Robotics

Assignment 2

by

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1.1 Task 1

1.1.1 a

$$\begin{pmatrix} x_1 \\ y_1 \end{pmatrix} = \begin{pmatrix} cos(\Theta_1) & sin(\Theta_1) \\ -sin(\Theta_1 & cos(\Theta_1 \end{pmatrix} \cdot \begin{pmatrix} L_1 \\ 0 \end{pmatrix} = \begin{pmatrix} L_1 \cdot cos(\Theta_1) & 0 \\ -L_1 \cdot sin(\Theta_1) & 0 \end{pmatrix} = \begin{pmatrix} L_1 \cdot cos(\Theta_1) \\ -L_1 \cdot sin(\Theta_1) \end{pmatrix} \tag{1.1}$$

With (x_1, y_1) calculated in correlation to (x, y), we assume (x_1, y_1) as the new start to calculate (x_2, y_2).

$$\begin{pmatrix} x_2 \\ y_2 \end{pmatrix} = \begin{pmatrix} cos(\Theta_2) & -sin(\Theta_2) \\ sin(\Theta_2 & cos(\Theta_2 \end{pmatrix} \cdot \begin{pmatrix} L_2 \\ 0 \end{pmatrix} = \begin{pmatrix} L_2 \cdot cos(\Theta_2) & 0 \\ L_2 \cdot sin(\Theta_2) & 0 \end{pmatrix} = \begin{pmatrix} L_2 \cdot cos(\Theta_2) \\ L_2 \cdot sin(\Theta_2) \end{pmatrix} \tag{1.2}$$

1.1.2 b

The four euqations are: $x_1 = L_1 \cdot cos(\Theta_1)$, $y_1 = L_1 \cdot sin(\Theta_1)$, $x_2 = L_2 \cdot cos(\Theta_2)$ and $y_2 = L_2 \cdot sin(\Theta_2)$.

$$\frac{x_1}{d\Theta_1} = -L_1 \cdot sin(\Theta_1) \tag{1.3}$$

$$\frac{x_1}{d\Theta_2} = 0 \tag{1.4}$$

$$\frac{y_1}{d\Theta_1} = -L_1 \cdot cos(\Theta_1) \tag{1.5}$$

$$\frac{y_1}{d\Theta_2} = 0 \tag{1.6}$$

$$\frac{x_2}{d\Theta_1} = 0 \tag{1.7}$$

$$\frac{x_2}{d\Theta_2} = -L_2 \cdot sin(\Theta_2) \tag{1.8}$$

$$\frac{y_2}{d\Theta_1} = 0 \tag{1.9}$$

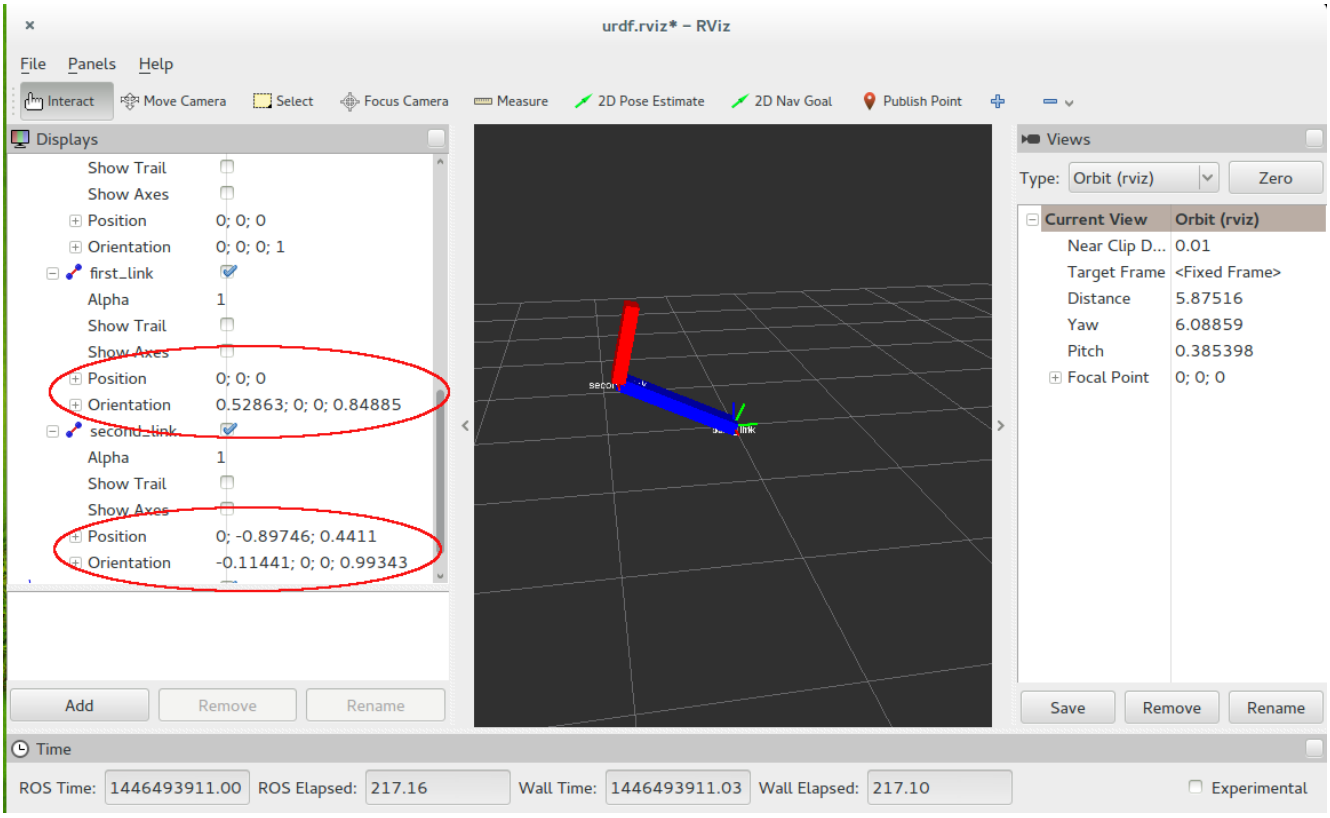
$$\frac{y_2}{d\Theta_2} = L_2 \cdot cos(\Theta_2) \tag{1.10}$$

1.2 Task 2

1.2.1 a

1.2.2 b+c

The coordinates have been marked in the following picture by a red eclipse.



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