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## **EU H2020 NeurONN: Two-Dimensional Oscillatory Neural Networks for Energy Efficient Neuromorphic Computing**

Aida Todri-Sanial, Thierry Gil, Nadine Azemard, Jérémie Salles, Eirini Karachristou, Stefania Carapezzi, Madeleine Abernot, Corentin Delacour, Siegfried Karg, Elisabetta Corti, et al.

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# EU H2020 NEURONN: Two-Dimensional Oscillatory Neural Networks For Energy Efficient Neuromorphic Computing



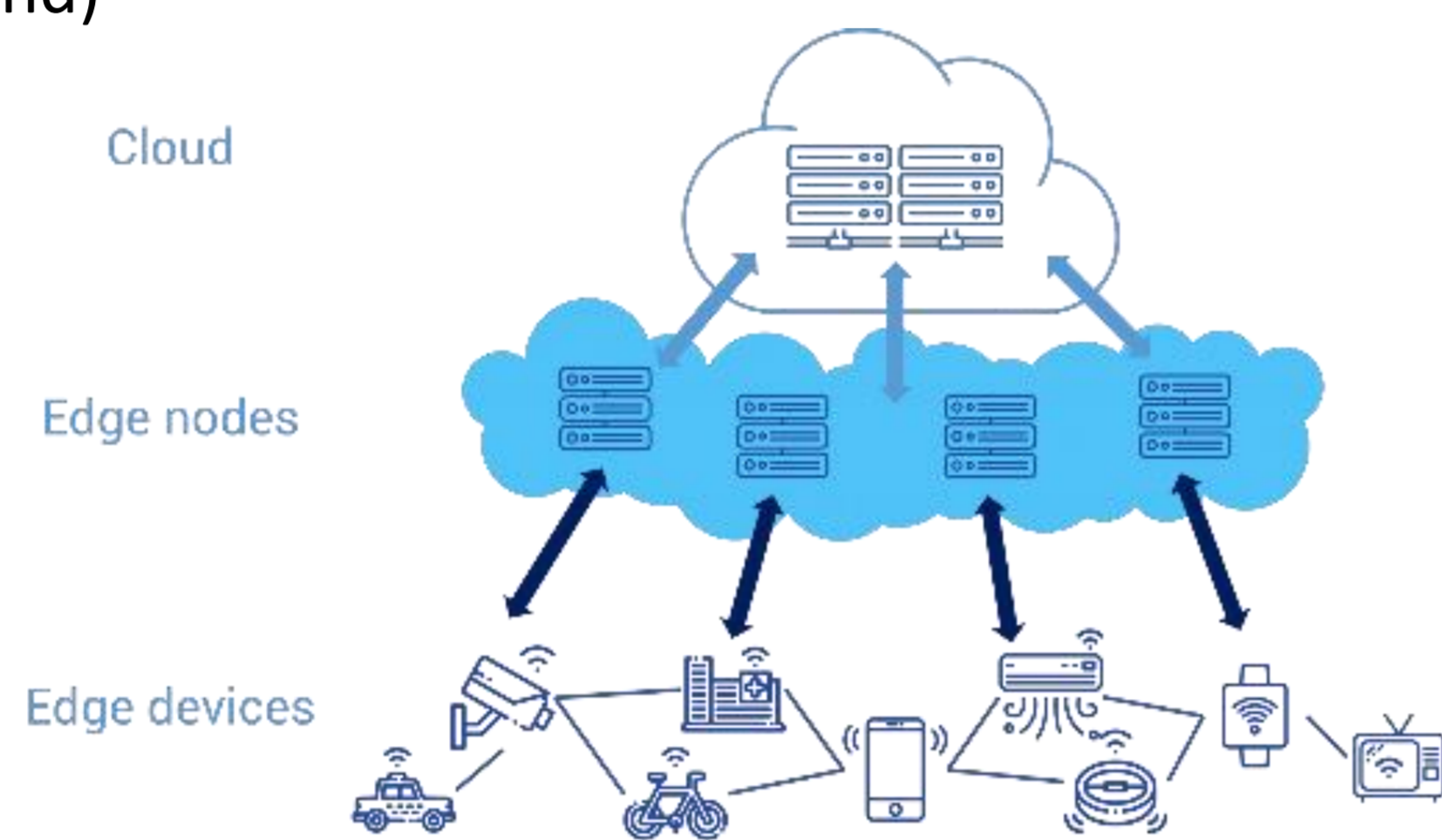
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## MOTIVATION AND GOALS

