

CDR

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Designvalg og krav

Link lengths: 2m, 2m, Gaffel

Reach: 4m

Lavt tyngdepunkt

Vi vil ha en svingradius på 180cm. (Kravet er < 200cm)

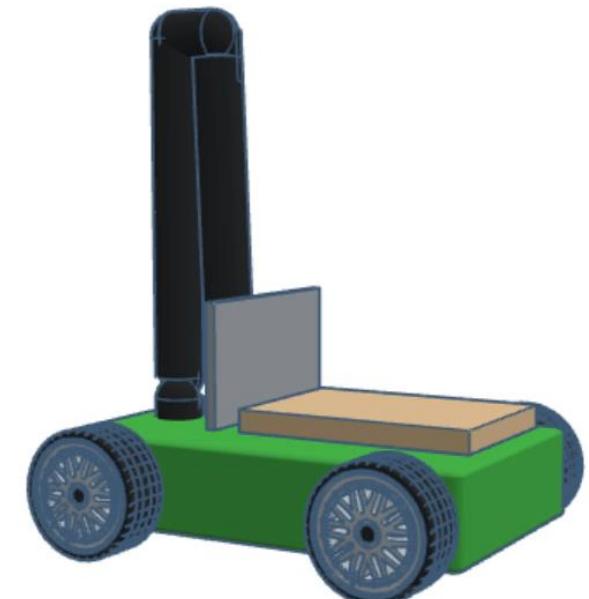
$$\tan(\gamma) = \frac{L}{R_f} \quad \rightarrow \quad \gamma = \tan^{-1}\left(\frac{L}{R_f}\right)$$

$$R_f^2 + L^2 = R_b^2 \quad \rightarrow \quad R_f = \sqrt{R_b^2 - L^2}$$

$$\gamma = \tan^{-1}\left(\frac{L}{\sqrt{R_b^2 - L^2}}\right)$$

Vi har satt lengden på hjulbasen (L) til 160cm

$$\gamma = \tan^{-1}\left(\frac{1.6}{\sqrt{1.8^2 - 1.6^2}}\right) = 62.73^\circ$$

