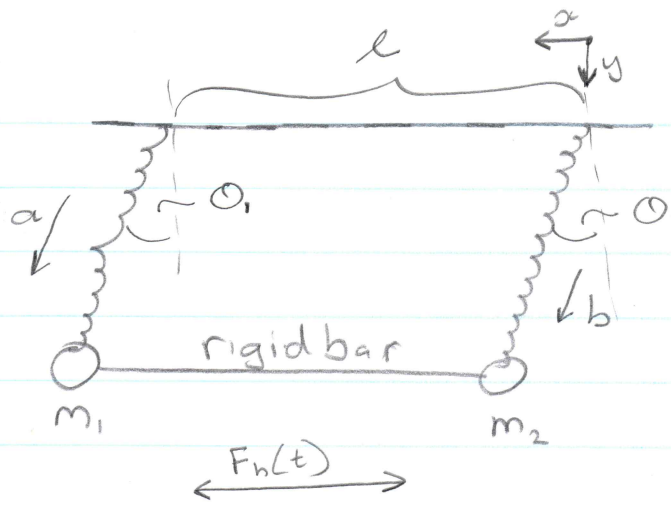

* Initial length of spring = r
both springs are equal length

$$T = \frac{1}{2} m_1 \dot{a}^2 + \frac{1}{2} m_2 \dot{b}^2 + \frac{1}{2} m_1 (r+a)^2 \dot{\theta}_1^2 + \frac{1}{2} m_2 (r+b)^2 \dot{\theta}_2^2$$

$$U = \frac{1}{2} k a^2 + \frac{1}{2} k b^2 - m_1 g (r+a) \cos\theta_1 - m_2 g (r+b) \cos\theta_2$$

Holonomic constraint

$$(x, y)_{m_1} = \left((r+a)\sin\theta_1 + \ell,\ (r+a)\cos\theta_1 \right) = \bar{R}_1$$

$$(x, y)_{m_2} = \left((r+b)\sin\theta_2,\ (r+b)\cos\theta_2 \right) = \bar{R}_2$$

$$F_c = (\bar{R}_1 - \bar{R}_2) \cdot (\bar{R}_1 - \bar{R}_2) - \ell^2 = 0$$

Coordinate system: θ_1 & θ_2 ⇒ cylindrical
a & b ⇒ radial
x & y ⇒ cartesian, only used for holonomic constraint