Maintaining Real-Time on SpiNNaker

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Overview of the topics

- The SpiNNaker system
- Neural network simulations
- Simulation timing
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).
Neural network simulation

- Multiple neuron types during one simulation;
- Multiple synapse types during one simulation;
Learning (STDP)

Potentiation: Presynaptic Leads Postsynaptic

Depression: Presynaptic Lags Postsynaptic

Delta T Potentiation

Delta T Depotentiation
Simulation timing

Simulation without synchronization across chips

Real simulation timing (with a barrier synchronization)

Simulation perfectly synchronized across multiple chips

Phase shifting
Conclusions

Features of SpiNNaker:

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

Questions???

Please, come near the poster!!!