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Maintaining Real-Time on SpiNNaker

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EPSRC

ARM

SpiNNaker

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Overview of the topics

- The SpiNNaker system
- Neural network simulations
- Simulation timing

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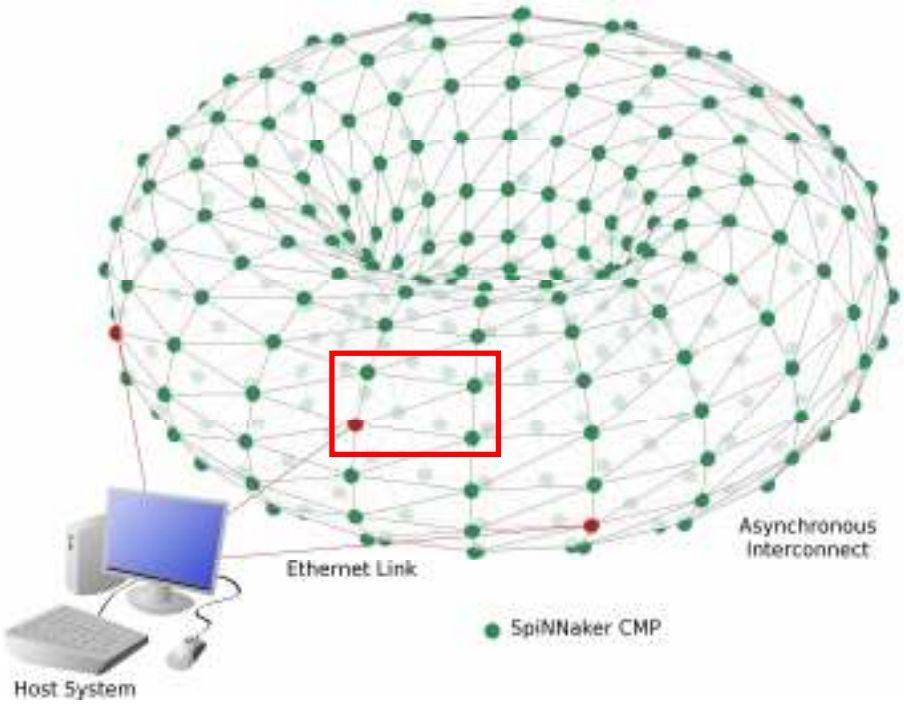
The SpiNNaker system



Biologically-inspired spiking neural network simulator:

- Off-the-shelf cores (multiple ARM9 per chip) with custom interconnect devices (asynchronous);
- Aims to simulate 1 billion+ neurons in real-time (~1% brain's neuron count).

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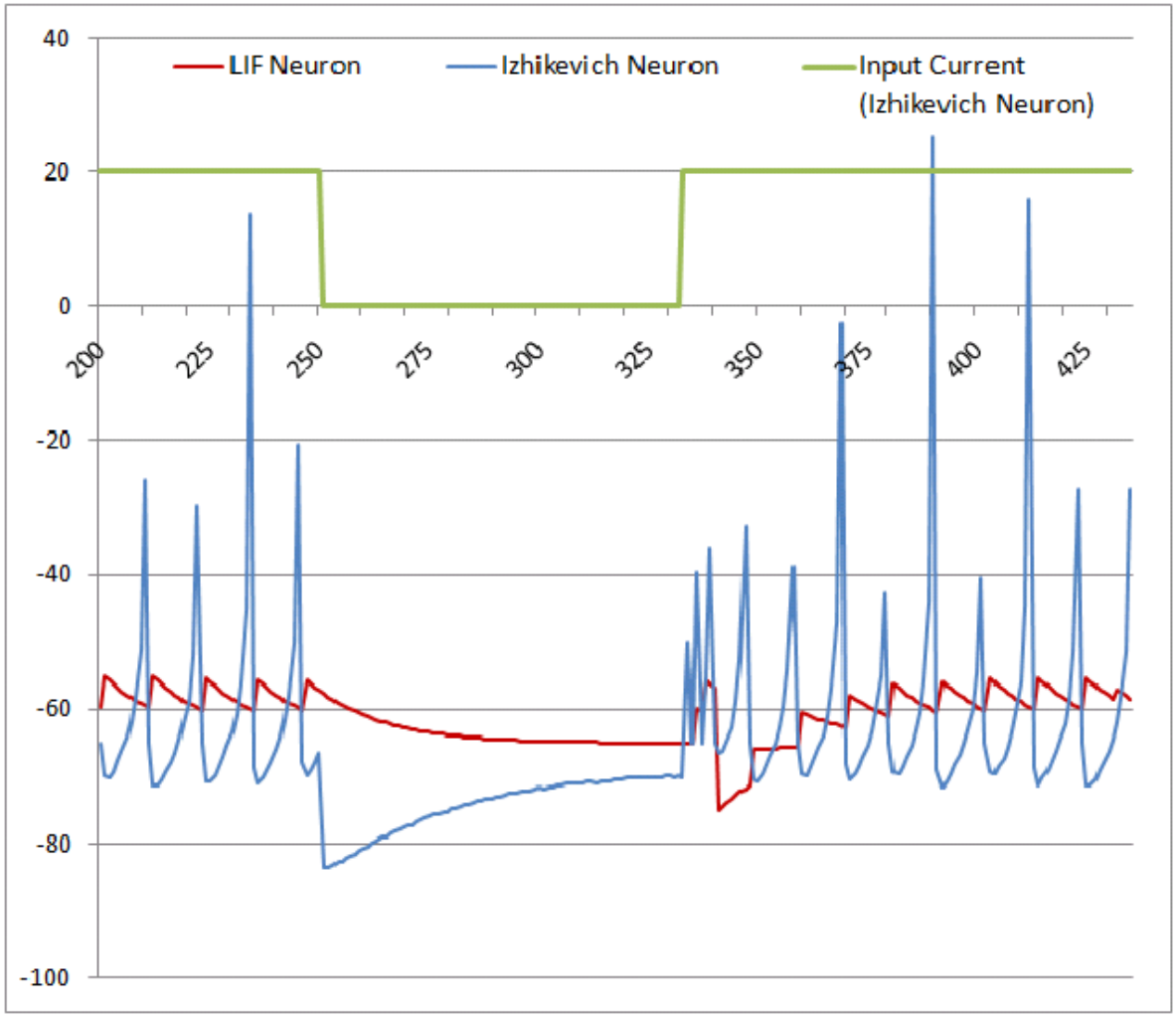
Neural network simulation



