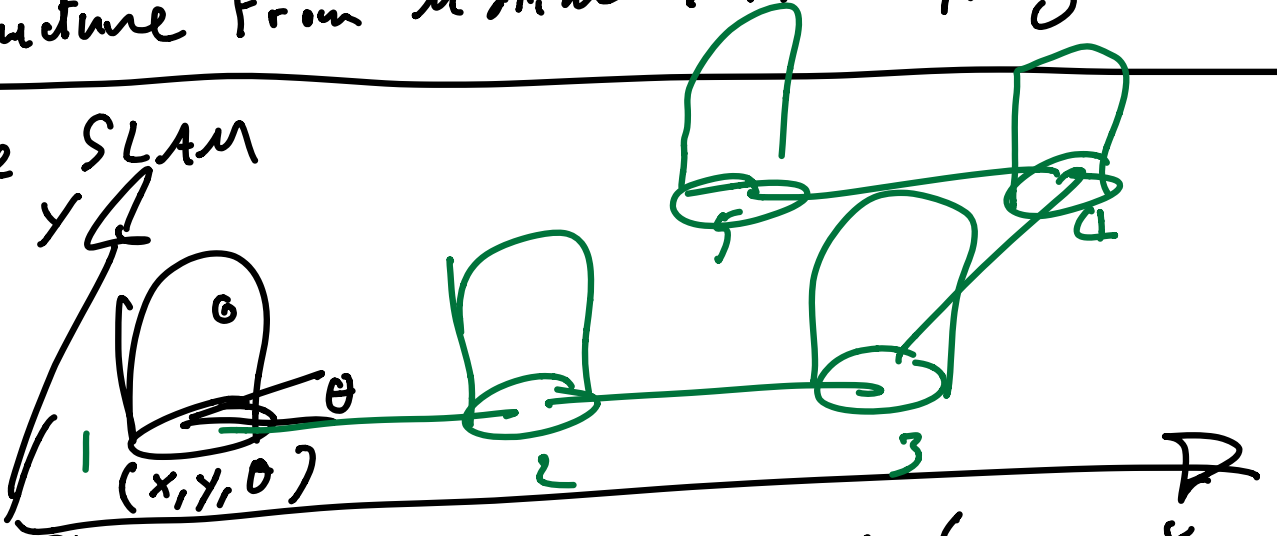


- 1) Pose SLAM = Sim. Localiz. and Mapping
- 2) Demo w. GTSAM
- 3) - Landmark SLAM
- Structure From Motion: 3D mapping. - VO

① Pose SLAM



$$P(x^t | z^t)$$

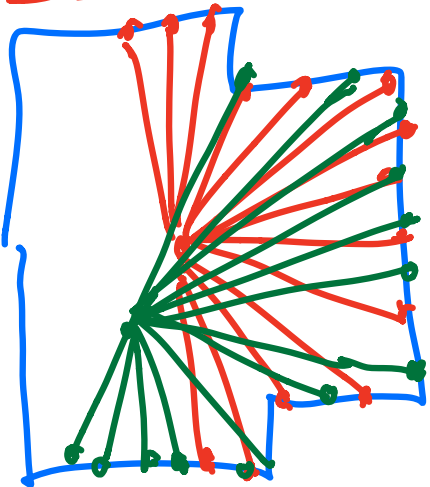
$$x^t = \{x_1, x_2, x_3, x_4, x_5\}$$

$\in SE(2)$ i.e. (x, y, θ)

