Goal is to find this
Optical tracker (on tripod) \( F_D \)

EM tracker base (fixed in workspace)

\[ d = F_D \cdot D_i \]

Solve for \( F_d \) as point cloud to point cloud registration problem from \( D_i = F_d \cdot D_j \)

Workspace

Calibration object (moves in workspace)

\[ \tilde{C}_i = F_d \cdot \tilde{a}_i \]

LEDs

EM markers

Solve for \( F_d \) as point cloud to point cloud registration problem from \( \tilde{D}_i = F_d \cdot \tilde{a}_i \)

\[ F_D = F_d \cdot F_{D_d} \cdot \tilde{C}_i \]

Optical tracker (on tripod) \( F_D \)

EM tracker base (fixed in workspace)

\[ \tilde{C}_i^{(expected)} = F_D \cdot F_{D_d} \cdot \tilde{C}_i \]

LEDs

EM markers

Calibration object (moves in workspace)
Defining the EM rigid body

\[ \vec{g}_j = \vec{G}_j - \vec{G}_0 \]

\[ \vec{g}_0 = \frac{1}{N_g} \sum \vec{G}_j \]

Calibrating the EM Pointer (pivot calibration)

Solve for \( F_G[k] \) such that

\[ \hat{G}_j^{(i)} = F_G[k] \cdot \vec{g}_j \]

Then solve least squares problem

\[ \hat{P}_{\text{dimple}} = F_G[k] \cdot \vec{t}_d \]

Calibrating optical pointer is similar except use \( P_i = F_G \cdot H_i \) instead of \( \hat{G}_j \)
Goal is to find this