



CoSMo: A Realistic Configurable Sensor Channel Model for Pre-Silicon Full-Stack Robotics SoCs Evaluation





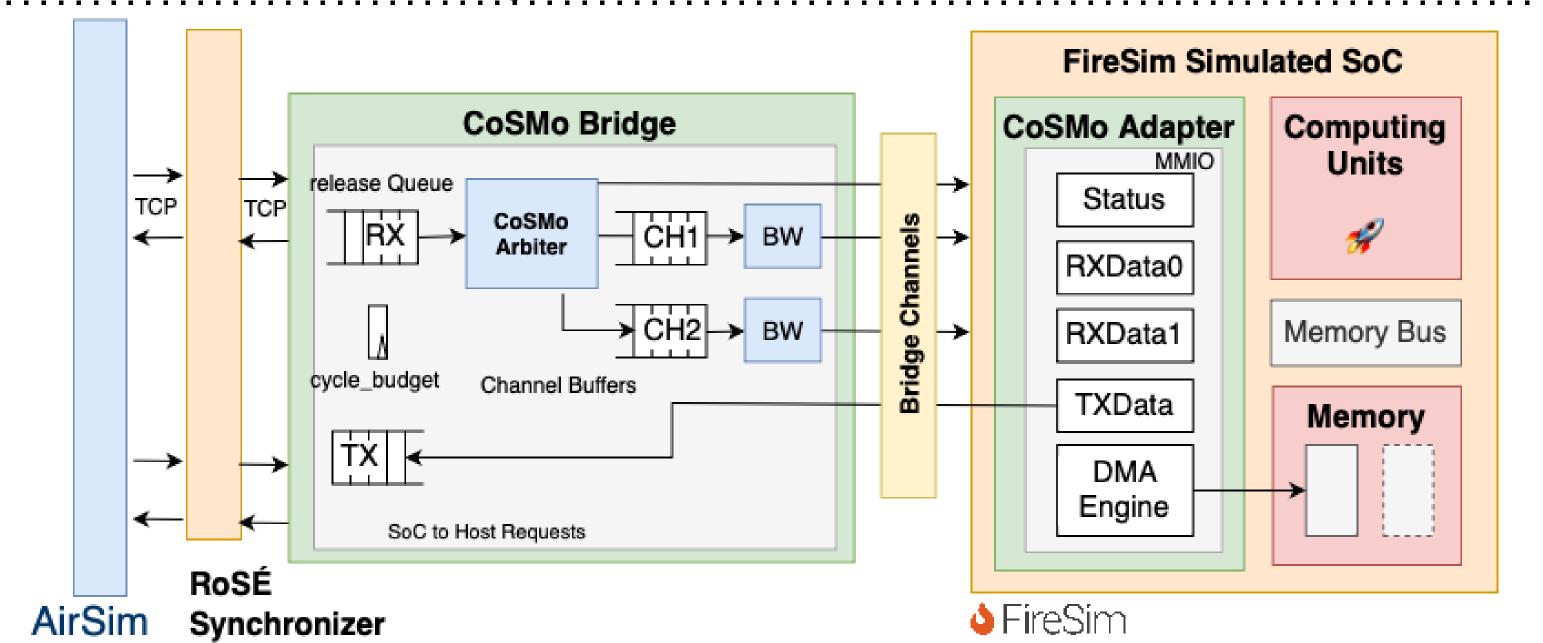
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Motivation