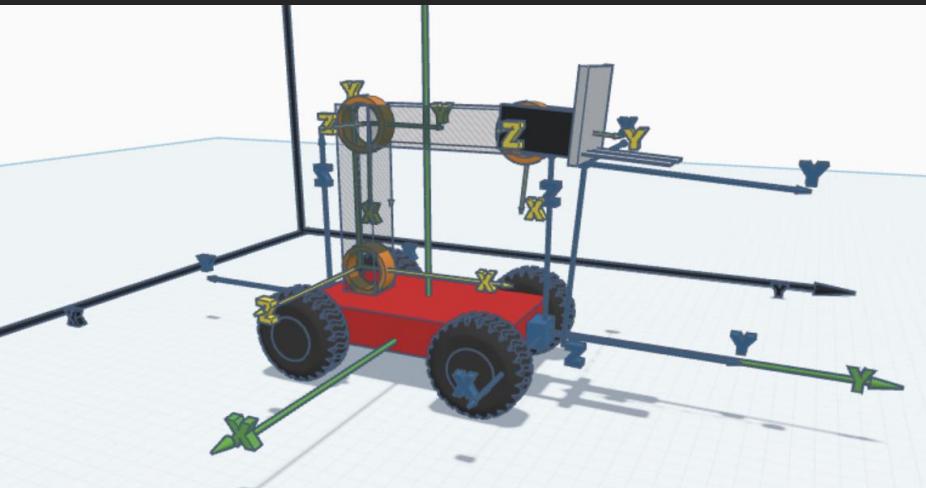


Kinematikk arm

Forward
kinematics

Inverse
kinematics

Transformasjoner

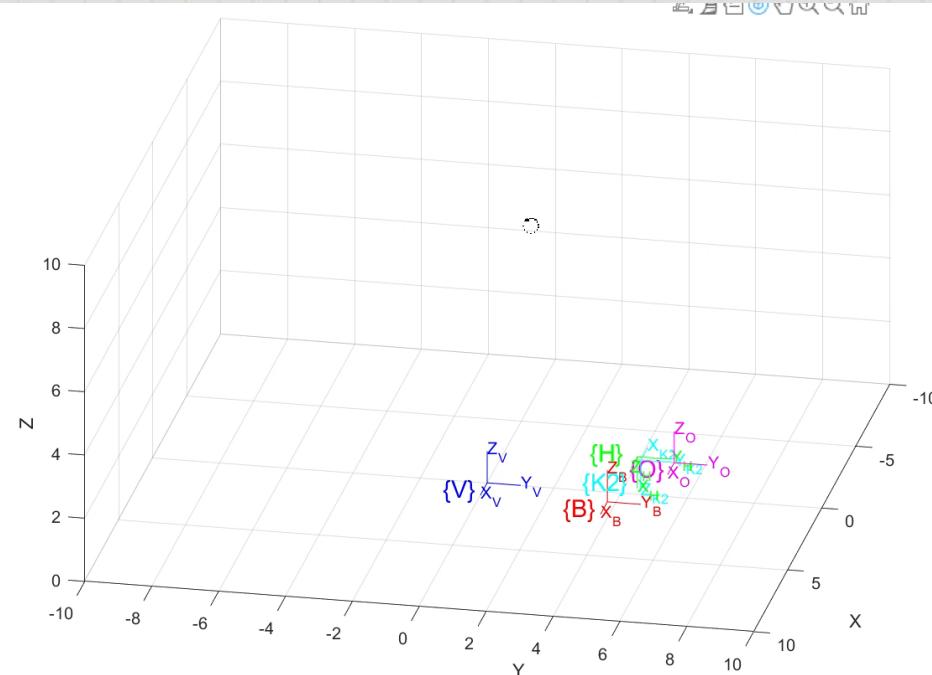
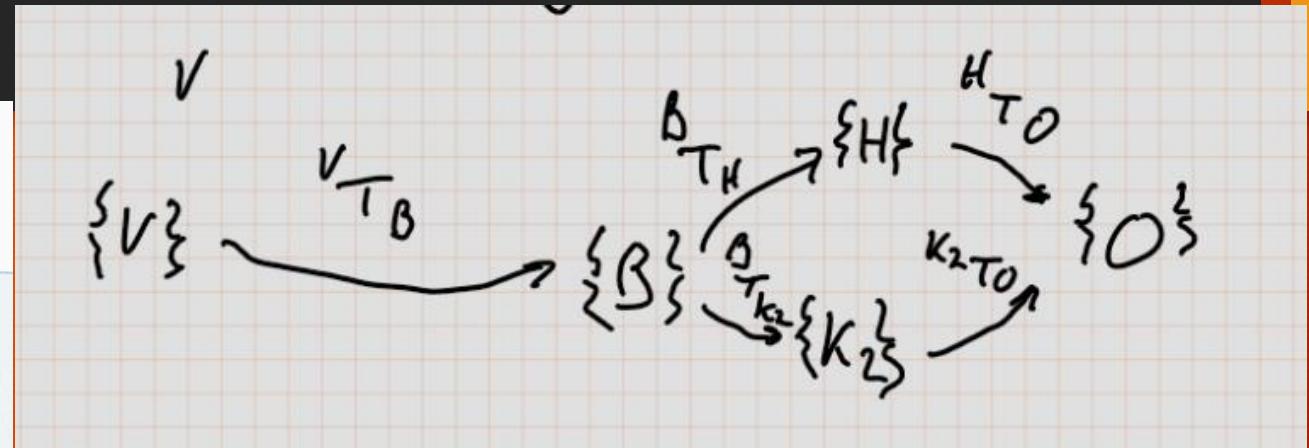


Transformasjon fra Verden til "Base":

