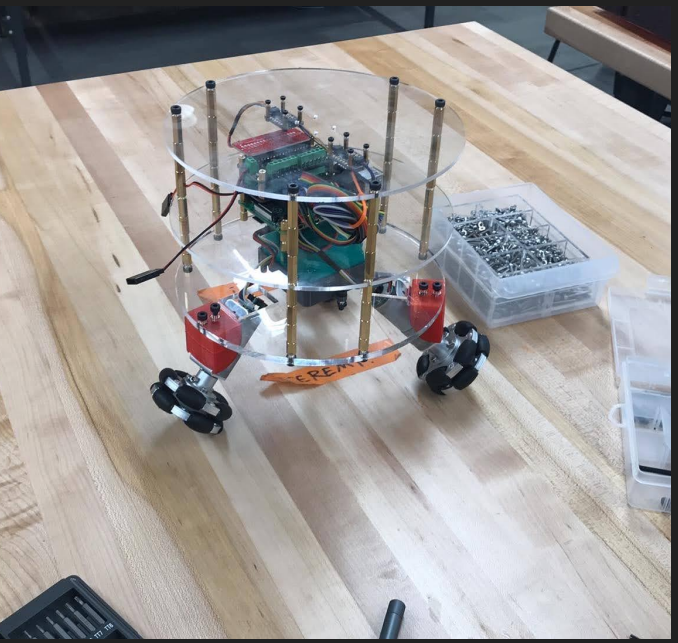
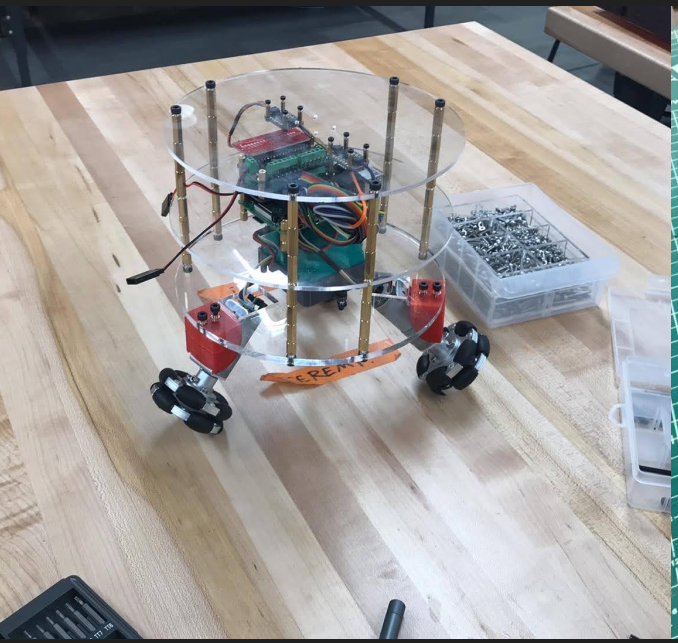
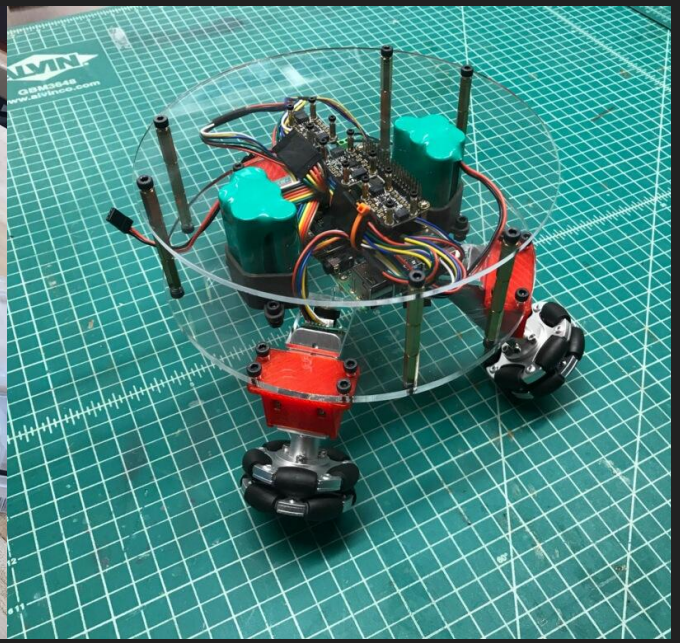
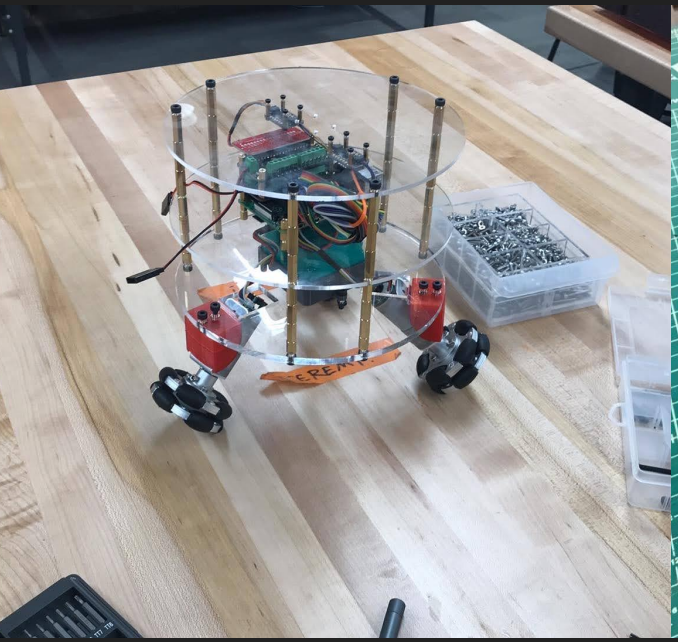
Balancing Robot