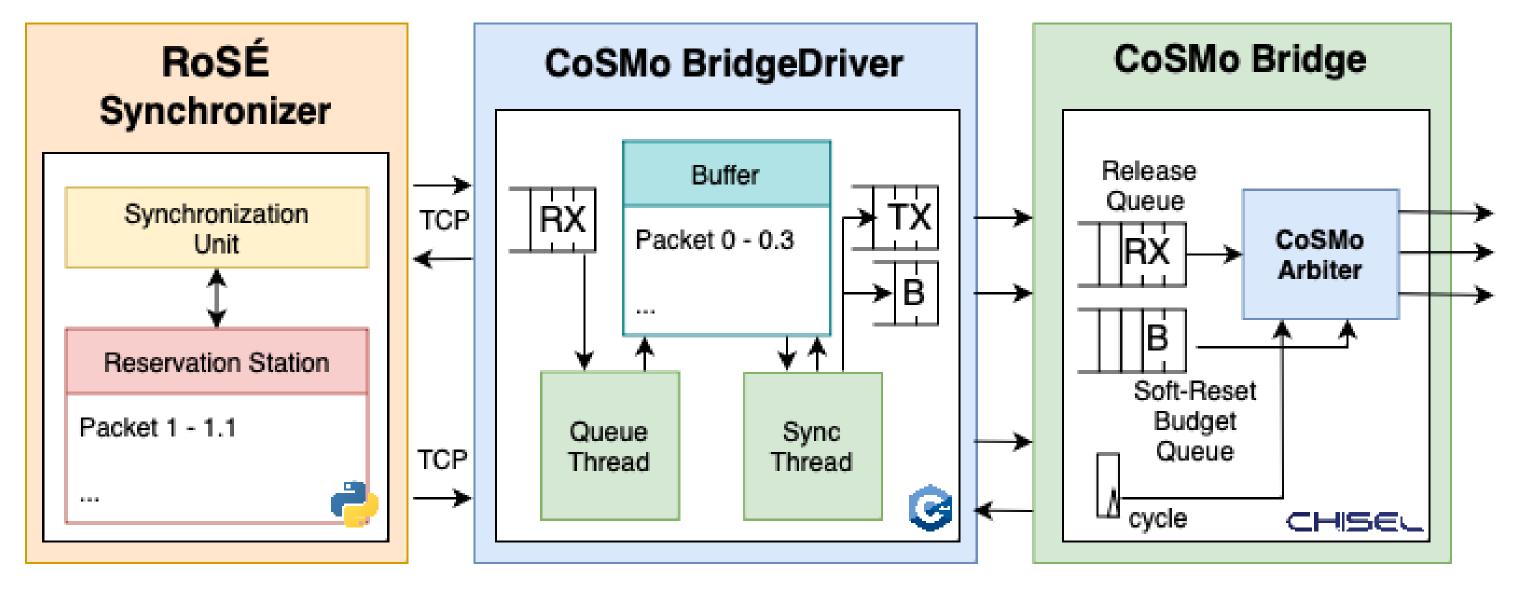
Robot maximum speed is restricted by sensor/perception latency. To effectively design robotics SoCs, it is critical to build end-to-end evaluation platform that models sensor behavior.

