ME729 Advanced Robotics - Project #3 description

4/09/2018
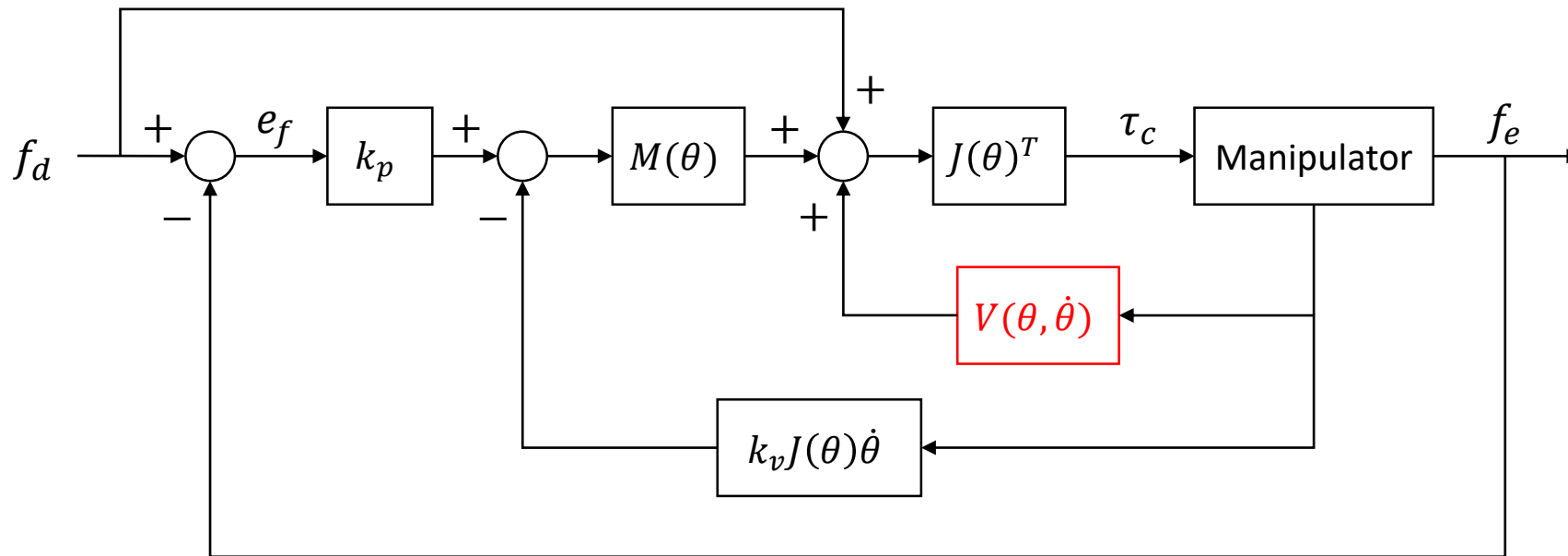
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Objectives
- The purpose of this project is to understand the force control algorithm using two-link planar manipulator.

Presentation
- Present all of your tasks with a code explanation, and show your demo.
- Submit your presentation file before start the class, i.e. before 4/23/18 6 p.m.

Tasks
- Let's see the following block diagram.
- The velocity vector of the equation of the motion is added in the control loop.

Block diagram: $f_d \rightarrow \oplus \xrightarrow{e_f} \boxed{k_p} \rightarrow \oplus \rightarrow \boxed{M(\theta)} \rightarrow \oplus \rightarrow \boxed{J(\theta)^T} \xrightarrow{\tau_c} \boxed{\text{Manipulator}} \xrightarrow{f_e}$, with feedback blocks $V(\theta,\dot{\theta})$ and $k_v J(\theta)\dot{\theta}$.

❑ Tasks - continued
- Math problems
    1) From the block diagram, make the control law, τ_c.
    2) Present τ_{c1} and τ_{c2} in detail using the following notation.

$$\tau_c = \begin{bmatrix} \tau_{c1} \\ \tau_{c2} \end{bmatrix}, M(\theta) = \begin{bmatrix} m_1 & m_2 \\ m_2 & m_3 \end{bmatrix}, \ddot{\theta} = \begin{bmatrix} \ddot{\theta}_1 \\ \ddot{\theta}_2 \end{bmatrix}, V(\theta, \dot{\theta}) = \begin{bmatrix} V_1 \\ V_2 \end{bmatrix}, J(\theta) = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

- Programming problems
    1) Implement the new control law based on the force control lab's source code.
    2) If needed, you can change the gains (kp, kv, and tau_gain).