

$$\left\{ \begin{array}{l} x_1''(t) = k \cdot [v_{\text{opt}}(x_0(t) - x_1(t)) - x_1'(t)] \\ \vdots \\ x_N''(t) = k \cdot [v_{\text{opt}}(x_{N-1}(t) - x_N(t)) - x_N'(t)] \end{array} \right\}$$