

# EMC Final Presentation

## Group 2

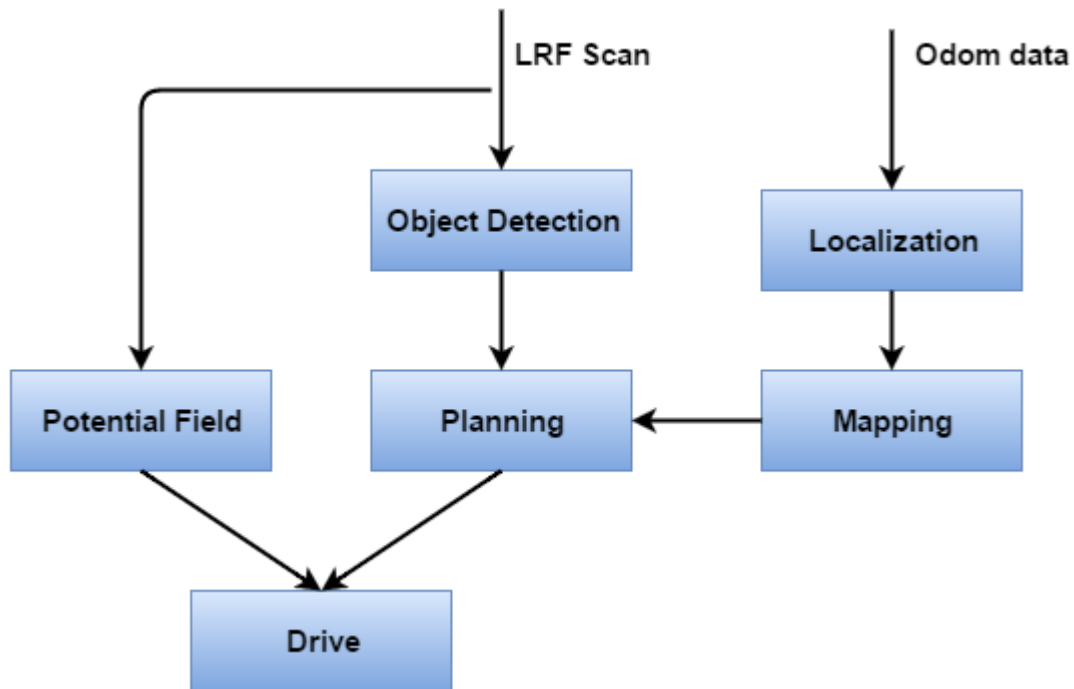
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Y. Knops



# | Content |

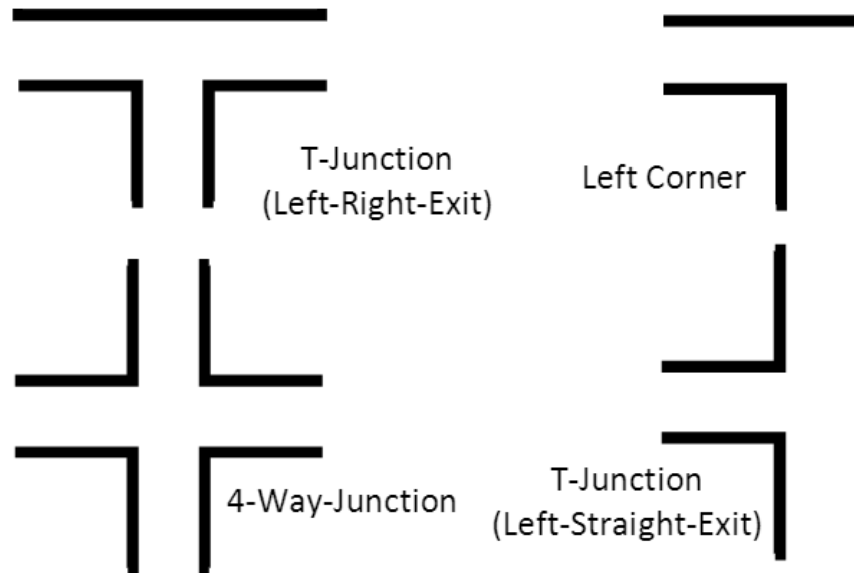
- The main flow
  - Object detection
  - Localization
  - Mapping
  - Planning
  - Collision prevention
  - Drive
- Current status
  - Main focus point for the next week
- Questions

# | The main flow |



# | Object detection |

- Detects objects such as

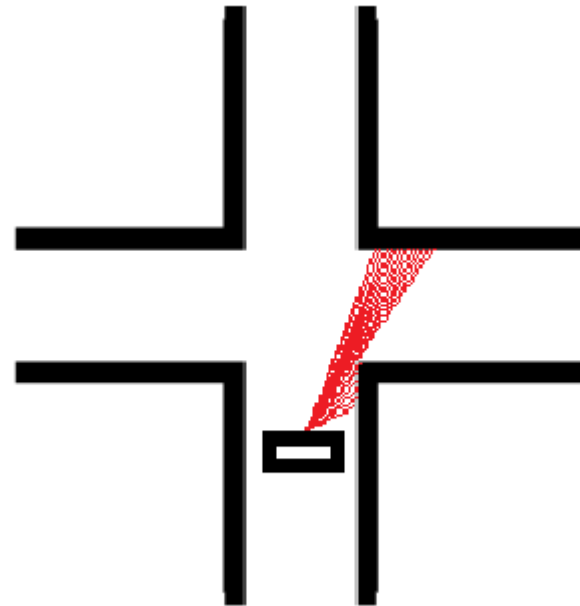


- Door detection

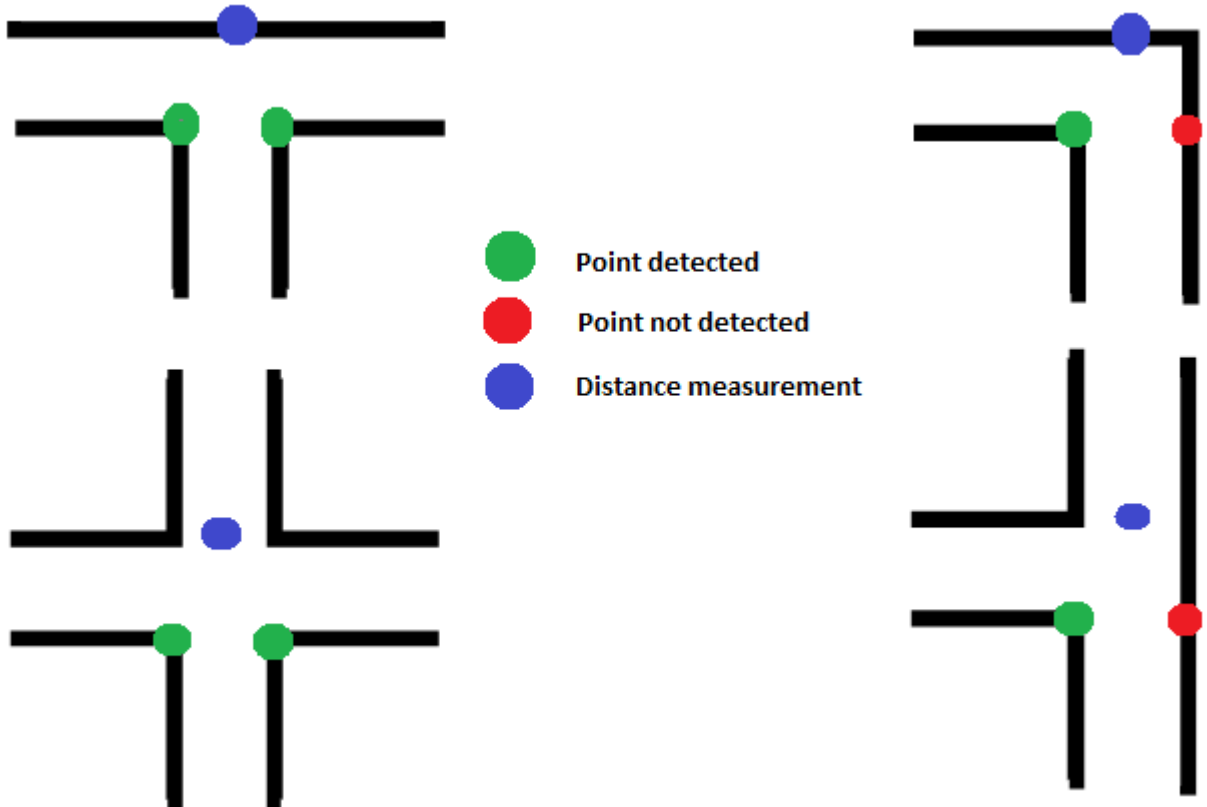
# | Object detection |

- How does this work:
  - Three point detection method
  - Point detection:

Compare distance of point  $n$   
to the distances of point  $n+1$   
to point  $n+20$

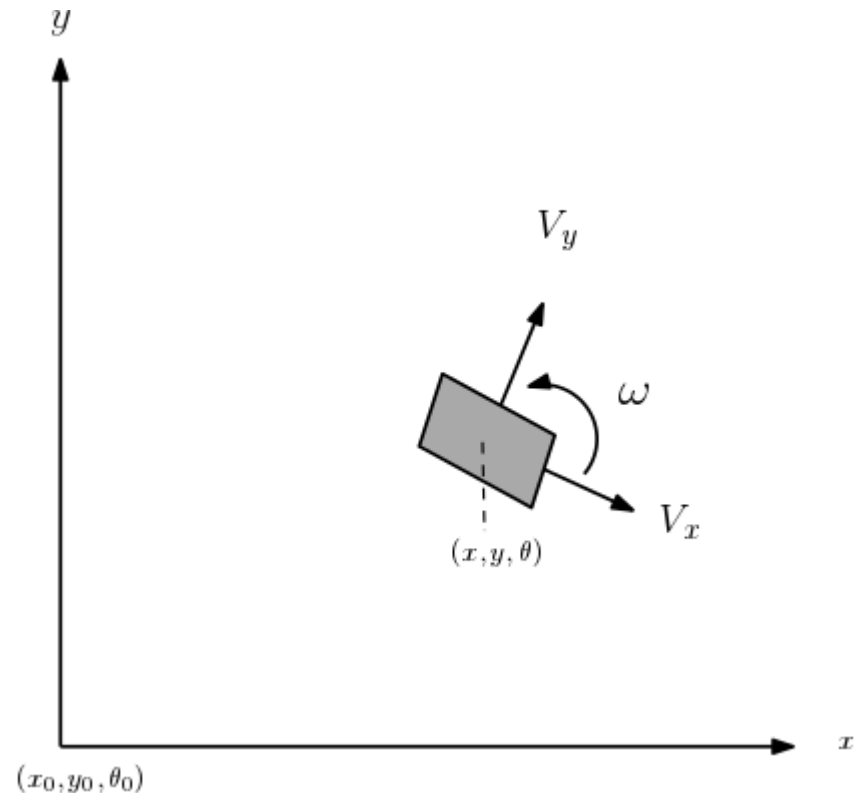


# | Object detection |



# | Localization |

- Determining global position
- Using goniometric properties to determine the position of the robot with respect to a fixed frame
- This is used to map our maze by creating a simple grid of nodes and lines (mapping)



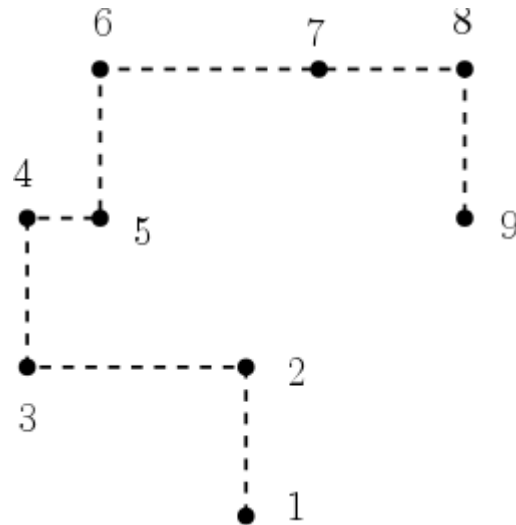
# | Localization |

- Odometry data is unreliable →
  - Extended Kalman filter to give a better estimate of the global position of the robot.
  - Statistical properties of the measurements are based on experimental data.



# | Mapping |

- Localization is used to map our maze by creating a simple grid of nodes and lines



# | Planning |

- Receives object number and coordinates from Detection.
- Decides where to go based on the Tremaux's maze solving algorithm.
- