Recursos TFG

Real-Time Operating Systems

Linux with PREEMPT_RT

A version of Linux configured for real-time applications by applying the PREEMPT_RT. Widely used in research labs due to its open-source nature and flexibility.

Xenomai

A real-time development framework that works alongside the Linux kernel, providing hard real-time capabilities with low latencies.

RTLinux

An older approach to achieving real-time performance with Linux. While less common today than PREEMPT_RT or Xenomai, it laid the groundwork for many modern real-time Linux implementations.

QNX

A commercial RTOS known for its reliability in embedded and safety-critical applications. Its microkernel architecture offers robust real-time performance.

VxWorks

Another commercial RTOS often used in embedded systems. It provides deterministic execution times, making it suitable for applications where timing is critical.

Real-Time Tools for Neuron Experiments

RTXI (Real-Time eXperiment Interface)

An open-source platform designed specifically for real-time, closed-loop experiments in neuroscience. RTXI has been widely adopted for dynamic clamp experiments, where real-time feedback is essential.

NeuroRighter

An open-source system for real-time neural interfacing. It supports closed-loop stimulation and recording, making it a useful tool for experiments requiring precise timing control.

Open Ephys

A community-driven project that offers both hardware and software solutions for real-time electrophysiology. Its open-source nature and modular design have made it popular among experimental neuroscientists.

MATLAB/Simulink Real-Time

Although more general-purpose, MATLAB/Simulink's real-time capabilities are often used to design, simulate, and deploy closed-loop experimental protocols, including dynamic clamp and real-time signal processing for neural experiments.

Dedicated Dynamic Clamp Systems

There are various hardware/software combinations developed in research labs that implement dynamic clamp techniques. These systems often leverage RTOS (like those mentioned above) to ensure the precise timing needed to simulate ionic currents in neurons.

Papers and tools

Asynchronous Tool Usage for Real-Time Agents

Software Tools for Conducting Real-Time Information Processing and Visualization in Industry: An Up-to-Date Review

Real-Time Tool Detection for Workflow Identification in Open Cranial Vault Remodeling

A systematic review of real-time data monitoring and its potential application to support dynamic life cycle inventories

Software Tools for Conducting Real-Time Information Processing and Visualization in Industry: An Up-to-Date Review

Real-Time Systems Design and Analysis: Tools for the Practitioner

Taking advantage of real-time collaboration tools

RThybrid: A standardized and open-source real-time software model library for experimental neuroscience

Automatized offline and online exploration to achieve a target dynamics in biohybrid neural circuits built with living and model neurons

Automatic signal adaptation for real-time bidirectional interaction with the nervous system

Design of a Bioelectronics Hybrid System in Real Time and in Closed Loop

Design of a Biohybrid Materials Circuit with Binary Decoder Functionality

In vitro neurons learn and exhibit sentience when embodied in a simulated game-world