Joint Angle Conversion

The following equations allows to convert the angles of the joints of the robot from the ROS convention in radians to the Arduino one that is in degrees. This conversion is useful to actuate the servomotors of the robot and retrieve its position.

Useful Formulas

$$angle_{deg} = \frac{180 * angle_{radians}}{\Pi}$$

$$angle_{radians} = \frac{\Pi * angle_{deg}}{180}$$

Conversion ROS → Motor

$$base_{deg} = \frac{\left(base_{radians} + \frac{\Pi}{2}\right) \cdot 180}{\Pi}$$

$$shoulder_{deg} = 180 - \frac{\left(shoulder_{radians} + \frac{\Pi}{2}\right) \cdot 180}{\Pi}$$

$$elbow_{deg} = \frac{\left(elbow_{radians} + \frac{\Pi}{2}\right) \cdot 180}{\Pi}$$

$$gripper_{deg} = \frac{-gripper_{radians} \cdot 180}{\frac{\Pi}{2}}$$

Conversion Motor → ROS

$$base_{radians} = \frac{\left(\Pi \cdot base_{deg}\right) - \left(\frac{\Pi}{2} \cdot 180\right)}{180}$$

$$shoulder_{radians} = \frac{\left(180 - shoulder_{deg}\right) \cdot \Pi - \left(\frac{\Pi}{2} \cdot 180\right)}{180}$$

$$elbow_{radians} = \frac{\left(\Pi \cdot elbow_{deg}\right) - \left(\frac{\Pi}{2} \cdot 180\right)}{180}$$

$$gripper_{radians} = - \frac{\left(\frac{\Pi}{2} \cdot gripper_{deg}\right)}{180}$$