on affordable FPGA development platforms [1, 2].

YANA integrates established third-party components with our own tools and hardware implementation. In particular, it uses NIR as an interchange layer between training outputs and deployment targets, and combines this with YANA-specific training, deployment, and runtime modules for quantization-aware workflows, compilation into hardware configurations, and on-device execution/measurement [3, 1]. This creates a practical path from model development to reproducible hardware evaluation.

Beyond architecture, YANA is already an established working tool for third-party engagement. The current prototype was successfully demonstrated in a hands-on tutorial at NICE 2025, where participants trained, deployed, and evaluated SNNs on KR260 platforms [4]. A follow-up tutorial at HEART 2026 is scheduled and extends this dissemination path to a broader user community [5]. These deployments indicate that YANA is not only a research artifact, but an operational platform for collaborative neuromorphic experimentation.

The open-source prototype is available today [1]. The next release (planned before June 2026) completes the first full version of the stack by adding support for a many-core architecture and a matching SNN partitioning/mapping tool accelerated in C++/CUDA. We submit this work for poster presentation and, if there is interest, we can also provide an ICNCE tutorial variant aligned with the HEART 2026 format.

[1] GitHub Repository, fzi-forschungszentrum-informatik/yana, 2025.

[2] B. Pachideh et al., Brain Informatics, 2025.

[3] J. Pedersen et al., Nat. Commun., 15(1), 8122, 2024.

[4] NICE'25 Tutorial Program, Heidelberg, 2025.

[5] HEART'26 Tutorial Program, Heidelberg, 2026.