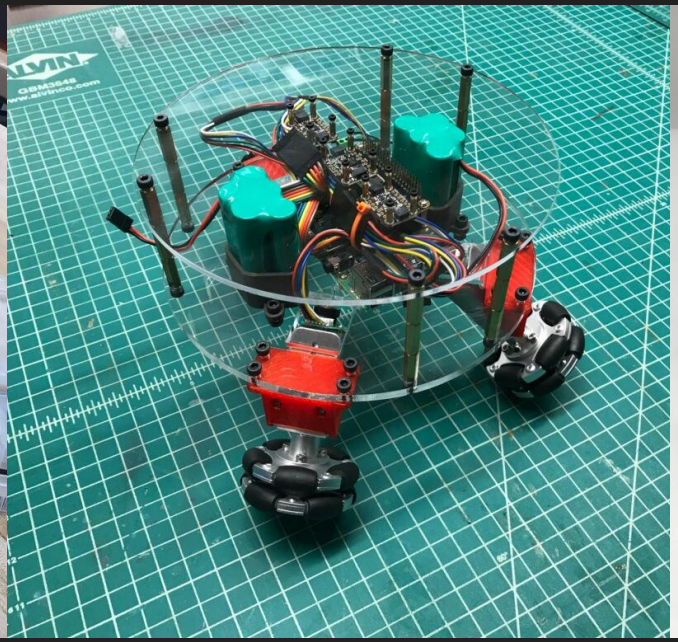
Fengwu Yao && Jeremy Kanovsky

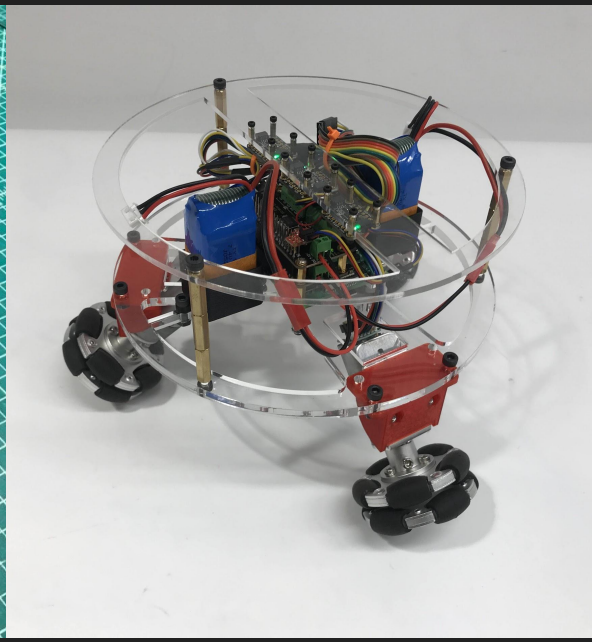


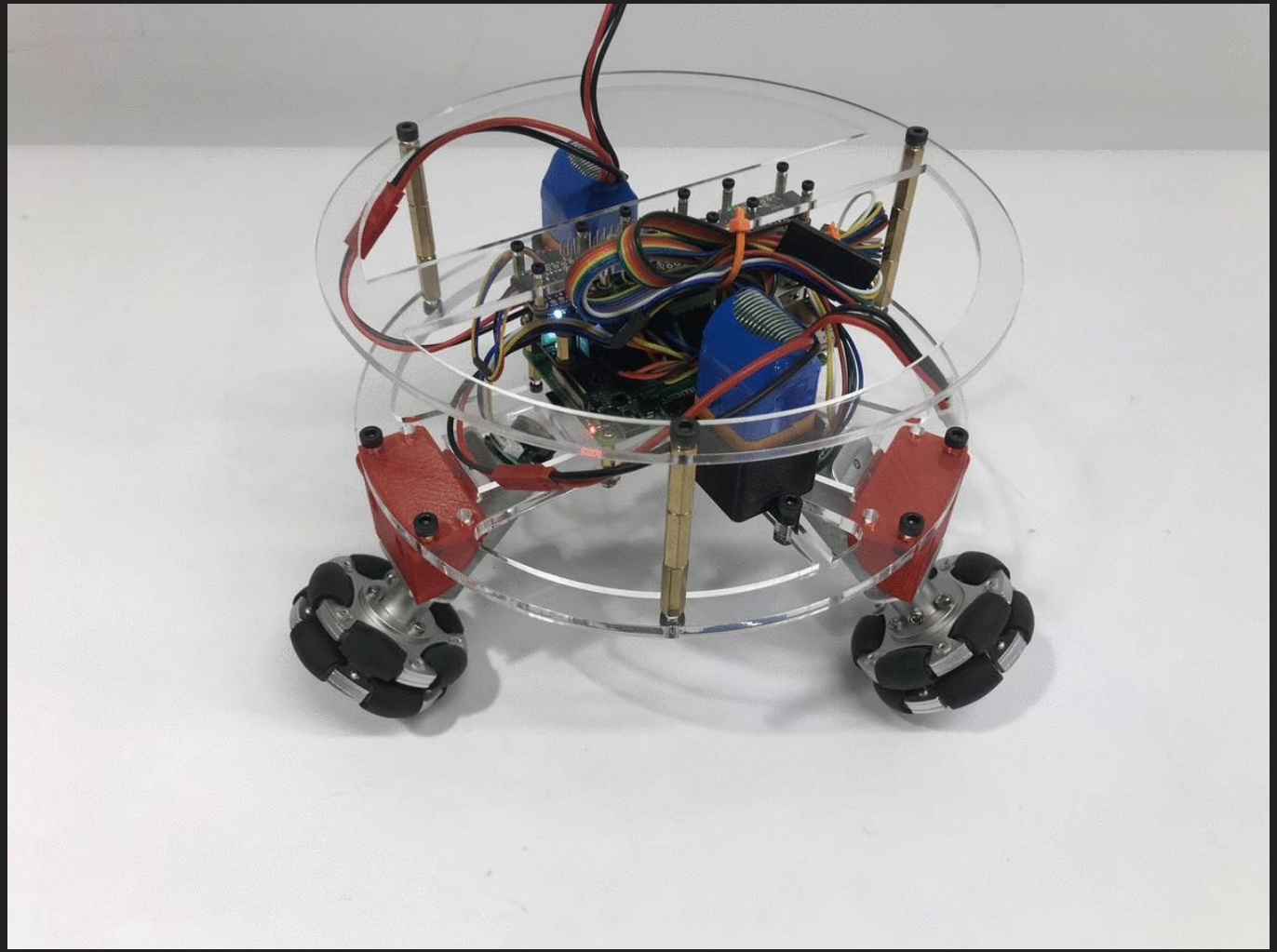




