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Research on Next-Generation Electronics Inspired by Neural Circuits

Department of Electrical and Electronic Engineering
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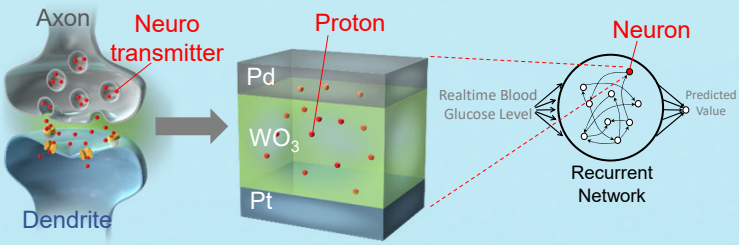
Ion-Based Ultra-Low-Power Information Processing

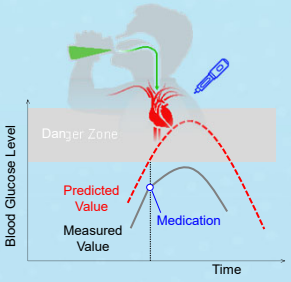
Realization of Short-Term Memory via Slow Proton Dynamics

Synapses that Generate Short-Term Memory | **Realizing Short-Term Memory with Electron-Proton Devices** | **Synapses that Generate Short-Term Memory**

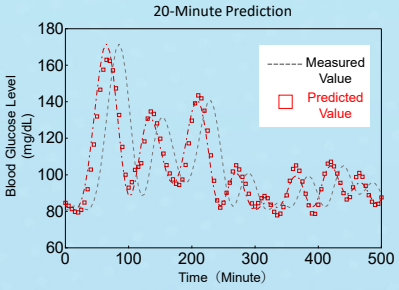


Learning and Predicting Individual's Biological Data Using Short-Term Memory

Real-Time Blood Glucose Prediction



Successful 20-Minute Blood Glucose Prediction

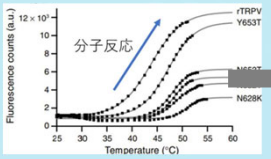


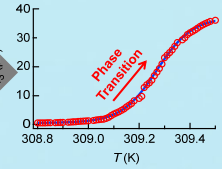
＊Collaborative Research with Companies

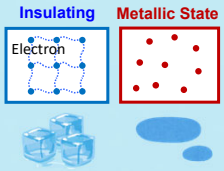
Large-Scale Sensing via Binarization

The skin temperature sensor has a 0/1 response

Temperature-Sensitive Functional Groups in the Skin | **Electrical Resistance Change of VO2** | **Metal-Insulator Transition**



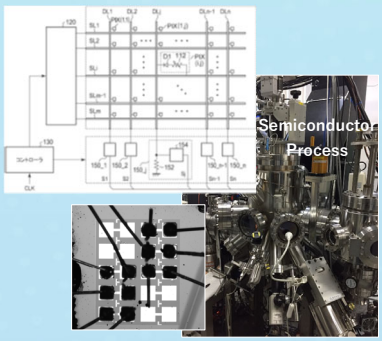




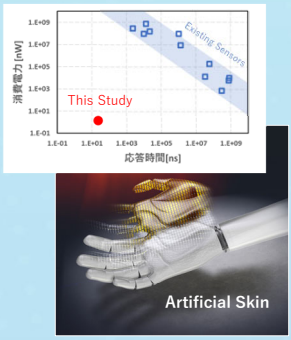
Grandl, Nature Neurosci. 2010.

Realizing Artificial Skin with Large-Scale Two-Dimensional Sensing

Biomimetic Temperature Sensing Sheet Using VO2



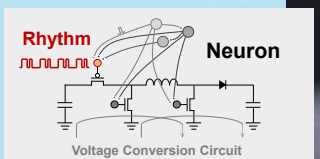
Large-Scale Sensor Sheet with Ultra-Low Power and Fast Response

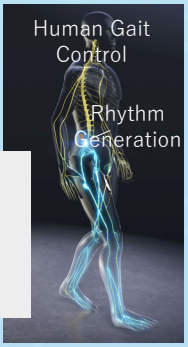


＊Collaborative Research with Companies

Next-Generation Electronics Inspired by Neural Circuits

Rhythm Control of Electronic Circuits



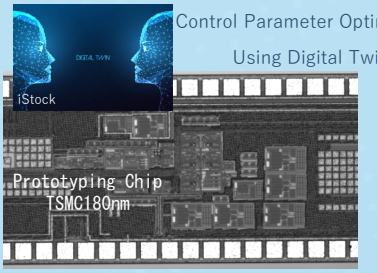


Ultra-Low Power Circuit Control Using Neuron Circuits

Collaboration with the Kawakami Lab

Autonomous Adaptive Control Using Digital Twin

Control Parameter Optimization Using Digital Twin



Solving Real-World Problems That Cannot Be Addressed by Software with Hardware Technology

Safety
We want to detect collapse accidents in advance.

Biodiversity
We want to track the life journey of migratory birds.

Food
We want to detect abnormalities in livestock and crops as early as possible.

Well-being
We want to continuously monitor health to prevent serious diseases.