SLAM unknown

z^t : Sensor

Z E B E D E E



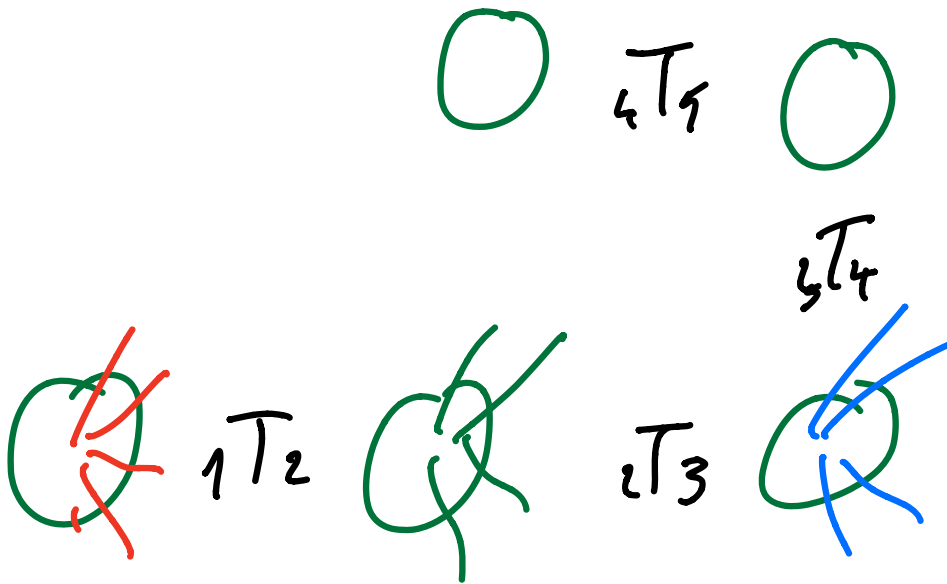
IMU + radio	
LIDAR	Pose SLAM
kinect.	
cameras	Visual SLAM
IMU + cameras	VI0 vis VI = visual-inertial
radar	esoteric SLAM
...	

ICP = iterated closest point

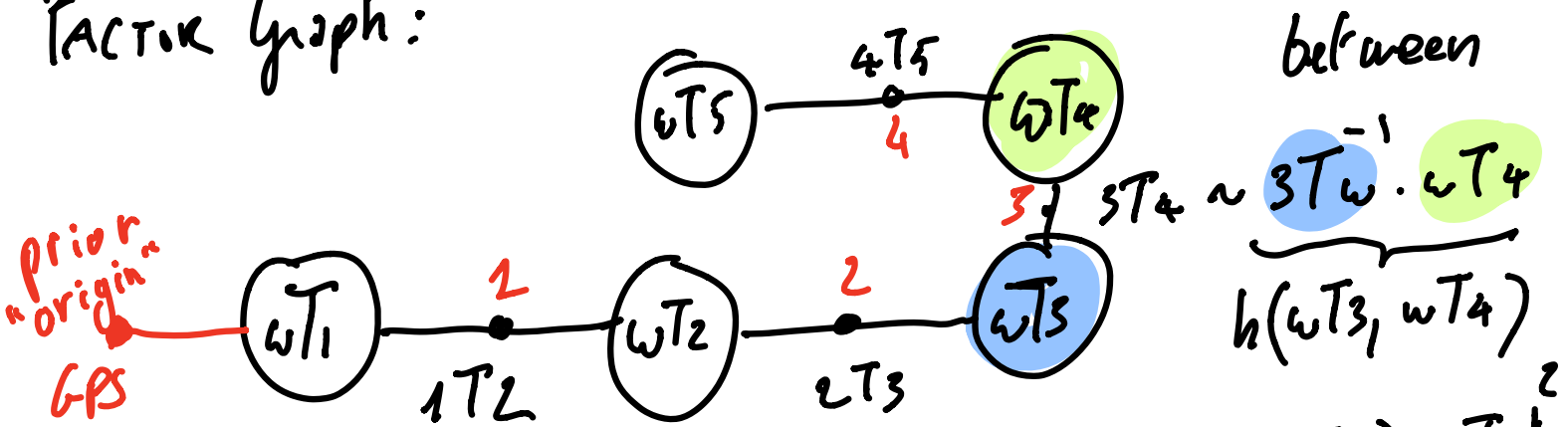


\Rightarrow GTR $\in SE(2)$ Carlone @ MIT: PC ROBUST REGISTRATION.

Exp:



Factor Graph:



$$SE(2) = (x, y, \theta)$$

Obj. minimize: $\| h(wT3, wT4) - \begin{bmatrix} x \\ y \\ \theta \end{bmatrix} \|^2$

