Trabajo Práctico Especial Robótica Móvil

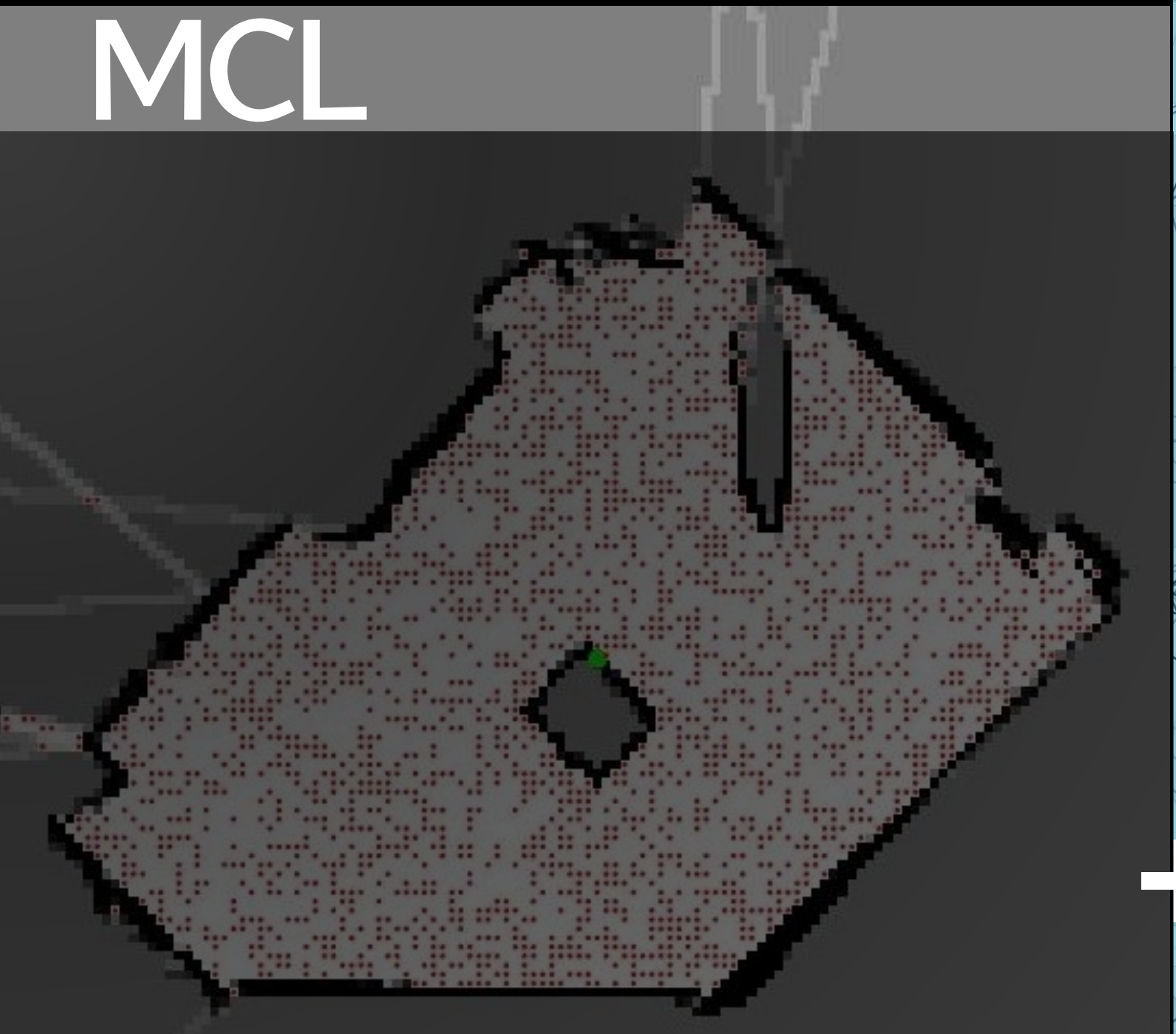
Seminario de Ingeniería Electrónica (86.48)

Vigilancia

J. Petereit, T. Emter, C. W. Frey, T. Kopfstedt and A. Beutel, "Application of Hybrid A* to an Autonomous Mobile Robot for Path Planning in Unstructured Outdoor Environments," ROBOTIK 2012; 7th German Conference on Robotics, 2012, pp. 1-6.