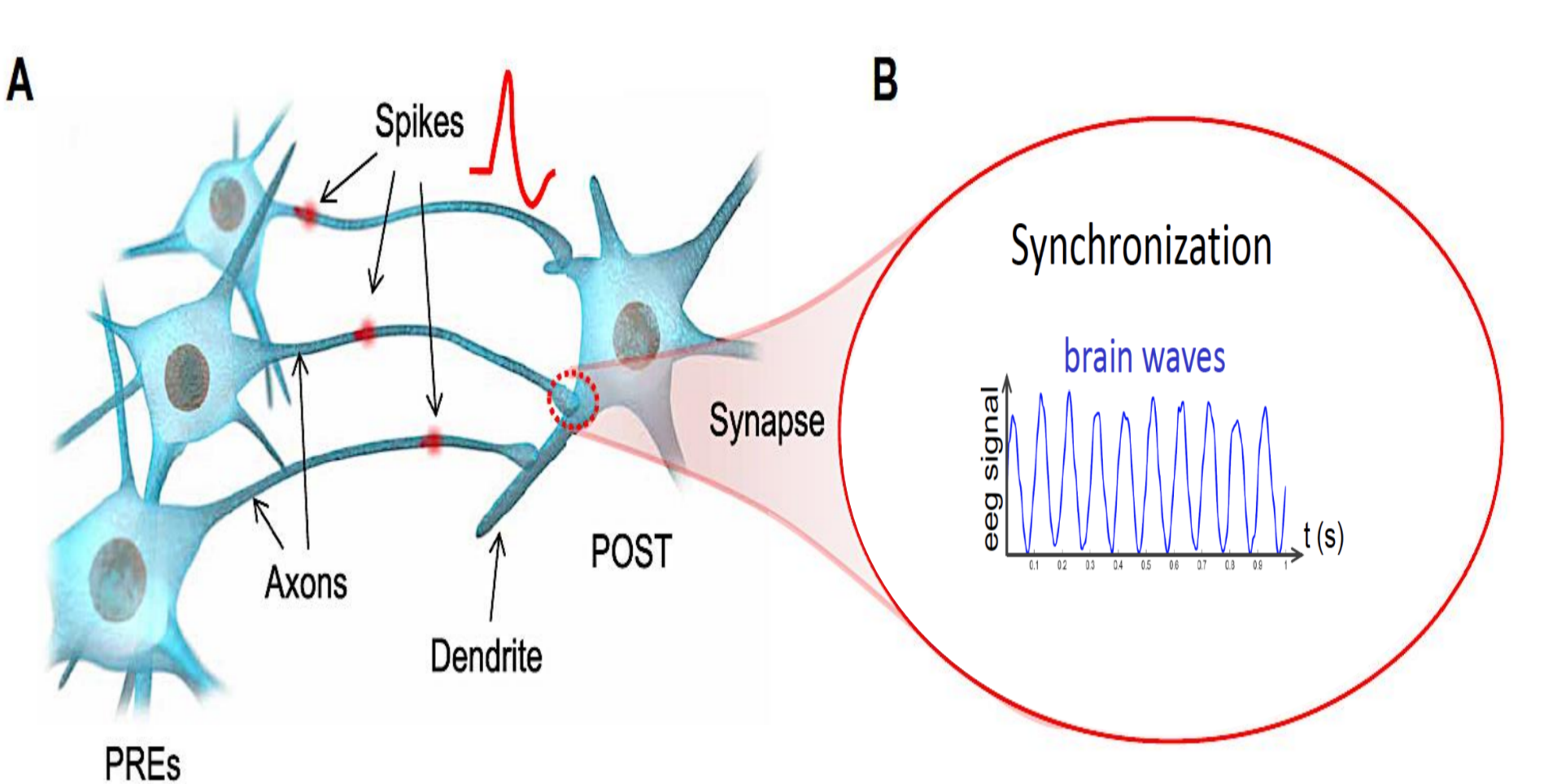
### ARTIFICIAL INTELLIGENCE AT THE EDGE

- Bandwidth (inference/second)
- Latency (frames/second)
- Privacy concerns
- Power consumption