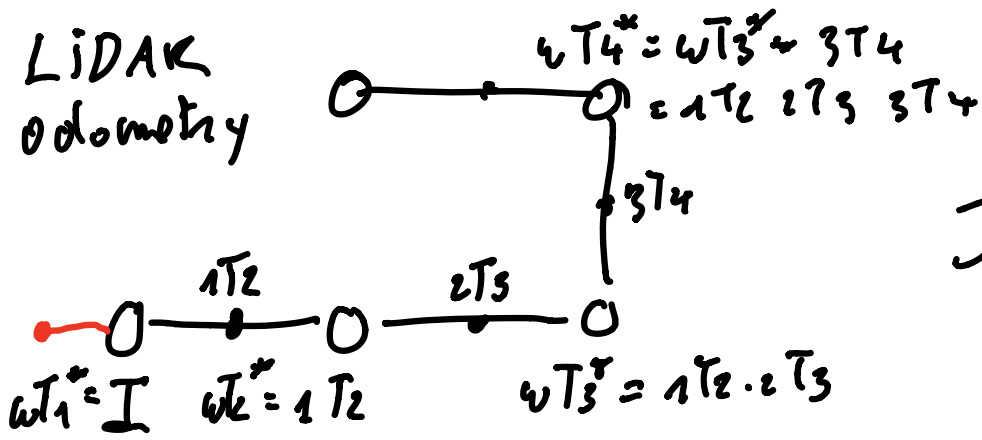
$sT4 \parallel h(wT3, wT4) - sT4 \parallel^2$

$$X^* = \arg \min J(X) = \sum_i \| h_i(X) - z_i \|^2$$

"meas. predict" "ICP"

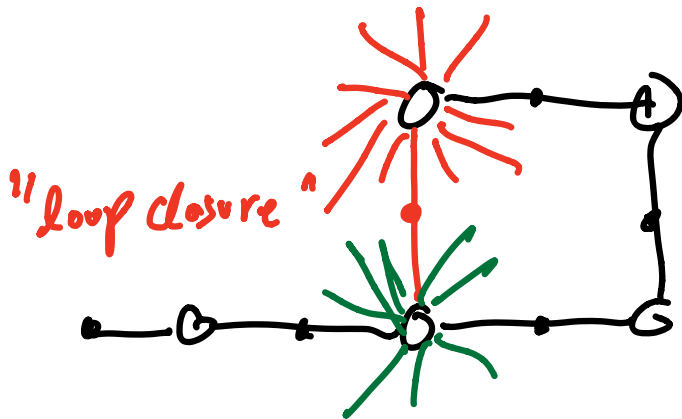
Pose SLAM

LIDAR odometry



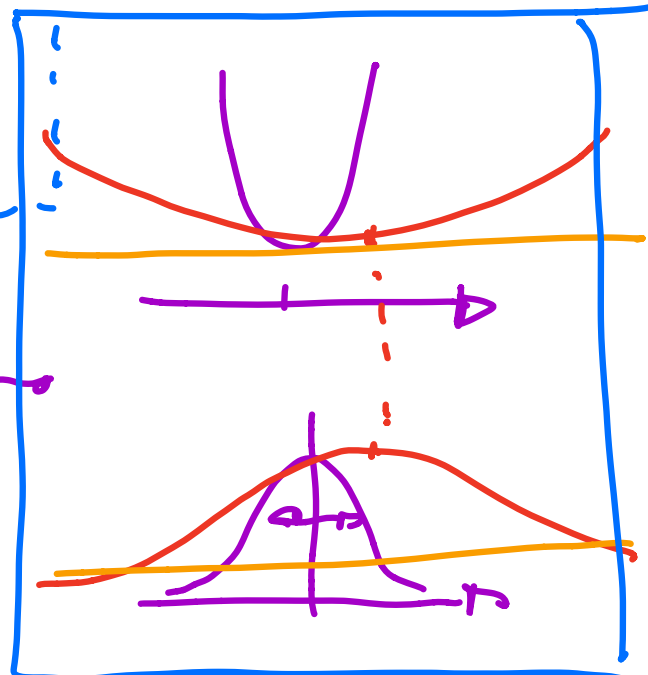
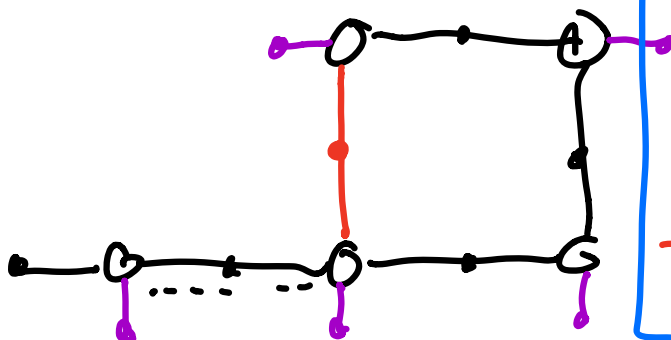
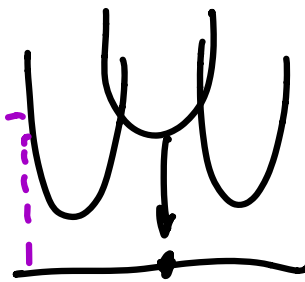
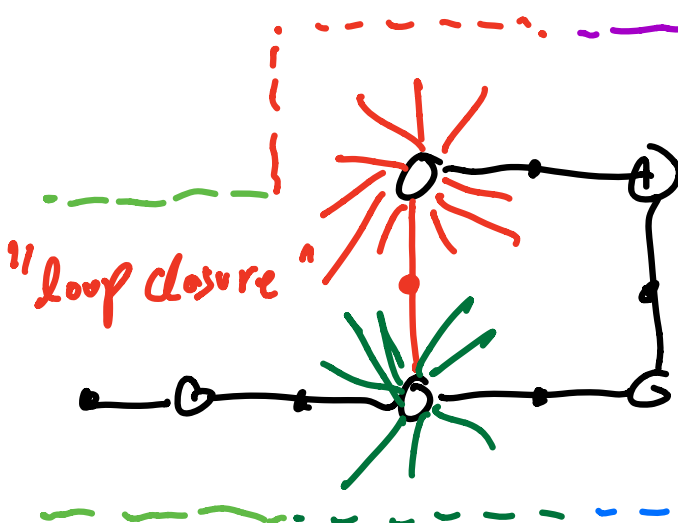
$J(x^*) = 0!$

