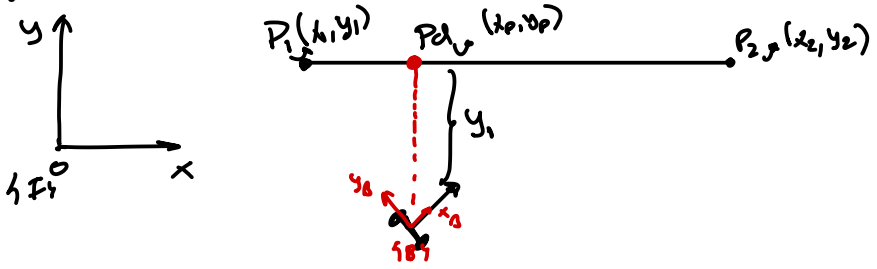
Challenge #1



Motion Model:

$$\begin{cases} \dot{x}_B = v\cos(\theta) \\ \dot{y}_B = v\sin(\theta) \end{cases}$$

v: linear velocity (system input)

θ: input of the system (the orientation)

Consider that the vehicle moves with constant velocity: $v = 1.0\ m/s$

Proposed controller: $\boxed{\theta = \arctan\left(-\frac{y_1}{\Delta h}\right)}$ where $\Delta h > 0$ is a tuning gain!

y_1 = distance to the closest point in the line!

Algorithm:

$t = 0$; $x_B = 0$; $y_B = 0$; P_1, P_2

While $t < 15\ s$:

Repeat:

1) Compute y_1 from x_B, y_B, P_1 and P_2
2) Compute θ from y_1 and Δh
3) Compute $\dot{x}_B$ and $\dot{y}_B$
4) Integrate using euler:

$$\begin{cases} x_B(t+1) = x_B + \Delta t\, \dot{x}_B \\ y_B(t+1) = y_B + \Delta t\, \dot{y}_B \end{cases}$$