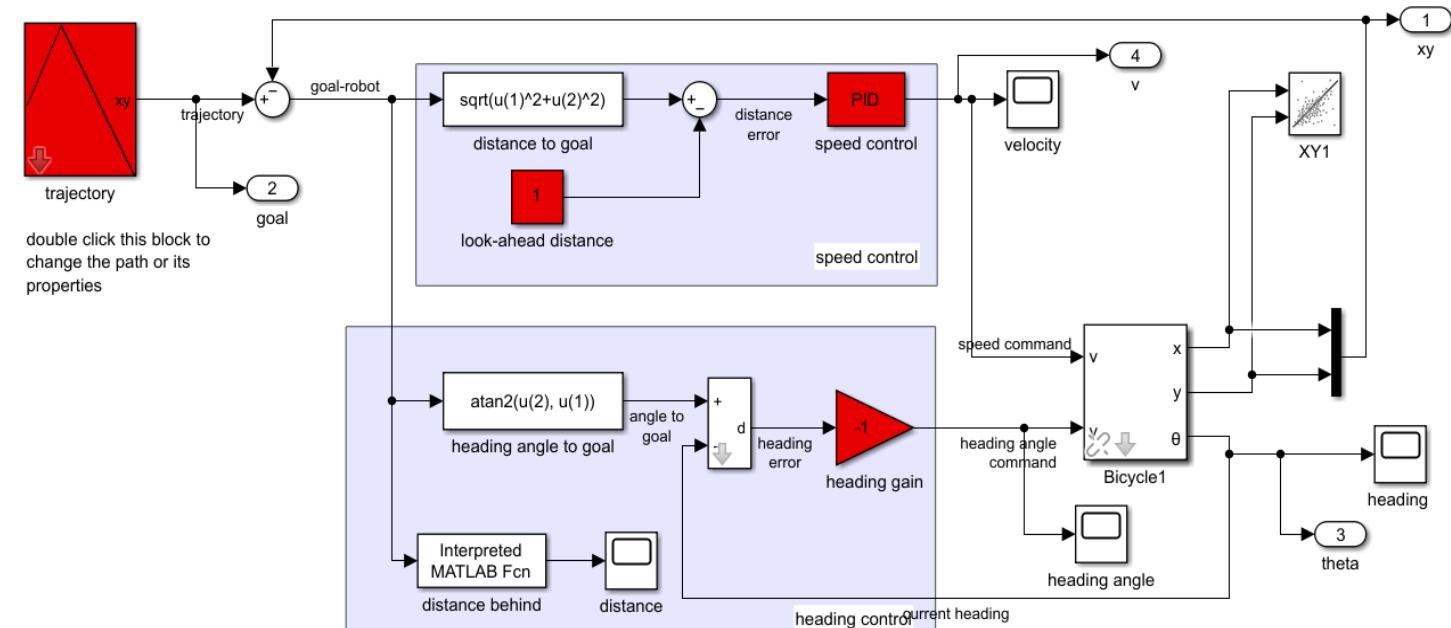
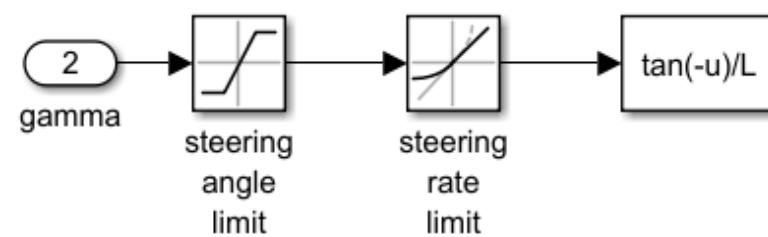
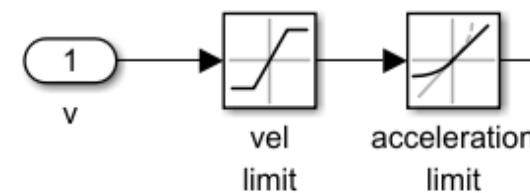
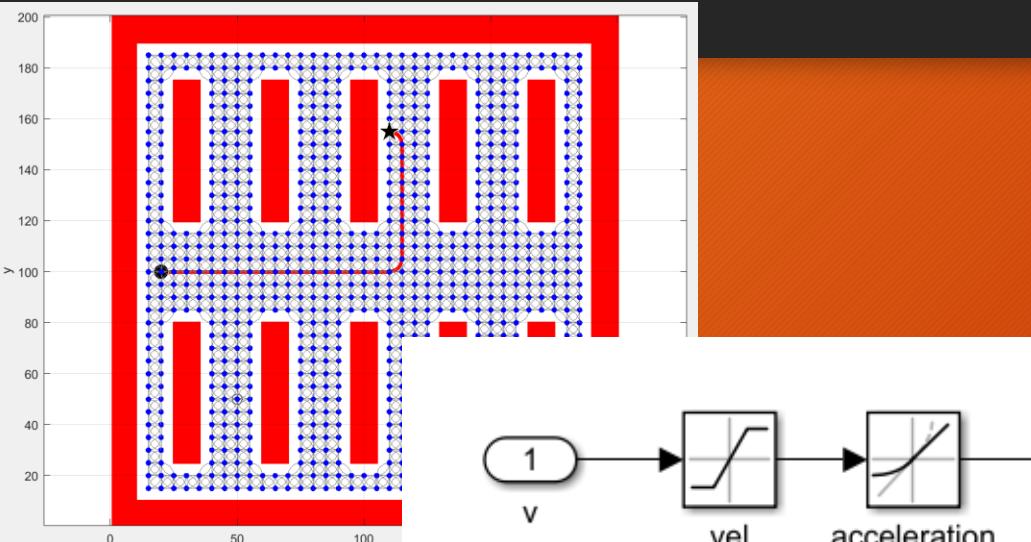
0 rotasjoner trengs derfor $R(O) = I$