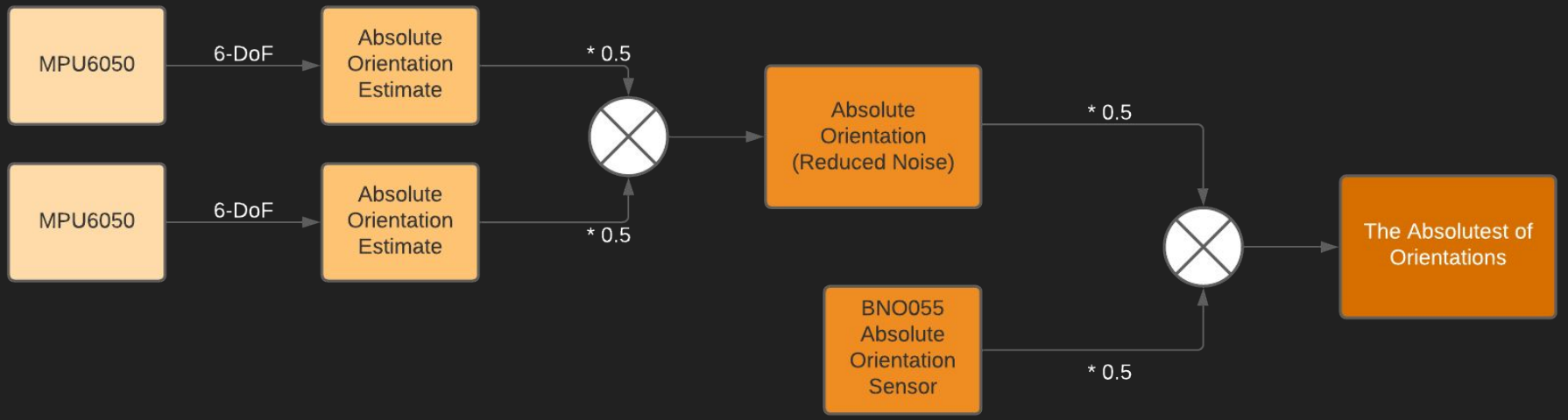


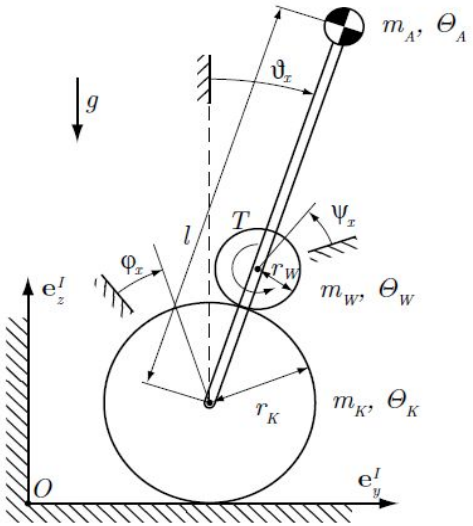


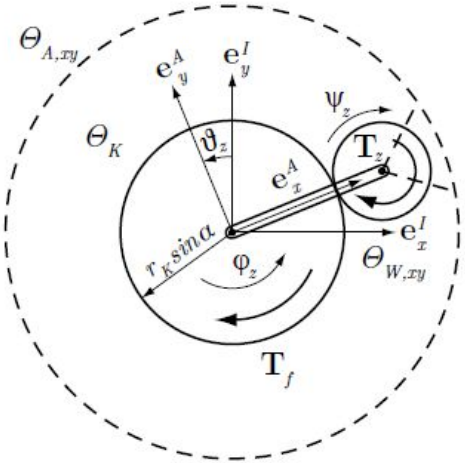




Sensing


MPU6050
6-DoF
Absolute Orientation Estimate
MPU6050
6-DoF
Absolute Orientation Estimate
* 0.5
* 0.5
Absolute Orientation (Reduced Noise)
* 0.5
BNO055 Absolute Orientation Sensor
* 0.5
The Absolutest of Orientations

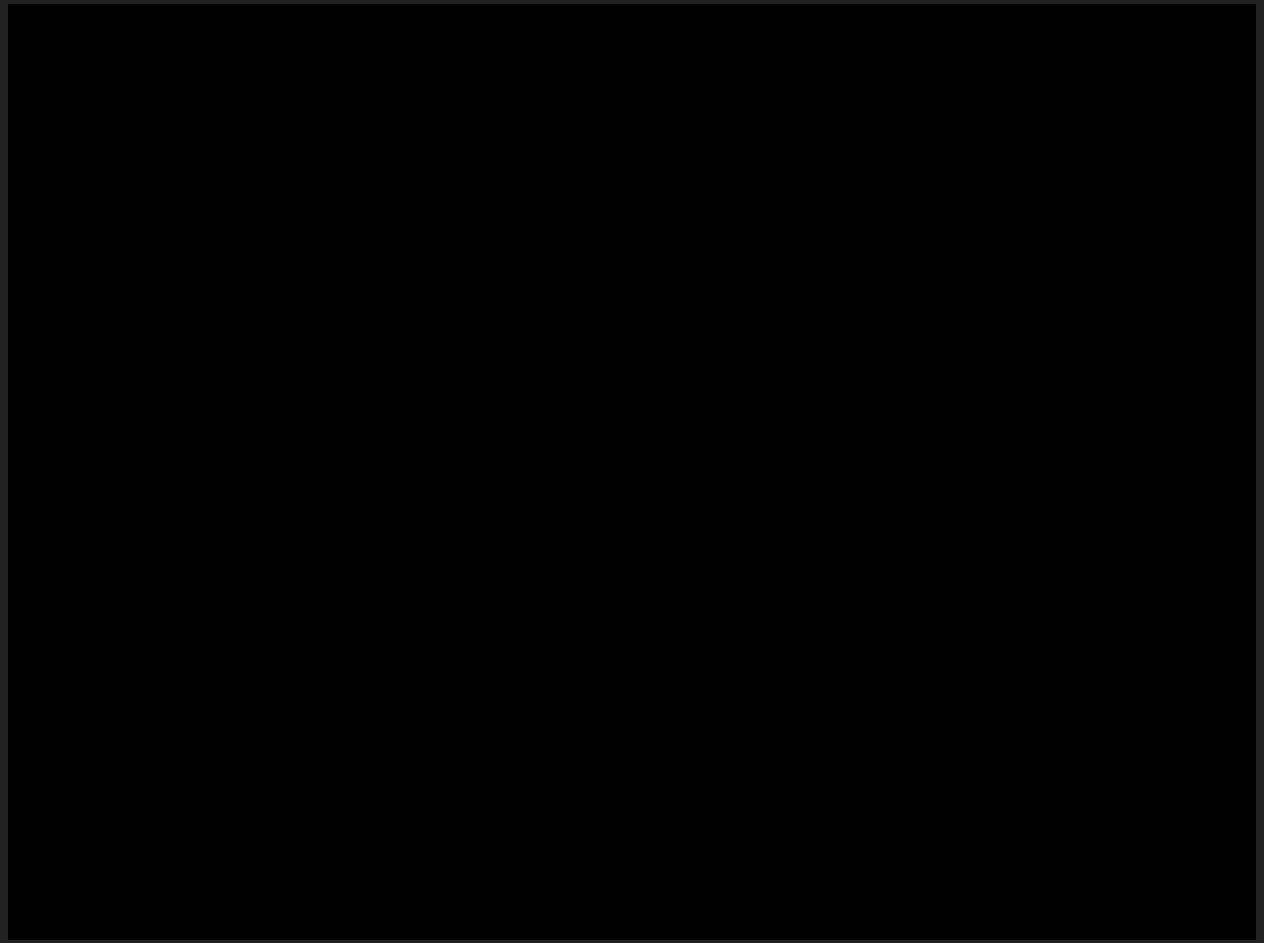


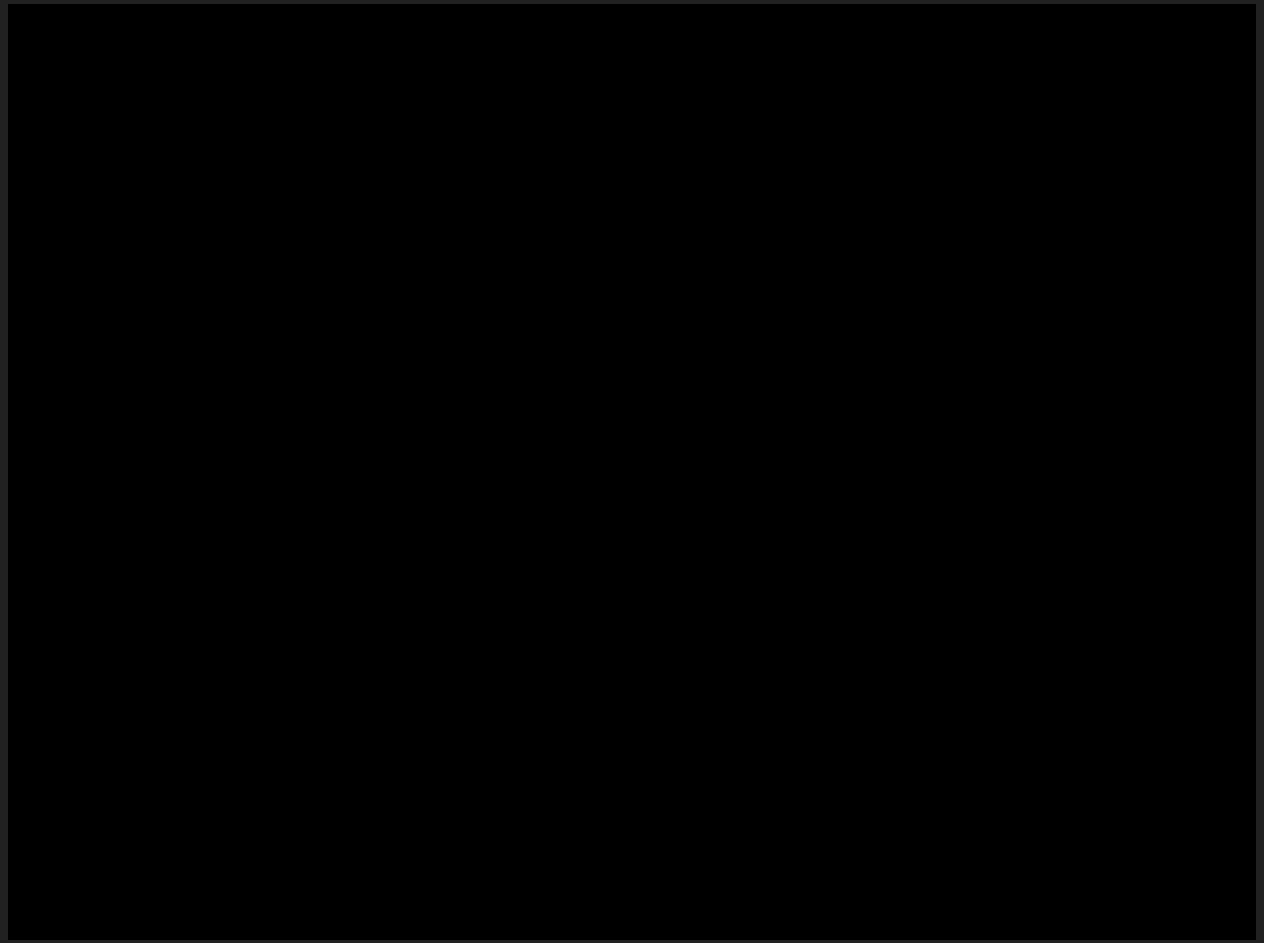


- Express all the coordinates as a function of two angles φ and ϑ
- Rotation of actuating wheel as a function of coordinates

$$\dot{\psi}_x = \frac{r_K}{r_W}\left(\dot{\varphi}_x - \dot{\vartheta}_x\right) - \dot{\vartheta}_x$$
$$\dot{\psi}_y = \frac{r_K}{r_W}\left(\dot{\varphi}_y - \dot{\vartheta}_y\right) - \dot{\vartheta}_y$$
$$\dot{\psi}_z = \frac{r_K}{r_W} \cdot \sin\alpha \cdot \left(\dot{\varphi}_z - \dot{\vartheta}_z\right)$$

$$x_K = \varphi_x r_K$$
$$x_W = \varphi_x r_K + \sin\vartheta_x \cdot (r_K + r_W)$$
$$x_A = \varphi_x r_K + \sin\vartheta_x \cdot l$$





This is an [END SLIDE]