Neuromorphic CPG for Motor Control

A neuromorphological approach to quadriped motion

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Abstract

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Chapter 1

Introduction

1.1 Neuronal Model

$$\tau_o \frac{\partial V}{\partial t} = V_0 + I_a - i_{f-} - i_{s+} - i_{s-} - i_{u+} - V \tag{1.1}$$
$$i_{f-} = g_{f-} \left(\tanh\left(v_f - d_{f-}\right) - \tanh\left(V_0 - d_{f-}\right) \right) \tag{1.2}$$
$$i_{s+} = g_{s+} \left(\tanh\left(v_s - d_{s+}\right) - \tanh\left(V_0 - d_{s+}\right) \right) \tag{1.3}$$
$$i_{s-} = g_{s-} \left(\tanh\left(v_s - d_{s-}\right) - \tanh\left(V_0 - d_{s-}\right) \right) \tag{1.4}$$
$$i_{u+} = g_{u+} \left(\tanh\left(v_u - d_{u+}\right) - \tanh\left(V_0 - d_{u+}\right) \right) \tag{1.5}$$
$$\tau_f \frac{\partial v_f}{\partial t} = V - v_f \tag{1.6}$$
$$\tau_s \frac{\partial v_s}{\partial t} = V - v_s \tag{1.7}$$
$$\tau_u \frac{\partial v_u}{\partial t} = V - v_u \tag{1.8}$$

with g_{f-}, $g_{s-} < 0$, g_{s+}, $g_{u+} > 0$ and d_{f-}, d_{s+}, d_{s-}, $d_{u+} \in \mathbb{R}$.

We could write i_{s+} and i_{s-} as a single current, but, since they play a different role in the neuron behaviour we choose to write them separately.

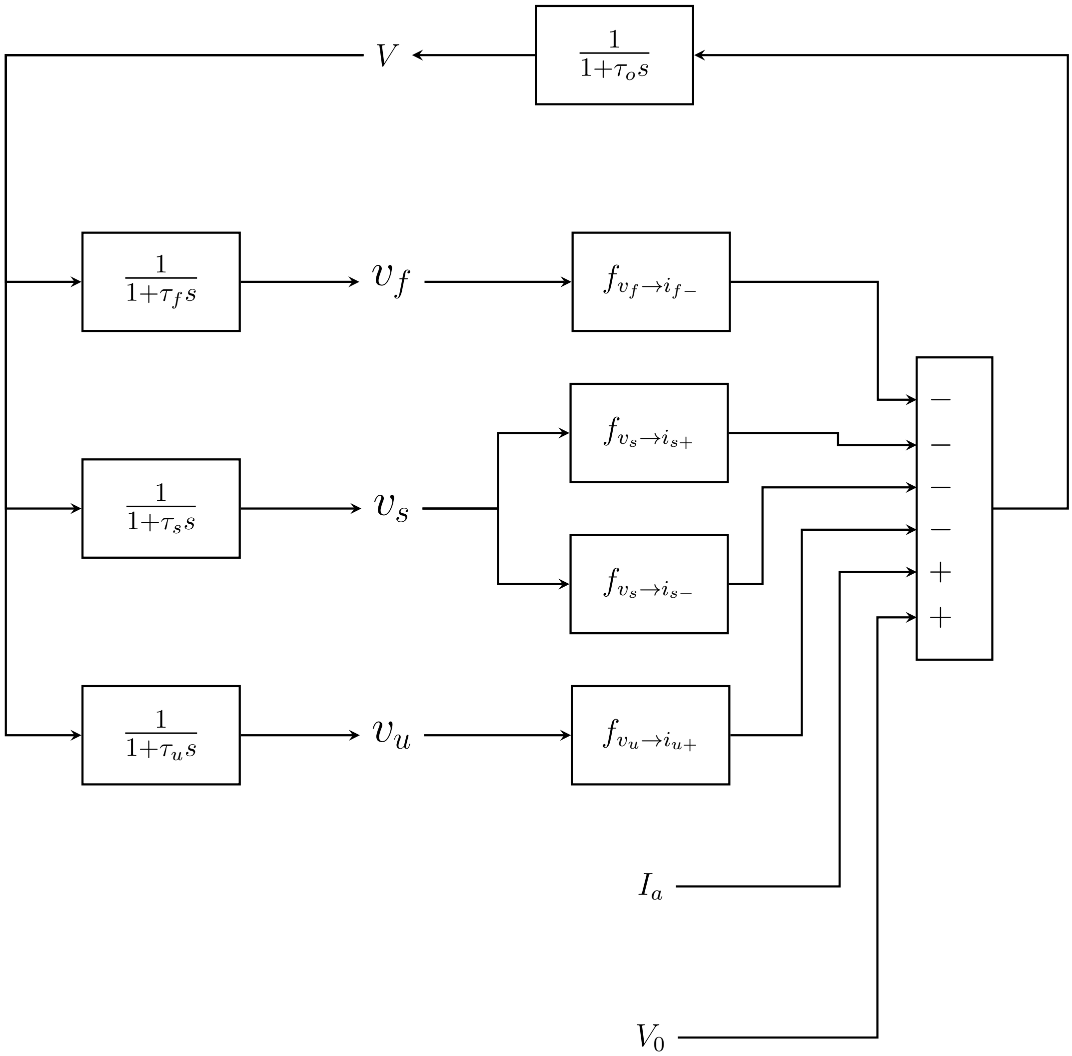

Figure 1.1: Diagram of the Neuron Model

Chapter 2

Chapter Two Title

Chapter 3

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Chapter 4

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Chapter 5

Conclusion

Bibliography

[1] In: (0).

Appendix A

Appendix Title