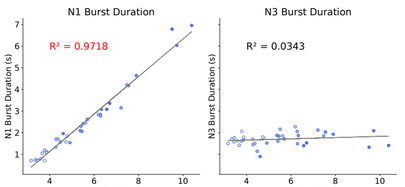
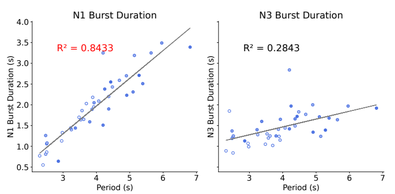
Study of the Sequential nature in neuronal dynamics

Case of study

Feeding CPG
Lymnaea stagnalis

Experimental approach

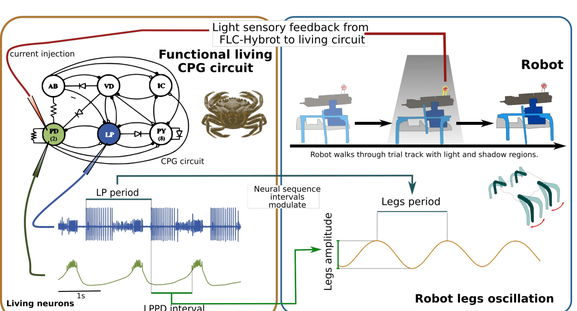




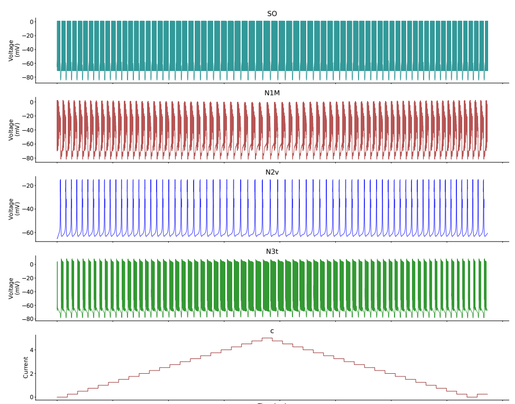
Presence of dynamical invariants under different cases of stimulation

Universality of sequential dynamical invariants

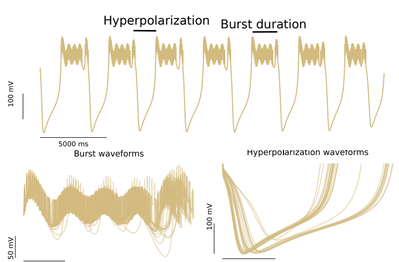
Transformation of sequential intervals into effective robot movement



Computational approach



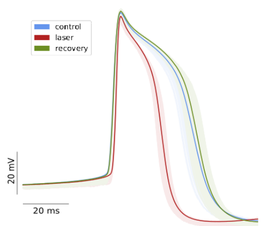
Importance of reproducing the functional variability in computational models

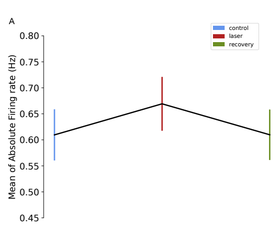


Technique to study it

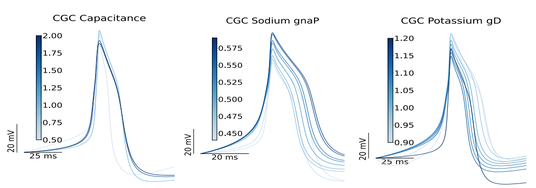
CW-NIR Infrared laser
Single neurons in RPG
Lymnaea stagnalis

Sustained illumination

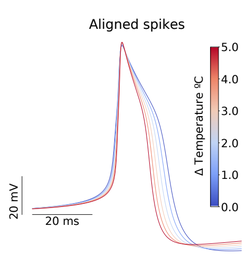




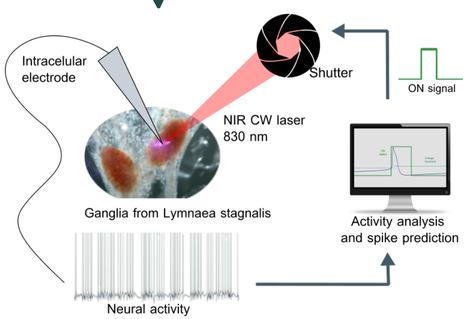
Sutained laser stimulation accelerates the action potential



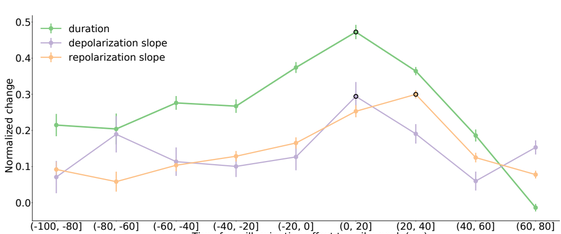
No candidate alone in the model could reproduce the effect, execept of the temperature dependency



Activity-dependent protocol



With the activity dependent protocol we could assess the action potential sequential generation at different time instants



The closed-loop protocol unveiled the CW-laser effect at different phases of the neuron dynamics, shifting the maximum effect at different spike generation times