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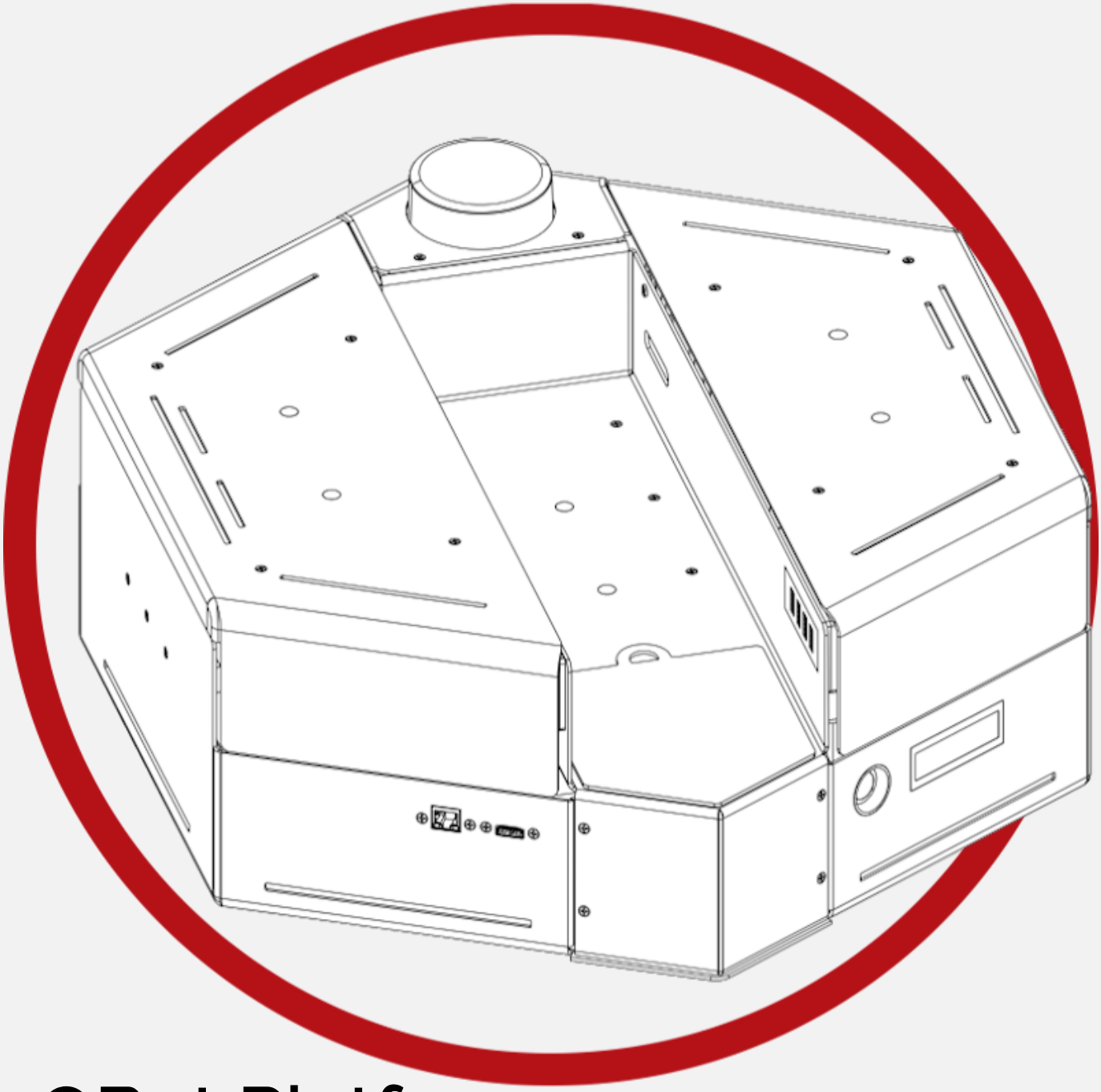

QBot Platform

Forward Kinematics

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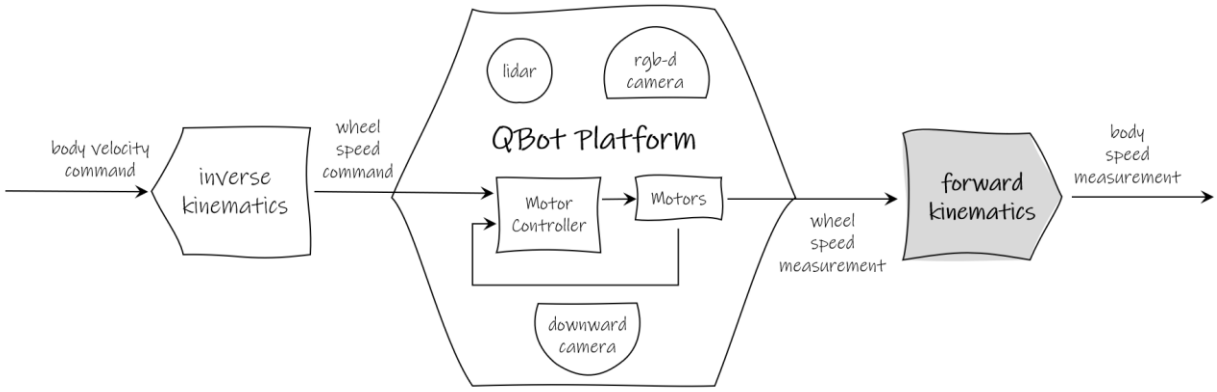
QBot Platform – Application Guide

Forward Kinematics

Why explore forward kinematics?

Forward kinematics help us understand how the basic joint movements translate to high level robot position and orientation, which is fundamental to robotics automation. This lab is the beginning of your journey to automate the robot to complete tasks such as line following and object avoidance. Here, you will learn how to control the overall motion of the robot by controlling individual wheels, commonly referred to as Tank Drive.



Background

Mobile robots are commonly built with two actuated wheels and numerous passive support castors to take on the payload. The two actuated wheels are placed lateral to the bilateral axis of the robot, with each wheel's velocity playing a pivotal role in the overall robot's forward and rotational velocities.

Tank Drive

In this lab, you will command wheel velocities for the QBot Platform, referred to as a Tank Drive mode for the robot. This mode trains you to intuitively control each wheel's velocity to move the robot around. While driving the QBot Platform in Tank Drive, wheel speed measurements will give you an idea of whether the commanded velocities are being obtained by the onboard speed controllers, the performance of which is out of scope of this lab.

Forward Kinematics

It is also important to measure what the QBot Platform's overall body velocity. A formulation to map the measured wheel velocities to the body velocities is called Forward Kinematics, which you will also develop in this lab. For further information, please refer to the Differential Kinematics file under Concept Reviews in "~\Documents\Quanser\concept_reviews".

Before you begin

Please review the following before beginning this lab,

1. Ensure you have completed the **Play** lab from Skills Progressions 0 in your language of choice.
2. Ensure that you have read the following concept reviews,
    a. Position Kinematics

b. Differential Kinematics