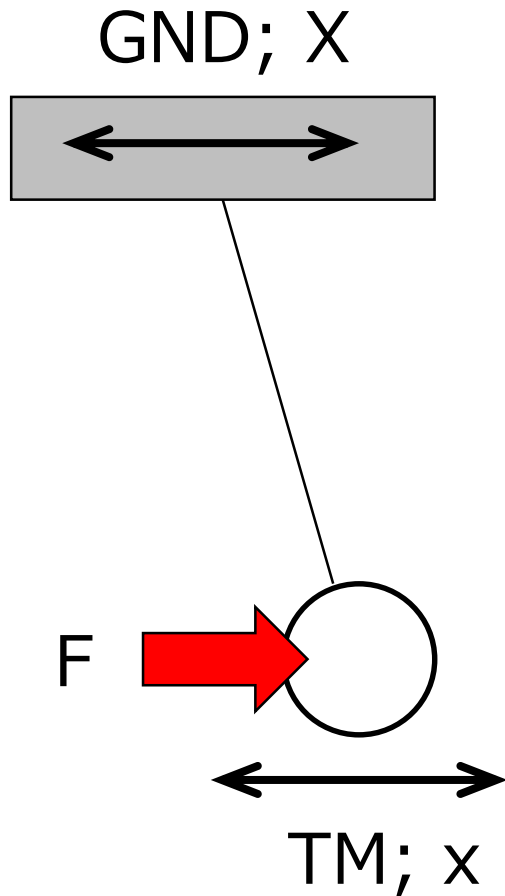


System: Harmonic oscillator



$$\begin{aligned} m\ddot{x} &= -k(x - X) + F \\ &= -kx + kX + F \end{aligned}$$

$$\mathbf{x} \equiv \begin{pmatrix} \dot{x} \\ x \end{pmatrix}, \quad \mathbf{u} \equiv \begin{pmatrix} X \\ F \end{pmatrix}, \quad \mathbf{y} \equiv x$$

$$\begin{cases} \frac{d}{dt} \mathbf{x} = \begin{pmatrix} 0 & -\frac{k}{m} \\ 1 & 0 \end{pmatrix} \mathbf{x} + \begin{pmatrix} k/m & 1/m \\ 0 & 0 \end{pmatrix} \mathbf{u} \\ \mathbf{y} = (0 \quad 1) \mathbf{x} + (0 \quad 0) \mathbf{u} \end{cases}$$