EE 543

ICP 2:

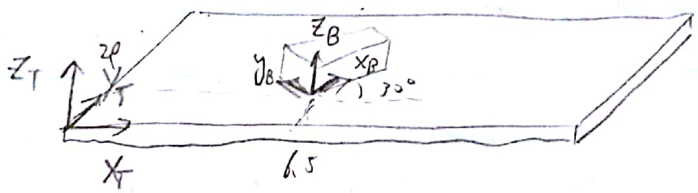
2.1 ROT z(42°) * Rot vector (3.2, -2.7, 4.4, 135) * ROT x(1.6°)

$$= \begin{bmatrix} -0.2486 & -0.4060 & 0.8794 \\ -0.0725 & -0.8996 & -0.4349 \\ 0.9659 & -0.1719 & 0.1937 \end{bmatrix}$$

2.2 quat_rot(0,0,1,42) * quat_rot(3.2, -2.7, 4.4, 135) * quat_rot(1,0,0,1.6)

$$= \begin{bmatrix} -0.2486 & -0.4060 & 0.8794 \\ -0.0725 & -0.8996 & -0.4349 \\ 0.9659 & -0.1719 & 0.1937 \end{bmatrix}$$

2.3



$$^{T}_{B}T = \begin{bmatrix} \cos 30^\circ & -\sin 30^\circ & 0 & 6.5 \\ \sin 30^\circ & \cos 30^\circ & 0 & 2.0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

2.4 trans(4.2, 0, 0, 1) * rot z(42) * rot angle (3.2, -2.7, 4.4, 135) * trans(-4, 14.7, 8.29, -16.2) * rot x(1.6)

$$= \begin{bmatrix} -0.2486 & -0.4060 & 0.8794 & 6.4204 \\ -0.0725 & -0.8996 & -0.4349 & 13.6566 \\ 0.9659 & -0.1719 & 0.1937 & 6.8232 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

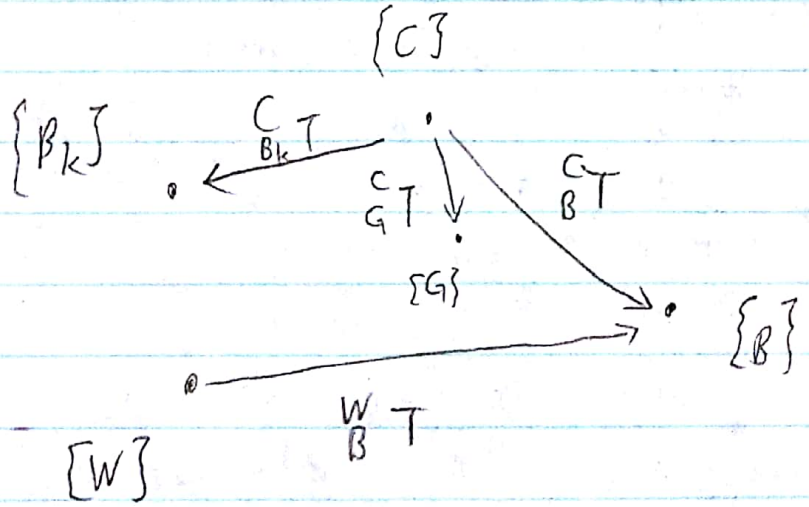
2.5

$$ {}^{0}_{1}T = \begin{bmatrix} \cos 30^\circ & -\sin 30^\circ & 0 & 5 \\ \sin 30^\circ & \cos 30^\circ & 0 & 5 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \qquad {}^{1}_{2}T = \begin{bmatrix} {}^{1}_{2}R & {}^{0}_{1}R \begin{bmatrix} -2 \\ 4 \\ 0 \end{bmatrix} \\ 0\ 0\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 0.9397 & 0 & 0.342 & -3.932 \\ 0 & 1 & 0 & 7.464 \\ -0.342 & 0 & 0.9397 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} $$

$$ {}^{1}_{2}R = \begin{bmatrix} \cos 20^\circ & 0 & \sin 20^\circ \\ 0 & 1 & 0 \\ -\sin 20^\circ & 0 & \cos 20^\circ \end{bmatrix} \qquad {}^{0}_{1}R = \begin{bmatrix} \cos 30^\circ & -\sin 30^\circ & 0 \\ \sin 30^\circ & \cos 30^\circ & 0 \\ 0 & 0 & 1 \end{bmatrix} $$

$$ \therefore\ {}^{0}_{2}T = {}^{0}_{1}T\ {}^{1}_{2}T = \begin{bmatrix} 0.8138 & -0.5 & 0.2962 & -3.9570 \\ 0.4698 & 0.866 & 0.171 & 0.975 \\ -0.3420 & 0 & 0.9397 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} $$

2.6



$$ {}^{W}_{B_k}T = {}^{W}_{B}T \left({}^{C}_{B}T\right)^{-1} {}^{C}_{B_k}T $$