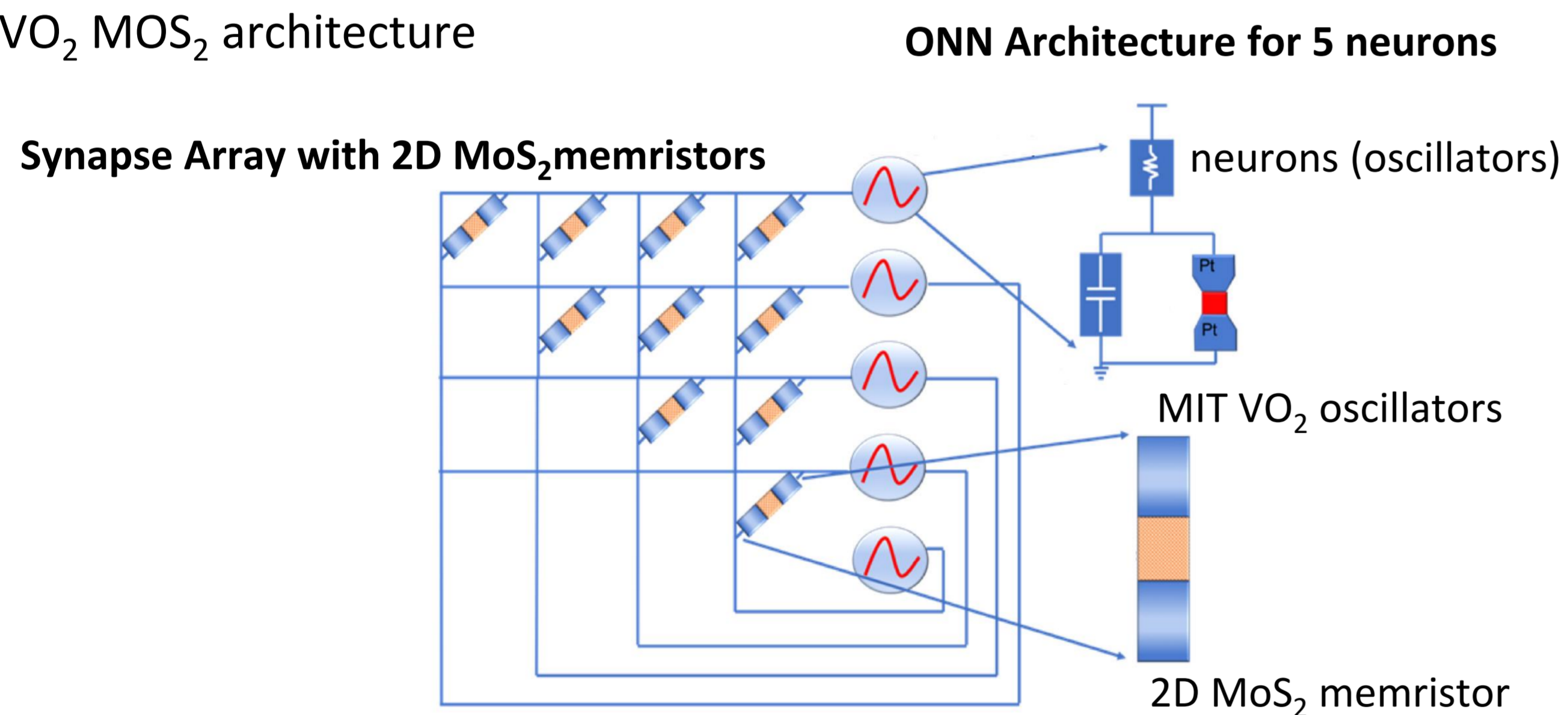
### NEUROMORPHIC COMPUTING

- Support online learning
- Excellent inference engine A
- Low power consumption
- Scalable/low cost



