



CISTER - Research Center in
Real-Time & Embedded Computing Systems

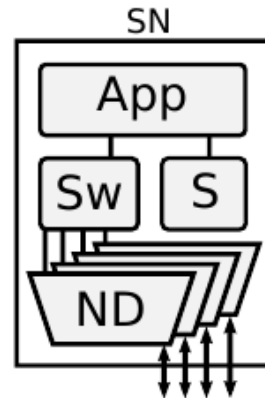
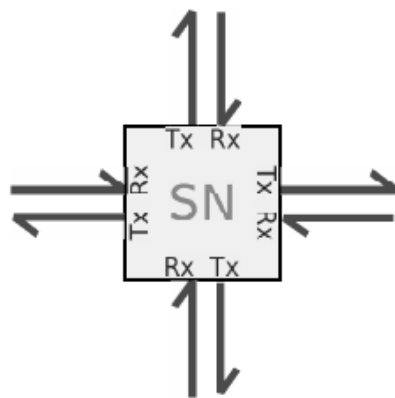
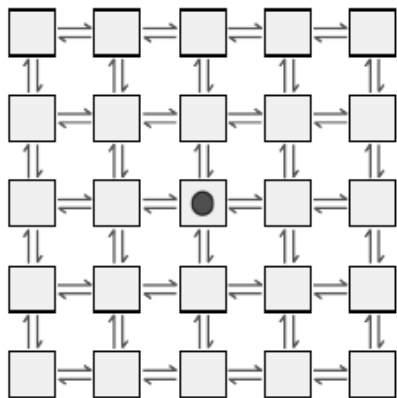
A module for the XDense architecture in ns-3

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NS-3 Implementation of XDense

- XDense is a scalable sensor network with distributed processing capabilities, for reduced latency on real-time applications.
 - It was implemented in hardware.
- The objective is to allow complex feature extractions by exploiting local communication and computation.
- A module for NoC-like grid mesh networks was developed to simulate XDense
 - based on the point-to-point network model from NS-3.
 - implements sensors, switches, custom low-overhead protocols and application layers.

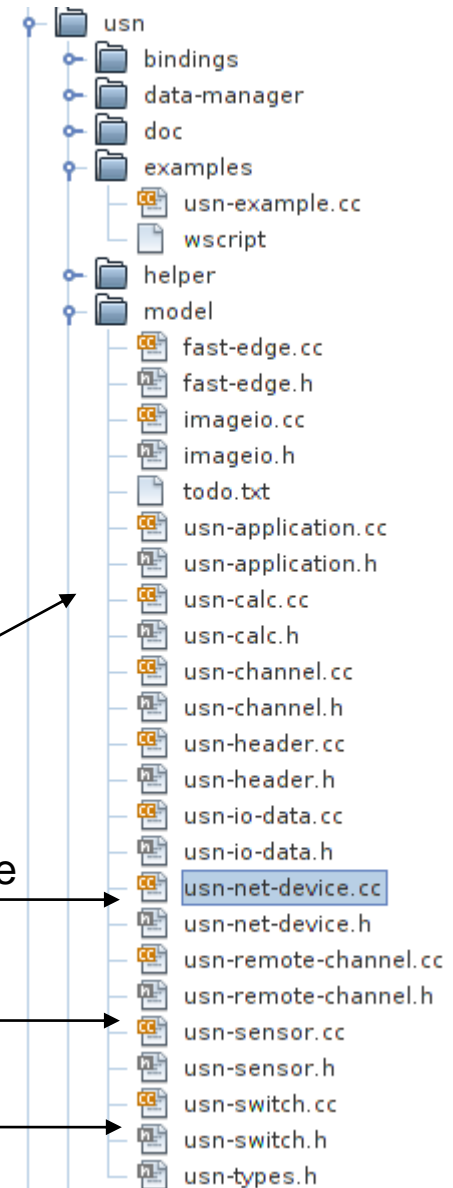


Application

Net Device

Sensor

Switch

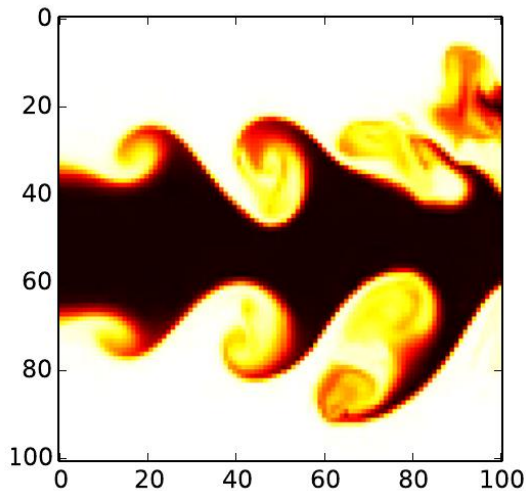


Distributed feature extraction

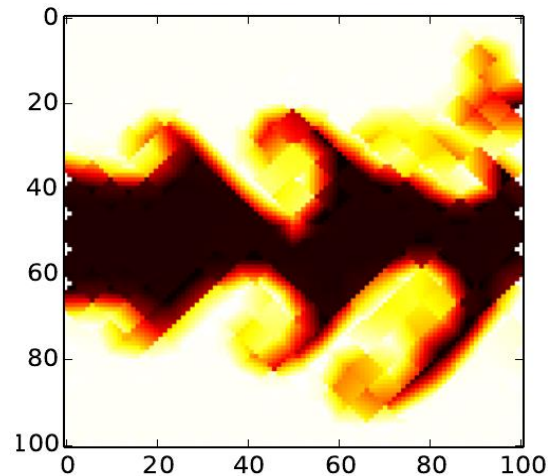
The model receives input from an experiment of computational fluid dynamics (CFD).

Distributed processing capabilities allow feature extraction 10x faster compared to naive scenario.

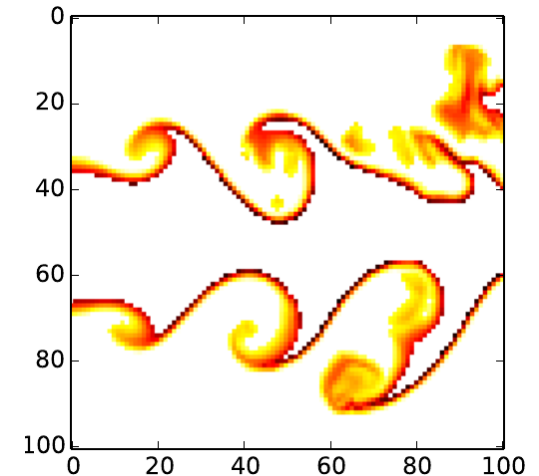
Parameter	Value
Network dimension	101×101
Nodes	10200
Sinks	1
Neighbourhood size: n_{hops}	0 to 4
Baudrate	10Mbps
Packet size	11bytes
Packet duration (t_{pck})	$8.8 \mu s$
Sensor resolution	16bits
Sampling period	5ms



Original CFD input data



Data extracted using distributed data compression



Data extracted using boundary detection