

## Observer and Controller

$$\text{System: } \dot{x} = Ax + Bu$$

$$y = Cx$$

$$\text{Observer: } \dot{\hat{x}} = (A - LC)\hat{x} + Ly + Bu$$

$$\text{Error: } \dot{e} = (A - LC)e$$

- By observability, we can arbitrarily assign  $\text{eig}(A - LC)$ ; these should be farther into LHP than desired controller poles.

$$\text{Controller: } u = -K\hat{x} \quad (\text{estimated state feedback})$$

- By controllability, we can arbitrarily assign  $\text{eig}(A - BK)$ .