

## Final Equation

$$T_{X_t}^{-,X_{t-1}} = T_{Odom_{t-1}}^{X_{t-1}} T_{X_t}^{Odom_t}$$

$$T_{X_t}^{-,0X} = T_{X_{t-1}}^0 T_{X_t}^{-,X_{t-1}}$$

$$T_{L_t}^{-,0L} = T_{0X}^{0L} T_{X_t}^{-,0X} T_{L_t}^{X_t}$$

(where  $T_{X_0}^0$  is initial guess)

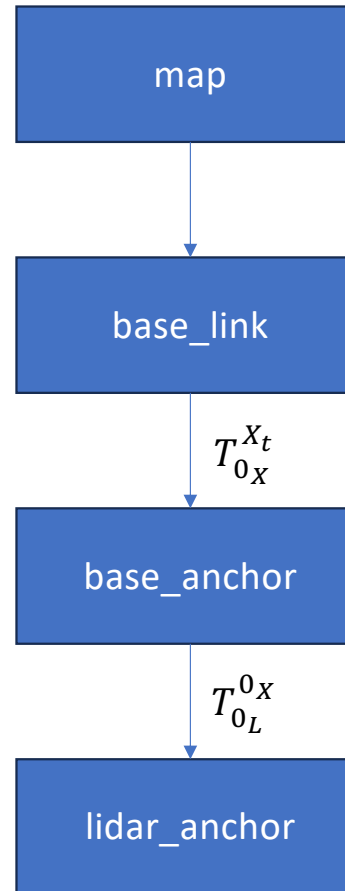
$$T_{L_t}^{0L} = ICP(T_{L_t}^{-,0L})$$

$$T_{X_t}^{0X} = T_{0L}^{0X} T_{L_t}^{0L} T_{X_t}^{L_t}$$

$$T_{0L}^{X_t} = T_{0X}^{X_t} T_{0L}^{0X}$$

Note:  $T_{0L}^{0X} = T_L^X = T_{L_t}^{X_t} = (T_X^L)^{-1}$

**TF**



for control purpose, every parking point will reference to this frame

for checking if lidar is aligned with template when publishing /scan\_model