$$t = [\Delta_x, \Delta_y, \Delta_z]^T$$

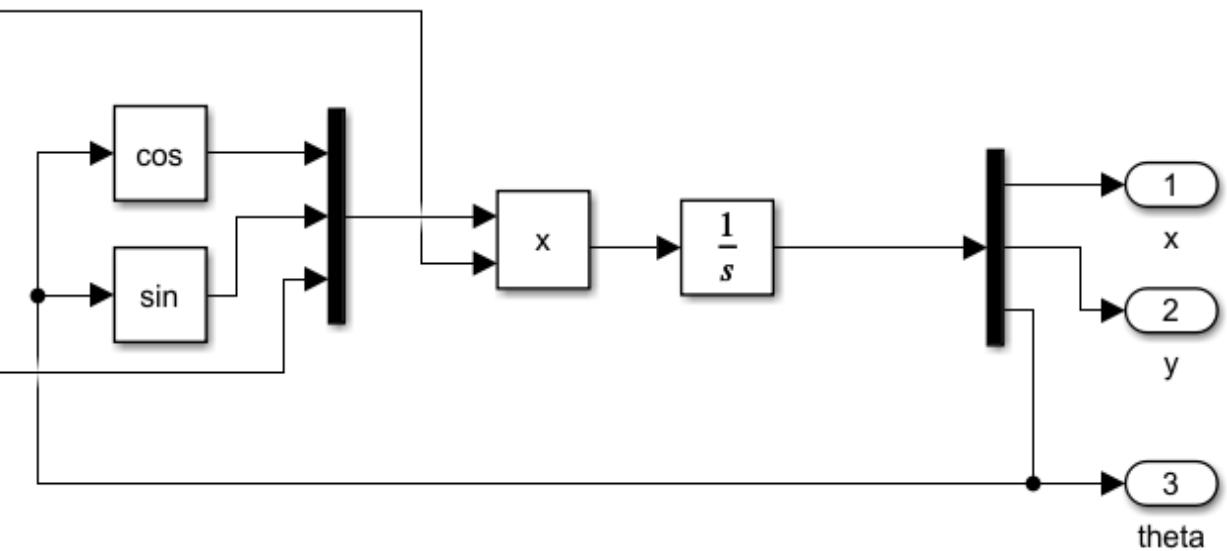
$$V_{TB} = \begin{bmatrix} R(O) & t \\ 0^{3 \times 3} & 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & \Delta_x \\ 0 & 1 & 0 & \Delta_y \\ 0 & 0 & 1 & \Delta_z \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

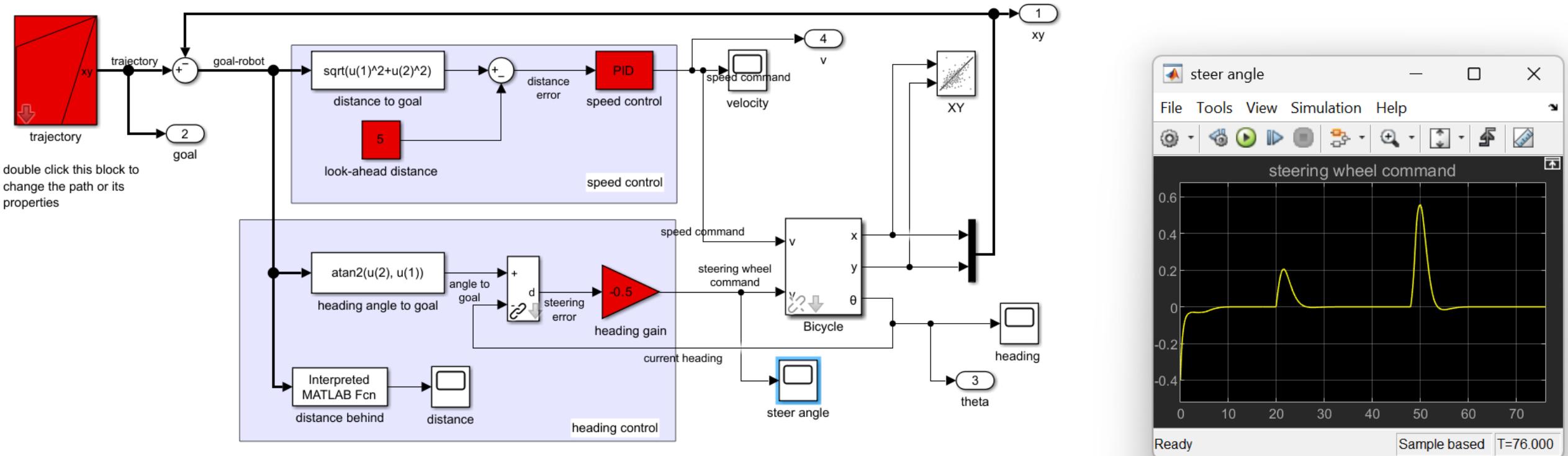


Kinematikk i MatLab



Bicycle kinematic model for mobile robot





Navigation strategies

- Lattice planer
- «Specific pose»
- LiDAR og 3D-kamera