Start
Goal
Map
Hybrid A*
MCL
Map
Pose estimada
Path
PD
V
W
Robot
Odom
Range

MCL



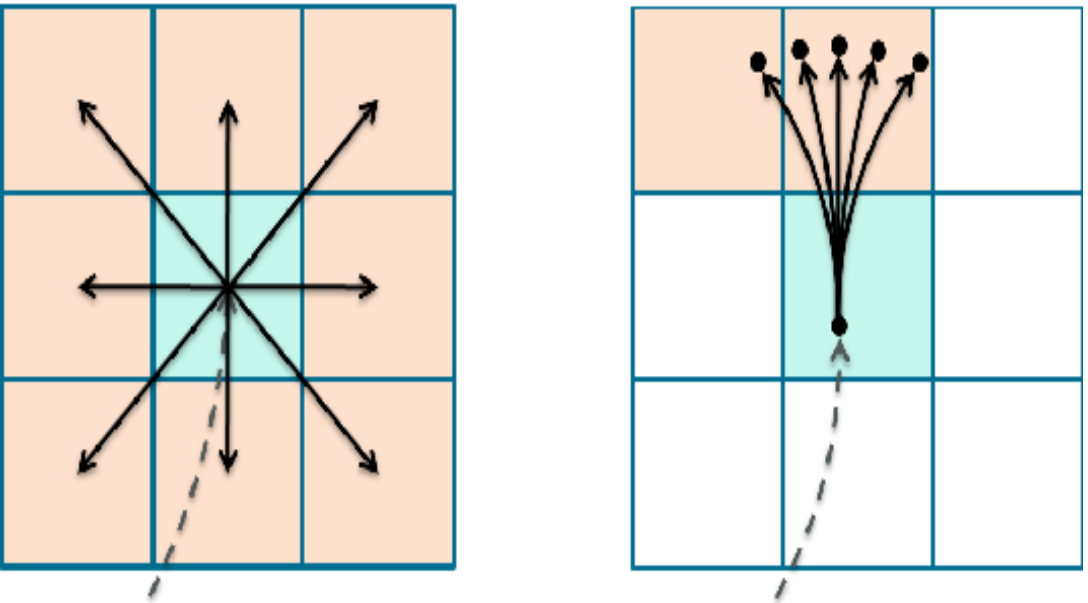
PARTICULAS: [500 5000]

Time = 100ms.

Distribución: Inicialmente uniformemente distribuidas dentro del mapa, luego son gaussianas