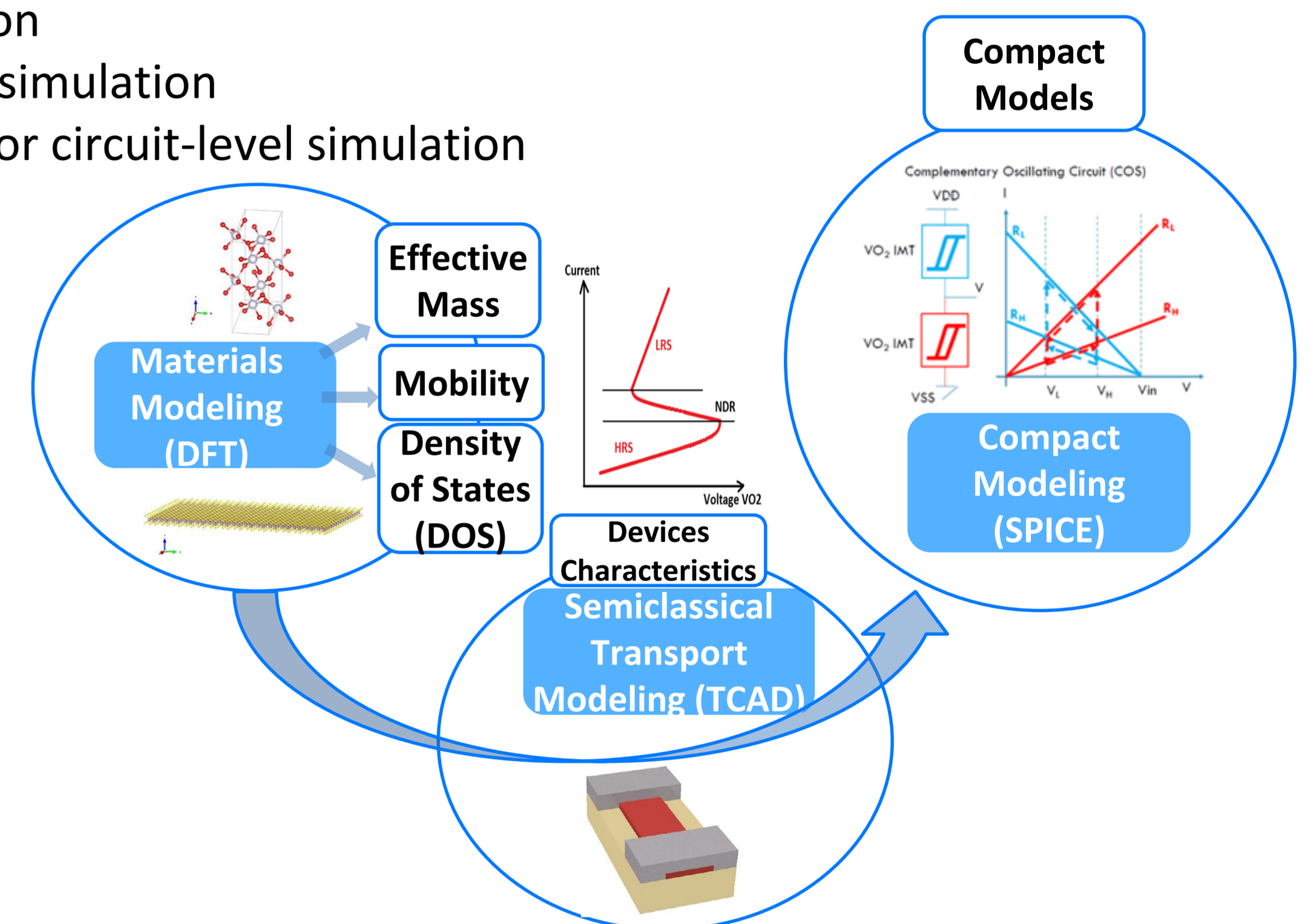
## WP1: NOVEL COMPUTING DEVICES AND CIRCUITS

- VO<sub>2</sub> oscillator devices emulating neurons
- MoS<sub>2</sub> memristor devices emulating synapses
- Co-integration of VO<sub>2</sub> and MoS<sub>2</sub> devices
- ONN VO<sub>2</sub> MoS<sub>2</sub> architecture



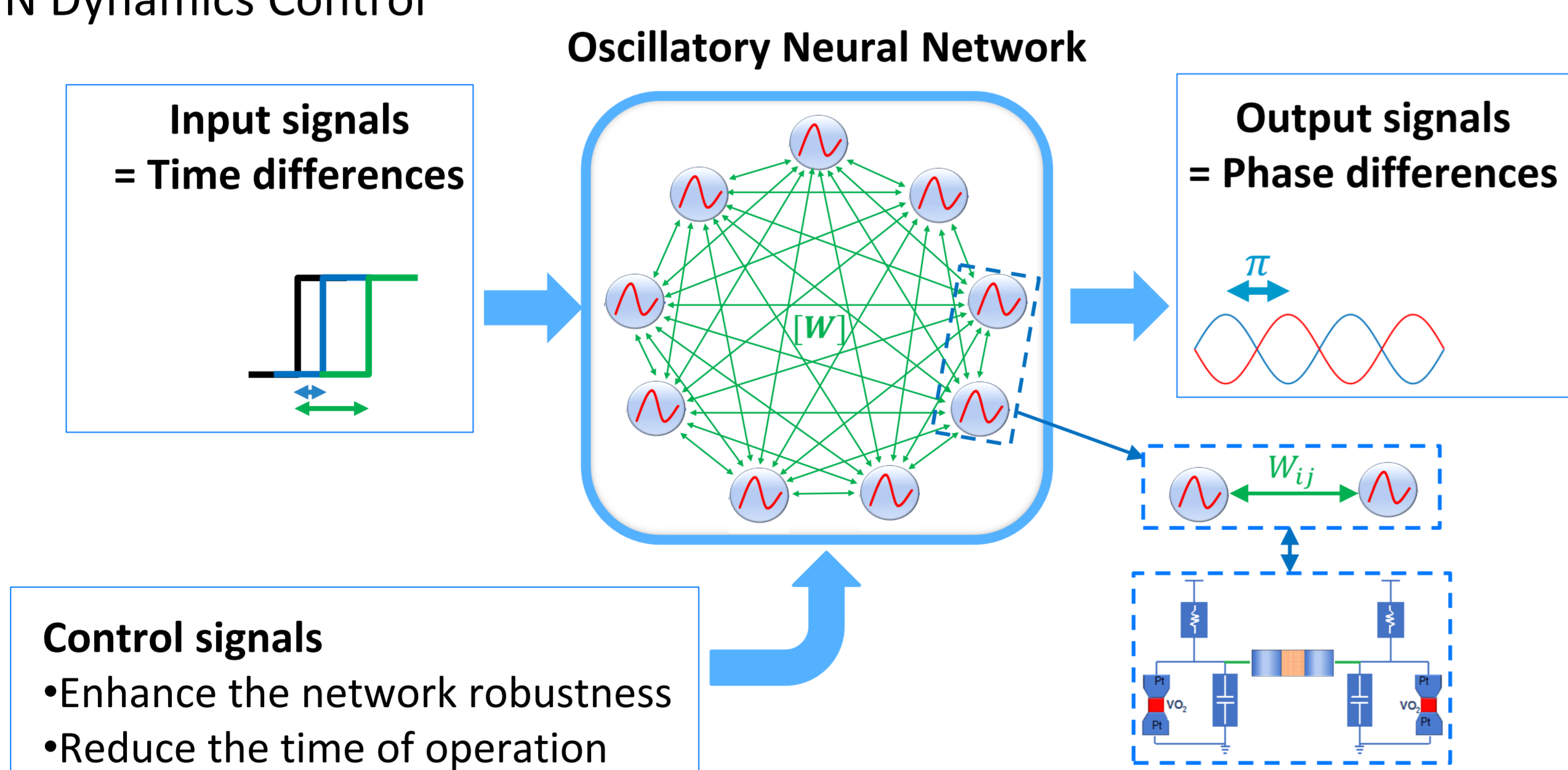
## WP2: ADVANCED DESIGN METHODS

- Atomistic simulation
- TCAD device-level simulation
- Compact-models for circuit-level simulation



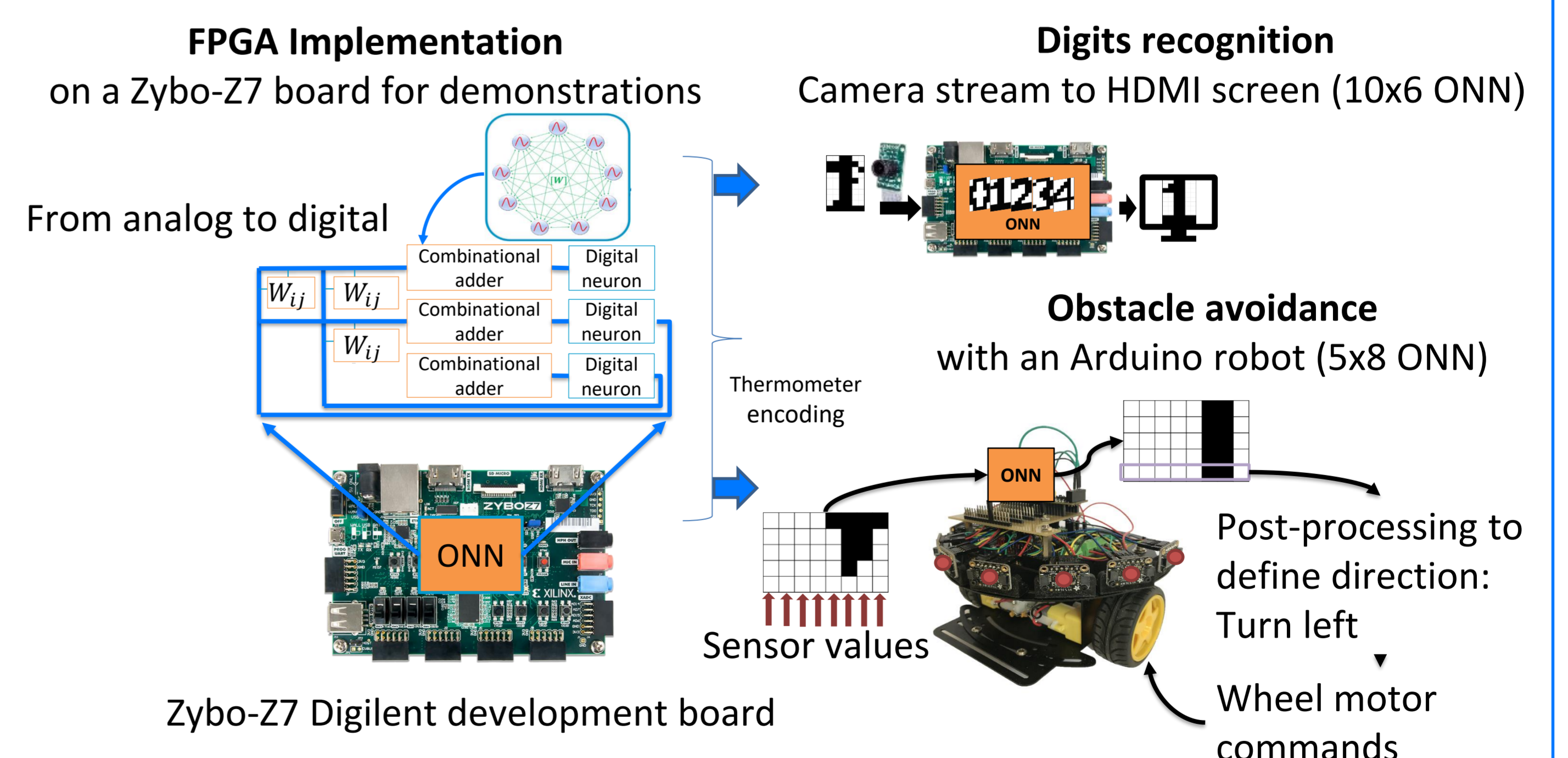
## WP3: ARCHITECTURE AND DESIGN SPACE EXPLORATION

- Energy-efficient Analog ONN Architecture Design
- ONN Dynamics Control



## WP4: DEMONSTRATOS AND USE CASES

- Digital ONN Implementation on FPGA



## ACKNOWLEDGEMENTS AND FUNDING



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