- Multiple neuron types during one simulation;
- Multiple synapse types during one simulation;

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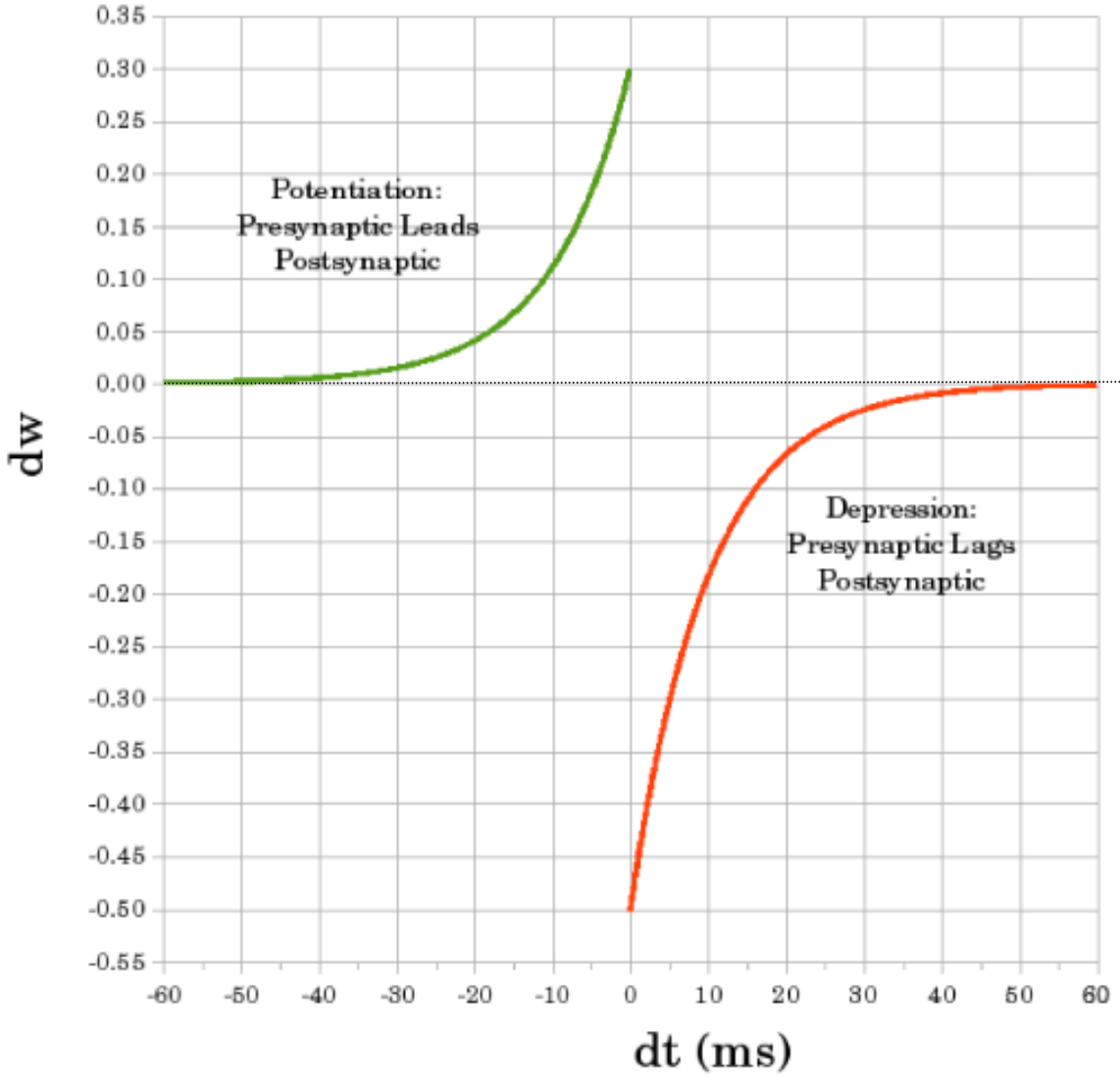
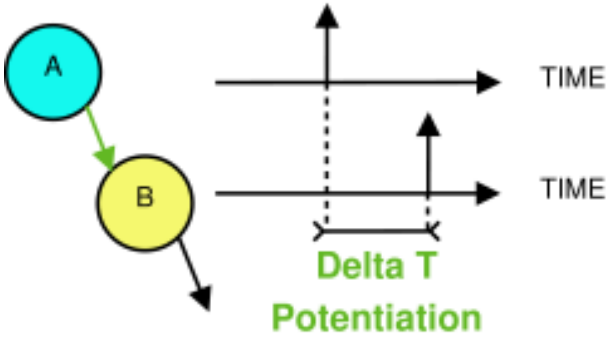
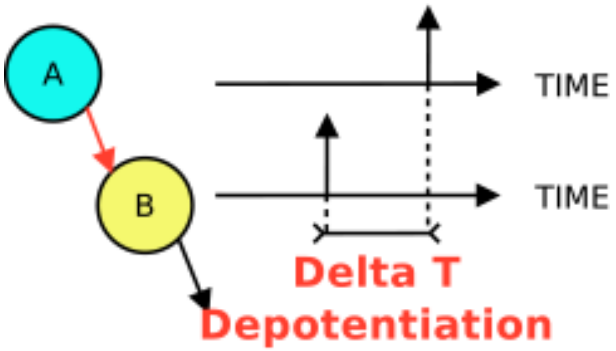
Learning (STDP)