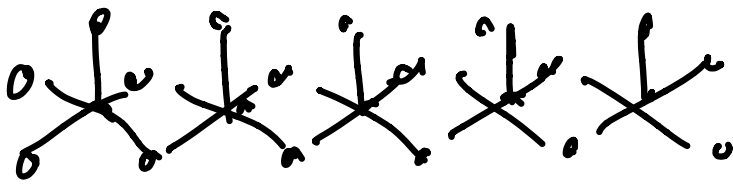
LIDAR Pose SLAM
SLAM



$J(x^*) > 0$

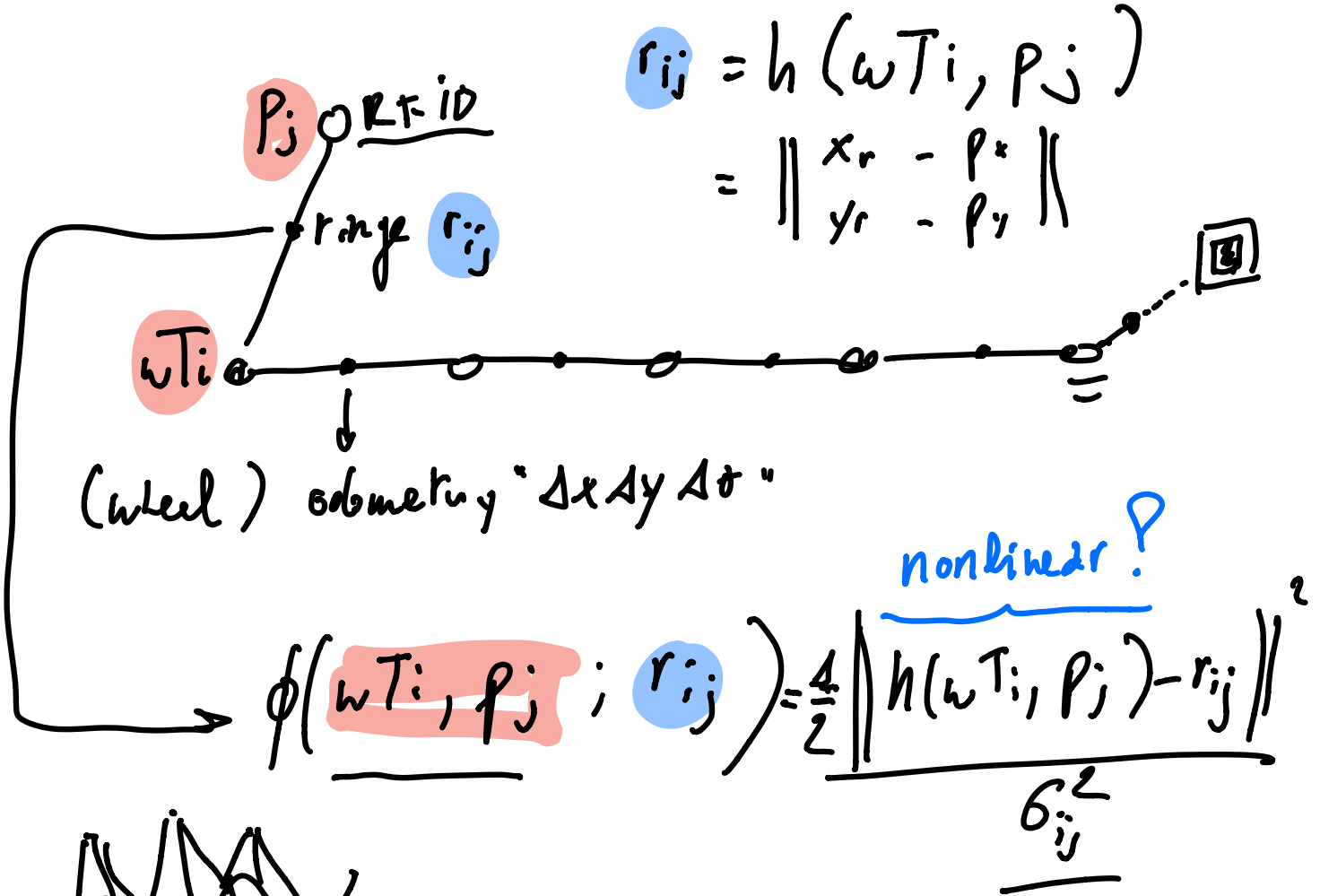
"sensor fusion"



