

# A Policy Gradient Platform Baseded on ZYNQ Ultrascale+ for Beam Diagnostic

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The KIT (Karlsruhe Institute of Technology) storage ring KARA (Karlsruhe Research Accelerator) aims at the stabilization of the emitted THz radiation to tackle the problem of micro-bunching instability. A reinforcement learning based method are planed to be implemented through a RF feedback system located at storage ring. IPE (Institute of Data Processing and Electronics) developed a reinforcement learning hardware platfrom for the final realistic approach in this paper. To provide a proof of concept, a CartPole problem environment are built on a ZYNQ MPSoC platfrom, a fast Neural Network inference are deployed on FPGA, and a Lite-Weighted training process are developed on ARM. The problem is solved by Policy Gradient method, showing the same functionality with simulation on standard PC and improve dramatically the inference and training speed. The platform could also used by other reinforcement learning based applications senario.

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