



Contribution ID: 175

Type: Speed talk

KINGFISHER: A Framework for Fast Machine Learning Inference for Autonomous Accelerator Systems

Thursday 8 September 2022 10:38 (3 minutes)

Modern particle accelerator facilities allow new and exciting beam properties and operation modes. Traditional real-time control systems, albeit powerful, have bandwidth and latency constraints that limit the range of operating conditions currently made available to users. The capability of Reinforcement Learning to realize self-learning control policies by interacting with the accelerator is intriguing. The extreme dynamic conditions require fast real-time components throughout the whole control loop from the diagnostic, with novel and intelligent detector systems, all the way to the interaction with the machine. In this talk, the novel KINGFISHER framework based on the modern Xilinx Versal devices will be presented. Versal combines several computational engines, specifically combining powerful FPGA logic with programmable AI Engines in a single device. Another key characteristic of this system is the native integration with the fastest beam diagnostic tools already available, i.e. KAPTURE and KALYPSO. In this contribution, the recent beam test and preliminary results aiming to control the microbunching instability by applying modulations using the Low Level RF and Bunch By Bunch systems at KARA at KIT will be presented.

Summary

Primary authors: SCOMPARIN, Luca (KIT IPE); CASELLE, Michele (KIT); SANTAMARIA GARCIA, Andrea (KIT); STEINMANN, Johannes (Karlsruhe Institute of Technology (KIT), IBPT)

Co-authors: BLOMLEY, Edmund (KIT); BOLTZ, Tobias (KIT); BRUENDERMANN, Erik (KIT); DRITSCHLER, Timo (Karlsruhe Institute of Technology); KOPMANN, Andreas (Karlsruhe Institute of Technology (KIT)); MÜLLER, Anke-Susanne (KIT); SCHREIBER, Patrick (KIT); WEBER, Marc (KIT)

Presenter: SCOMPARIN, Luca (KIT IPE)

Session Classification: Session 2: Beam Diagnostics

Track Classification: ST - Diagnostics