Methodology

System Architecture



Latency Injection



Case Studies

Environments

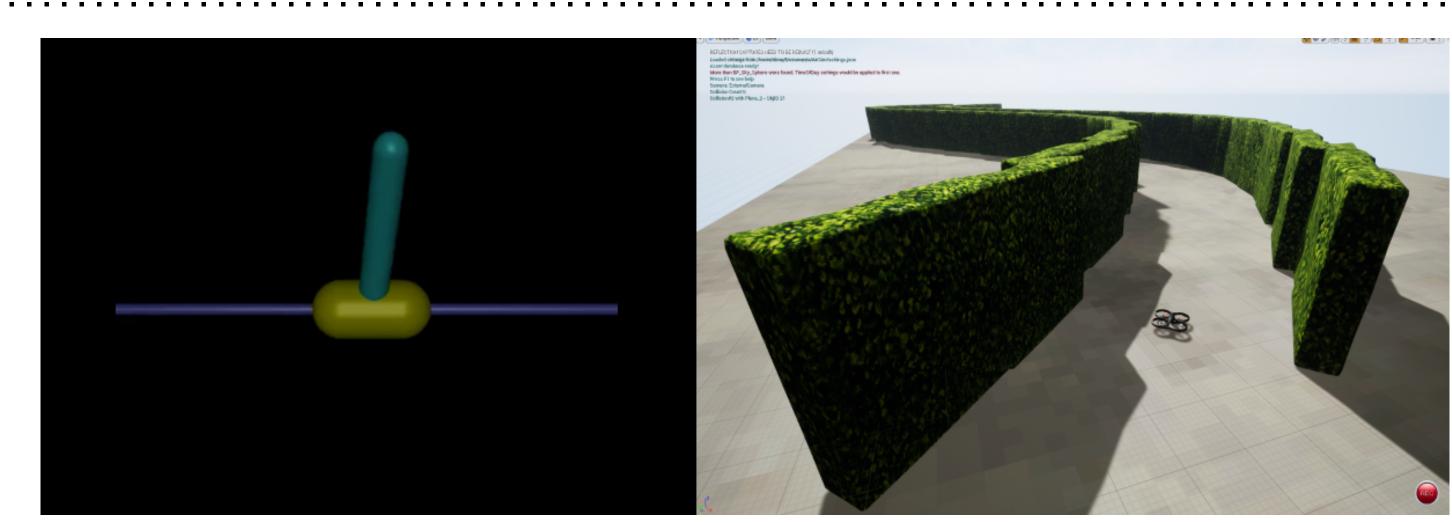
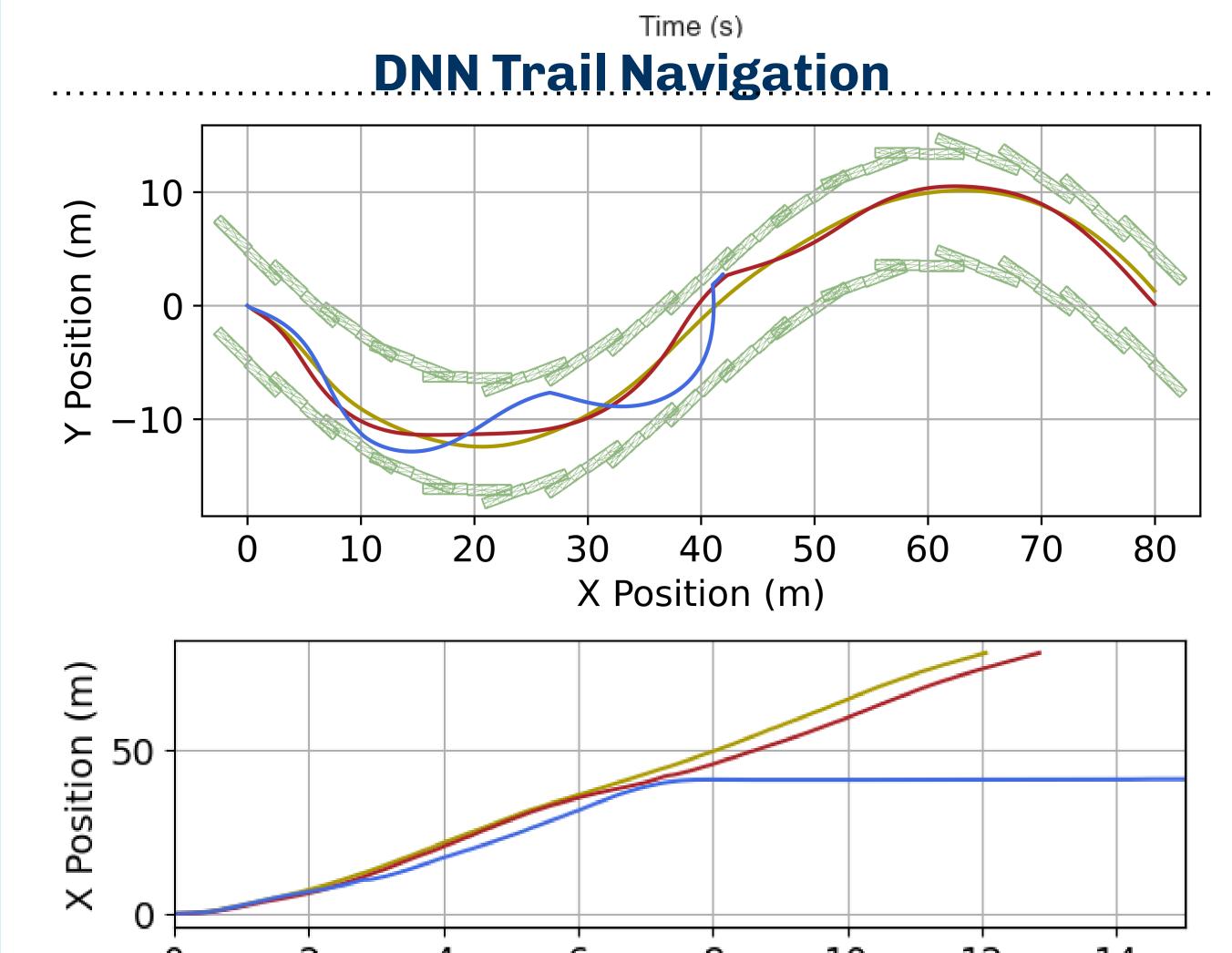