Intervalo de remuestreo: 1

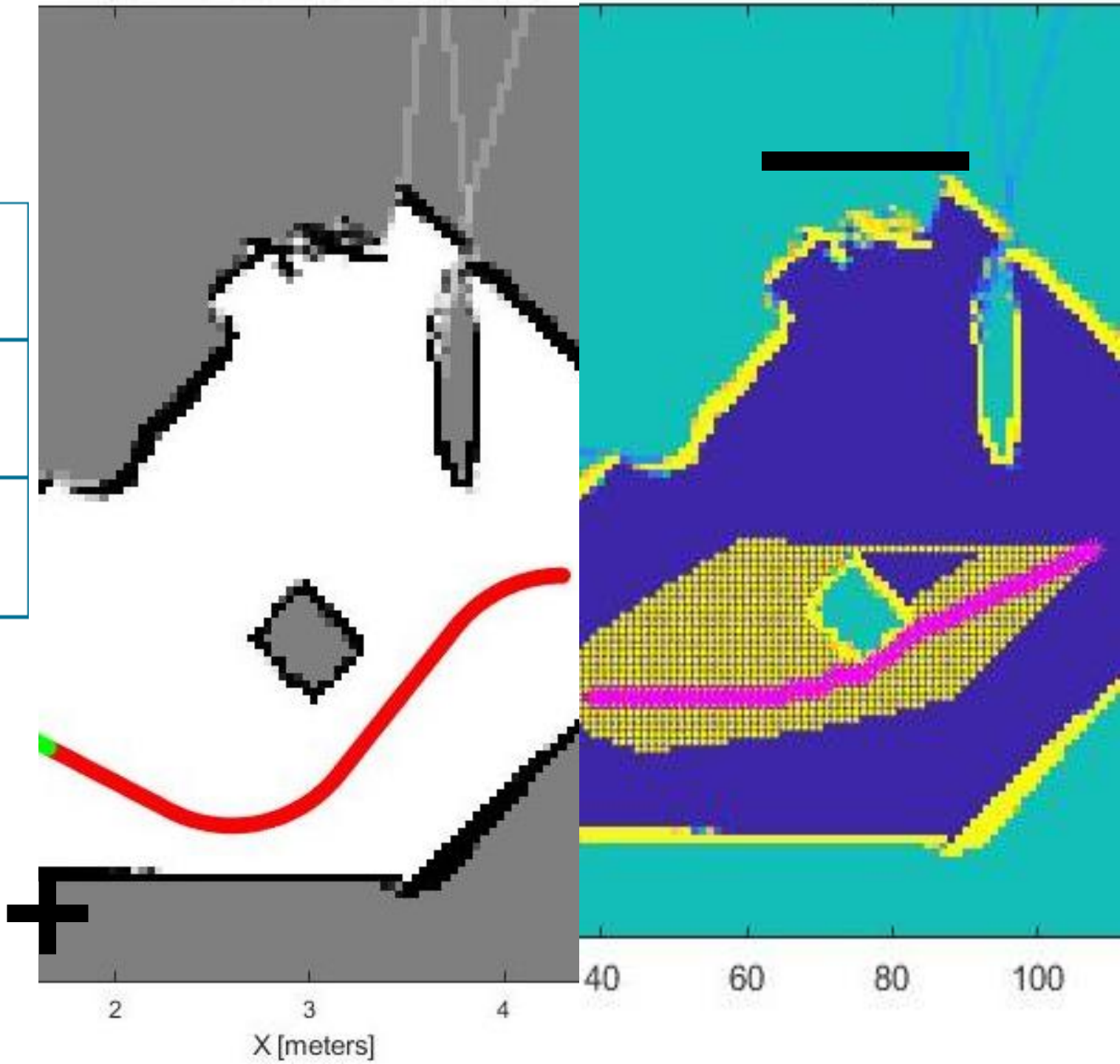
Hybrid A*



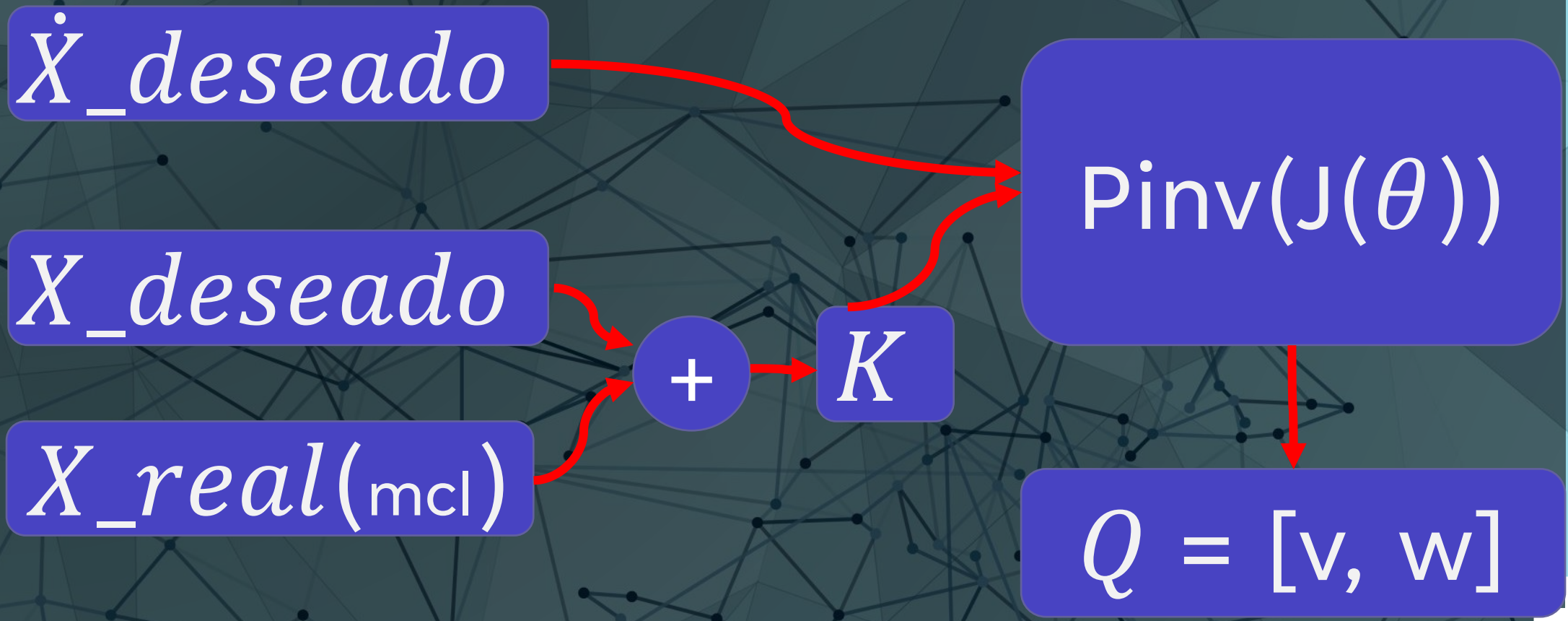
(a) regular A*

(b) Hybrid A*

Rad.CC = 70cm.
nP = 5.
Long.P = 20cm
D = 10cm. (interp. entre poses)
MUY DEPENDIENTE DE LA ORIENTACIÓN

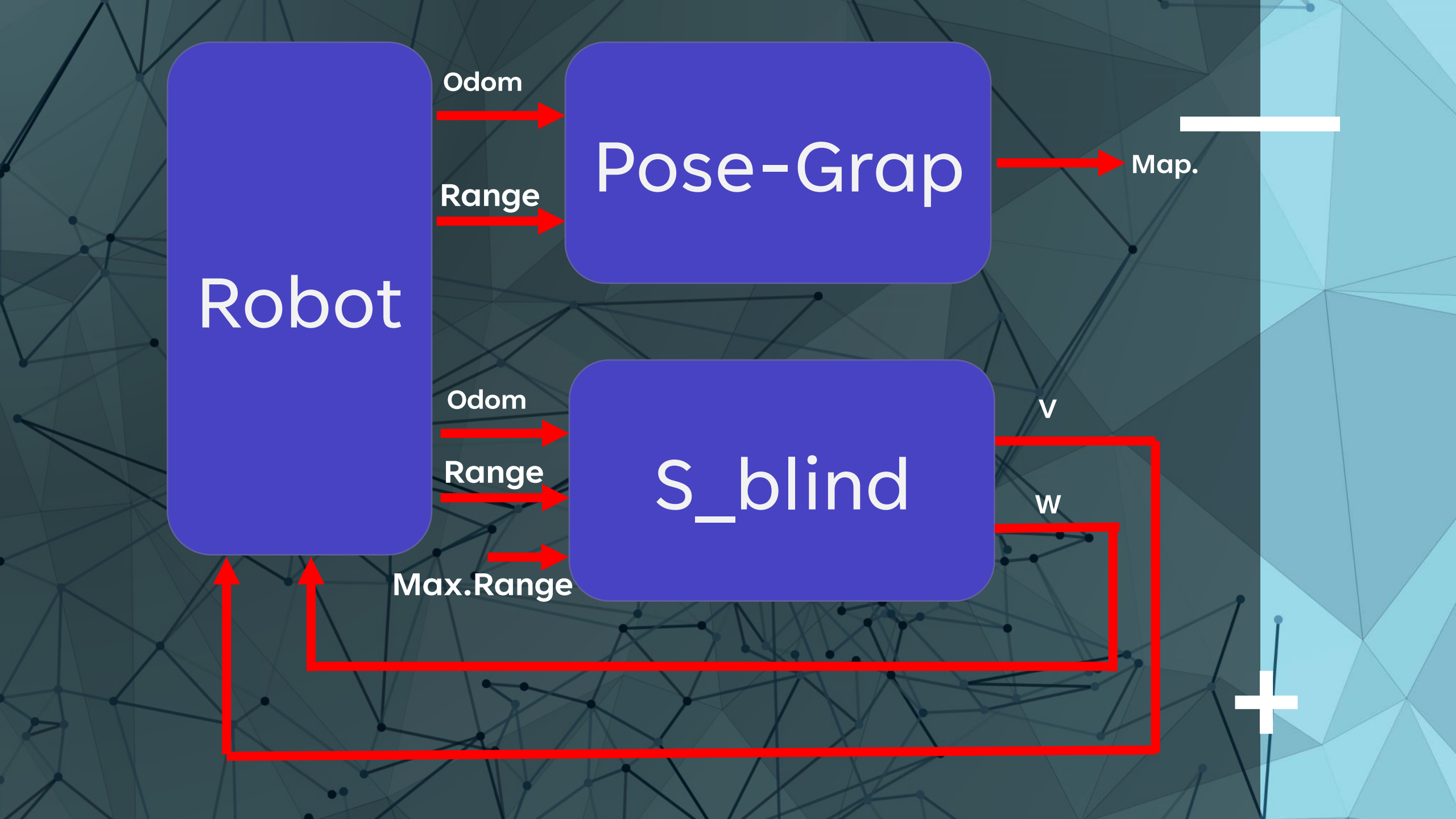


Control PD

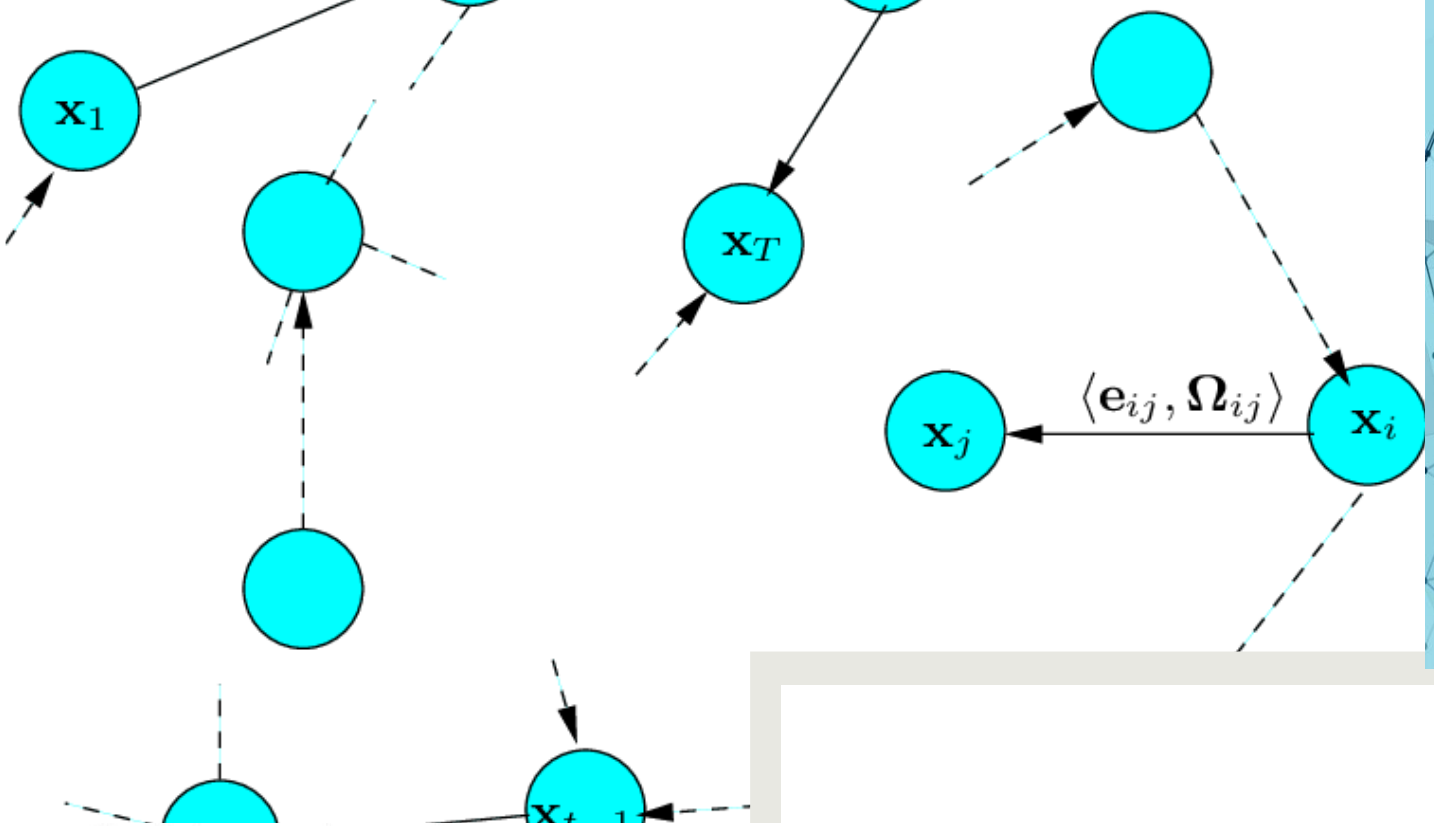


Exploración

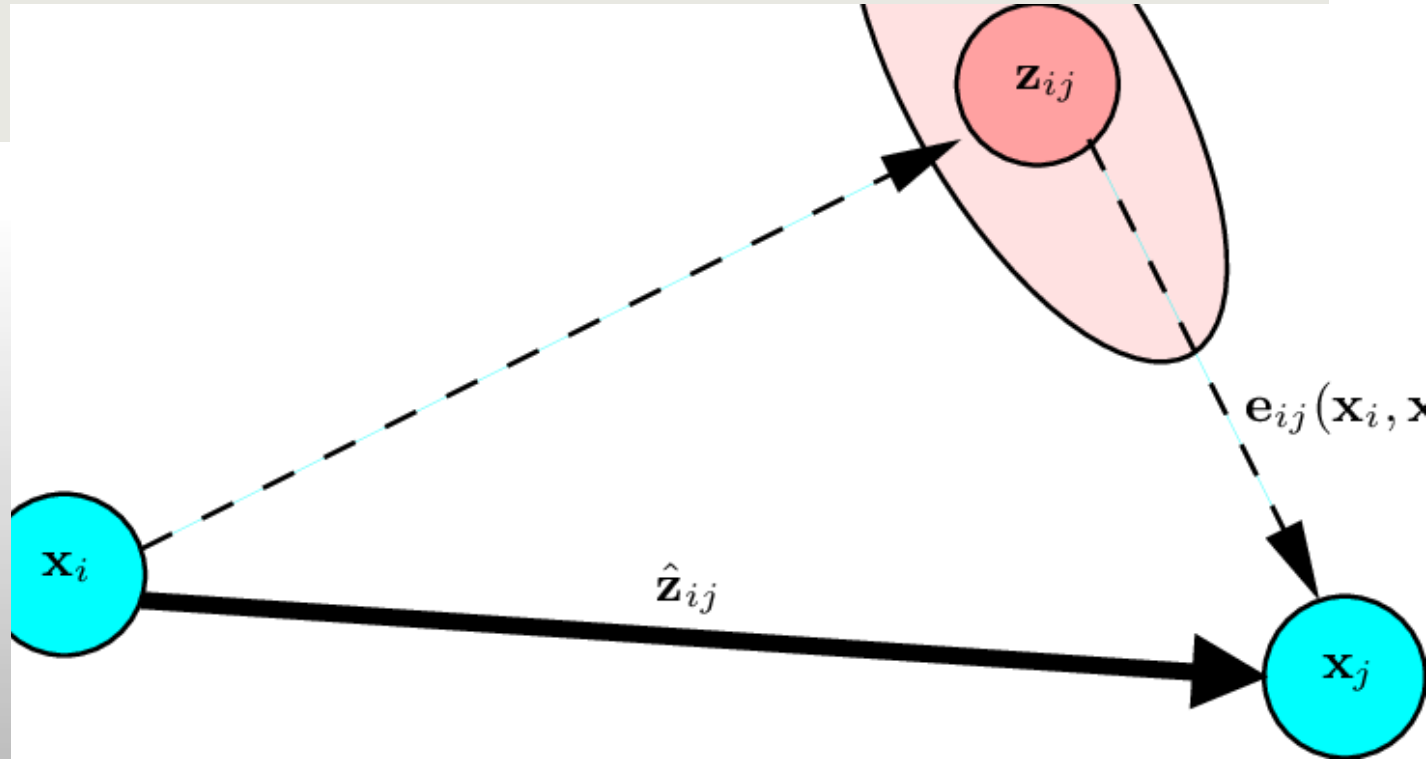
G. Grisetti, R. Kümmerle, C. Stachniss and W. Burgard, "A Tutorial on Graph-Based SLAM," in IEEE Intelligent Transportation Systems Magazine, vol. 2, no. 4, pp. 31-43, winter 2010, doi: 10.1109/MITS.2010.939925.


Robot
Odom
Range
Pose-Grap
Map.
Odom
Range
Max.Range
S_blind
V
W

Graph-Slam

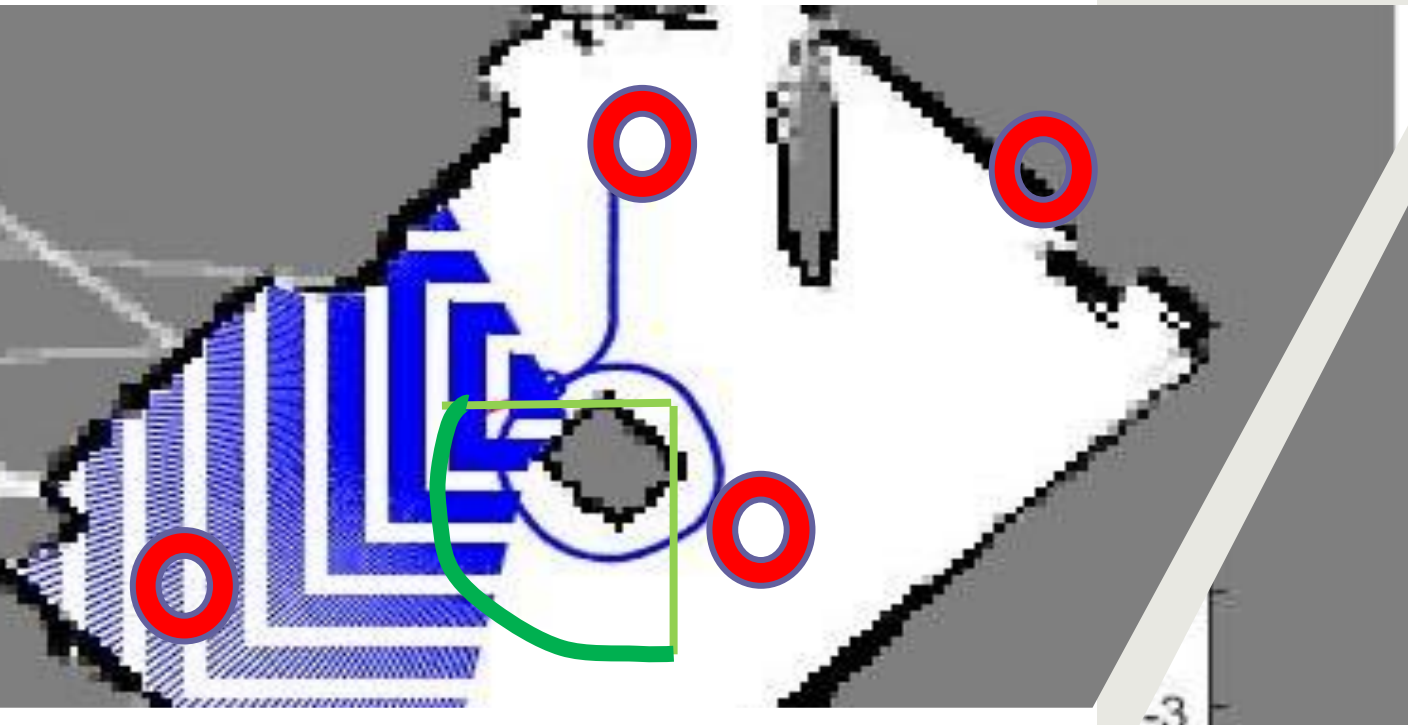

$\mathbf{x}_1$
$\mathbf{x}_T$
$\mathbf{x}_j$
$\langle \mathbf{e}_{ij}, \mathbf{\Omega}_{ij} \rangle$
$\mathbf{x}_i$

Posiciones de nodos
datos crudos
Construcción del grafo
(Front-End)
grafo (nodos & arcos)
Optimización del grafo
(Back-End)


$\mathbf{z}_{ij}$
$\mathbf{e}_{ij}(\mathbf{x}_i, \mathbf{x}$
$\mathbf{x}_i$
$\hat{\mathbf{z}}_{ij}$
$\mathbf{x}_j$

Resultados

Sin Cierre de Lazo



Con Cierre de Lazo