IO-SFL:

$$x_b = x + b\cos(\theta) \qquad \dot{x_b} = v\cos(\theta) - \omega b\sin(\theta) \qquad \dot{\theta} = \omega$$
$$y_b = y + b\sin(\theta) \qquad \dot{y_b} = v\sin(\theta) - \omega b\cos(\theta)$$

$$\begin{bmatrix} v \\ \omega \end{bmatrix} = \begin{bmatrix} \cos(\theta) & \sin(\theta) \\ -\frac{1}{b}\sin(\theta) & \frac{1}{b}\cos(\theta) \end{bmatrix} \begin{bmatrix} \dot{x_b} \\ \dot{y_b} \end{bmatrix}$$

$$\dot{x_b} = \dot{x}_{des} + k_1 e_x \qquad e_x = x_{des} - x_b$$
$$\dot{y_b} = \dot{y}_{des} + k_2 e_y \qquad e_y = y_{des} - y_b$$