Figure: Left: An inverted pendulum robot stabilizes using PID algorithm. Right: A quadcopter visually navigates a trail using a ResNet14 planner.

Inverted Pendulum Stabilization 0.20 0.15 0.05 Latency(ms) ----- 25.0 Frequency(MHz)_Latency(ms) **—** 1 20.0 **—** 1 15.0 ____ 2_20.0 0.10 0.05 0.00 -0.05 -0.10-0.15 -0.200.0



Time (s)

122 KB/s

Unlimited BW

Evaluation

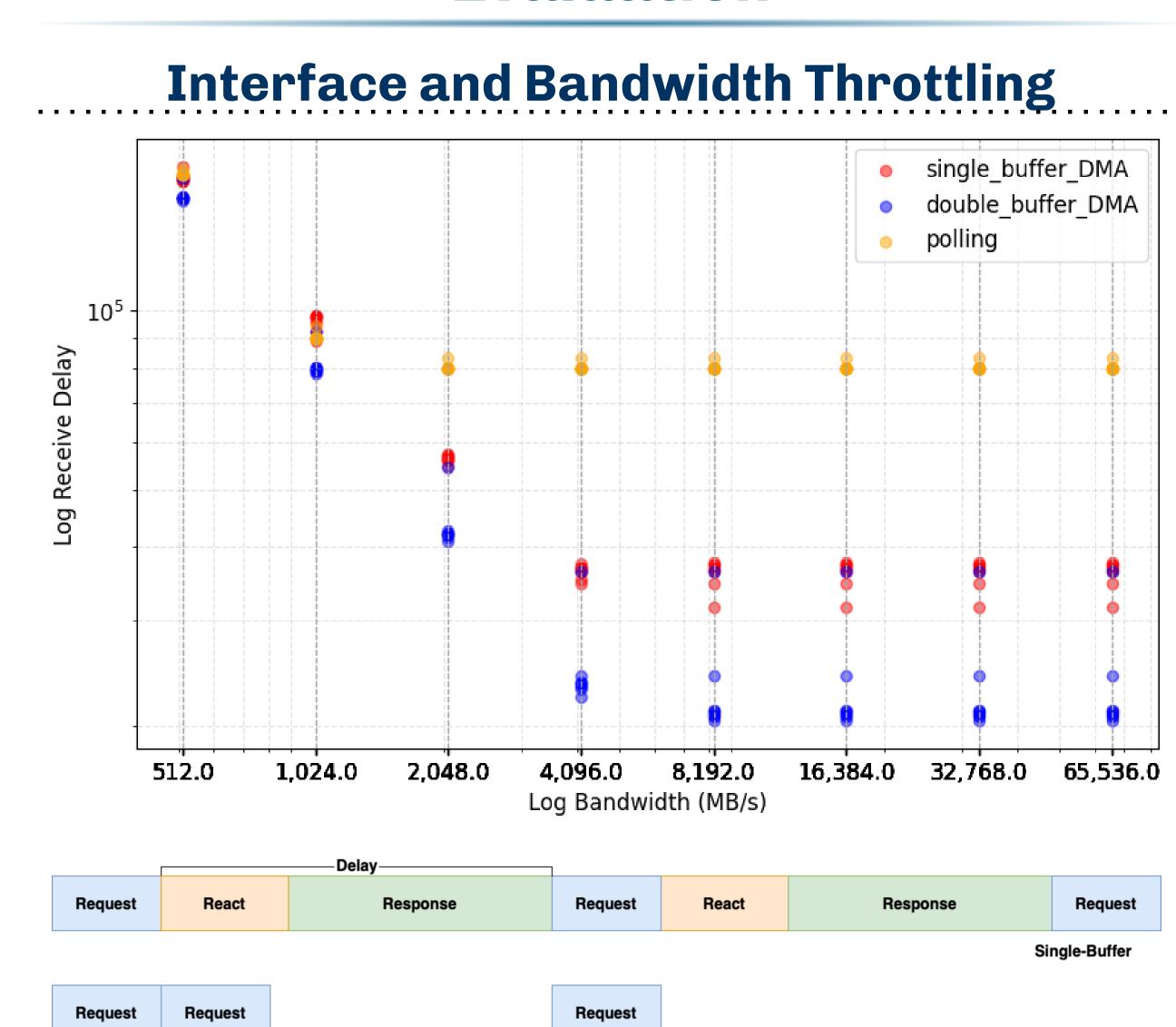
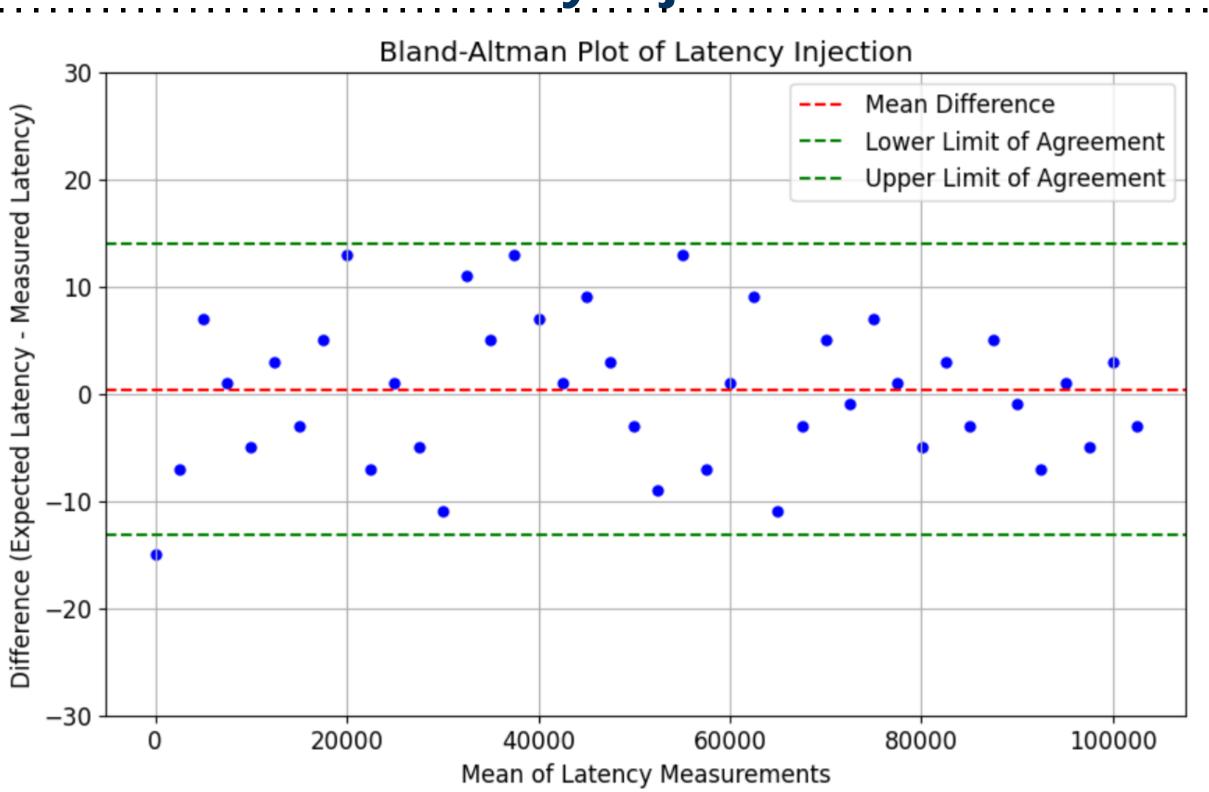


Figure: Software pipelining with double-buffering DMA

Latency Injection



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