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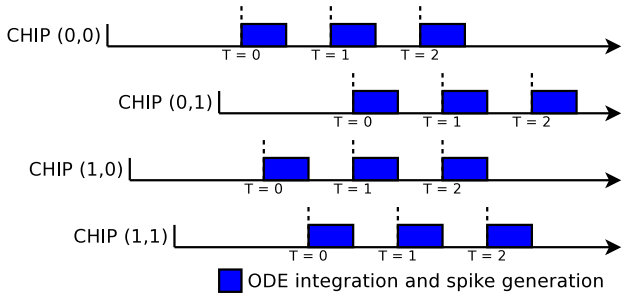
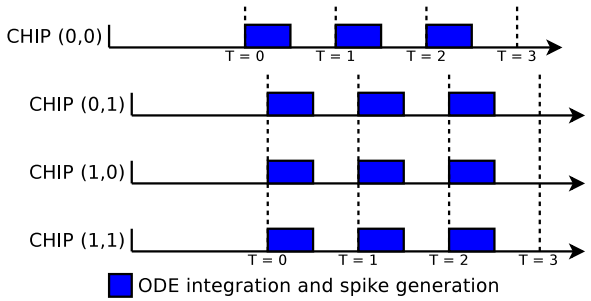
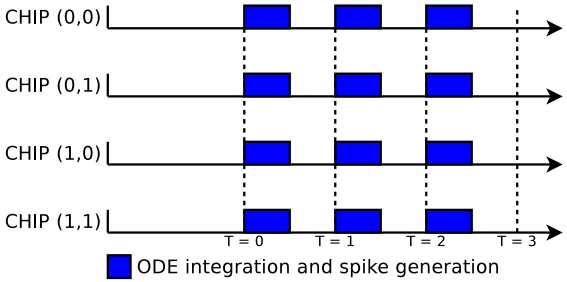
Simulation timing



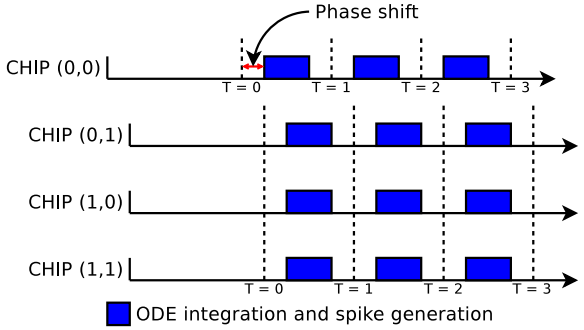
Simulation without synchronization across chips



Real simulation timing (with a barrier synchronization)



Simulation perfectly synchronized across multiple chips



Phase shifting

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Conclusions

Features of SpiNNaker:

- Simulates very large networks
- Real-time
- Multiple neuron types
- Multiple synapse types
- Learning

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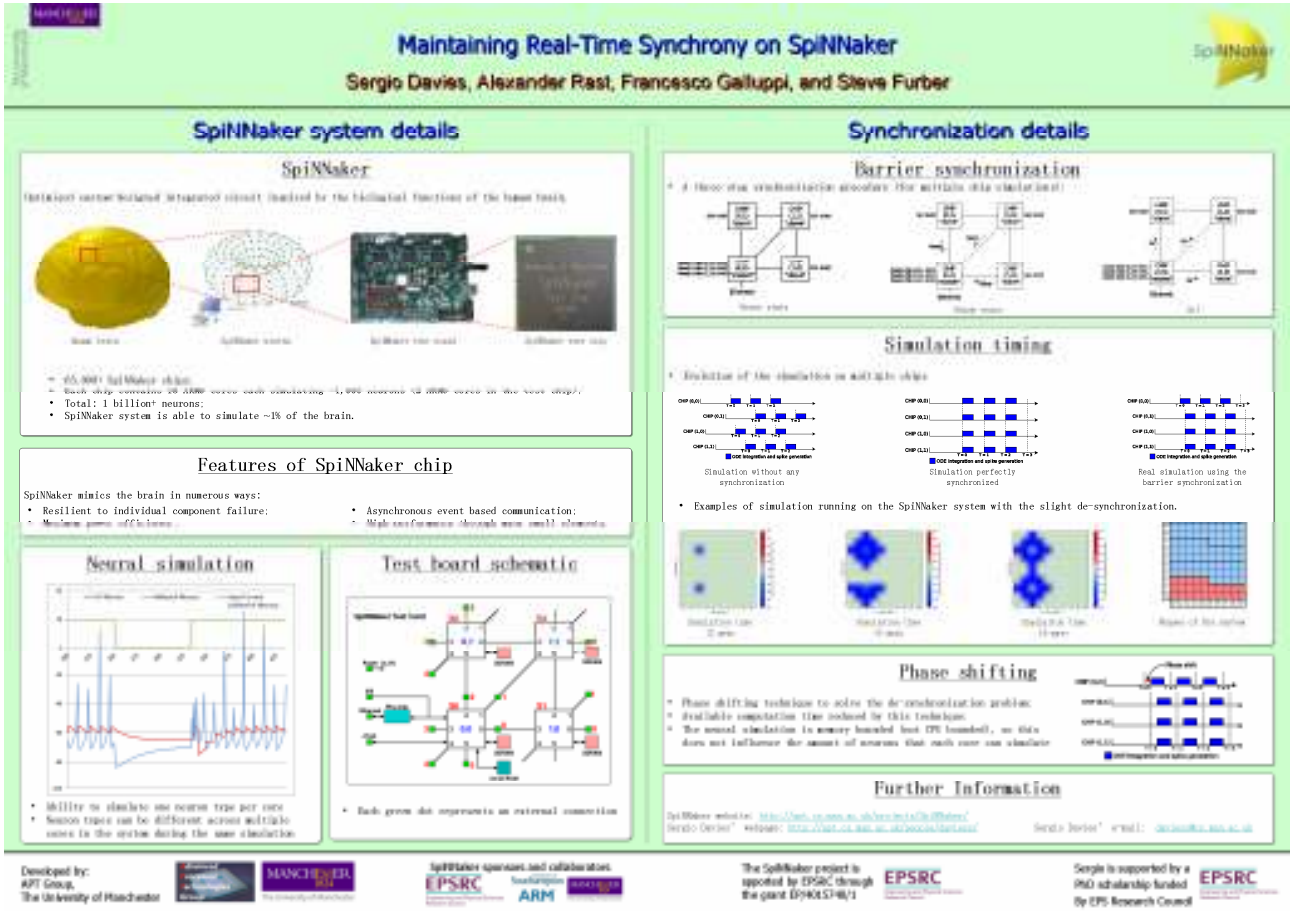
Thank you!!!

Questions???



Please, come near the poster!!!

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