

Bot aim

Given the bot's pose and the goal's pose, what should the bot's heading be to be able to score?

For brevity, call the bot's pose B and the goal's pose G . Then, our desired heading, θ , is the angle at which the bot is *perpendicular* to the goal.



Since we want the angle to the horizontal, let P be the point with coordinates (G_x, B_y) , forming a right-angled triangle.



Hence, we can use trigonometry to find θ :

$$\cos \theta = \frac{\text{Adj}}{\text{Hyp}}$$

Then, calculate the length of the adjacent, Adj, and the hypotenuse, Hyp:

$$\begin{aligned} \text{Adj} &= |B_x - G_x| \\ \text{Hyp} &= \sqrt{(B_x - G_x)^2 + (B_y - G_y)^2} \end{aligned}$$

Hence,

$$\therefore \theta = \arccos \left(\frac{|B_x - G_x|}{\sqrt{(B_x - G_x)^2 + (B_y - G_y)^2}} \right)$$