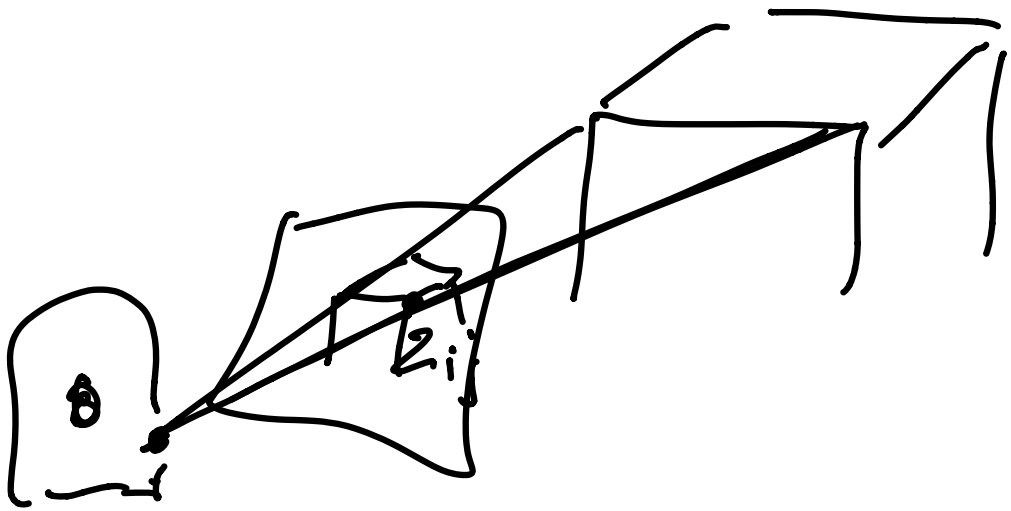


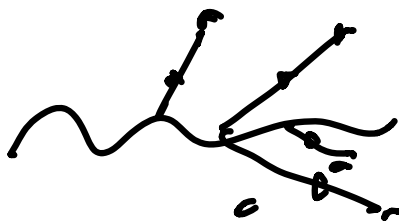
imu backbone

LANDMARK SLAM



Visual SLAM





Projection F

$$h(\omega T_i, p_j) = k(\pi(\omega T_i \circ p_j))$$

$$\arg \min_X \pi \|h(x_i) - z\|^2$$

NLS

Make way to integrate IMU:

400 Hz → 400 400 · 3600

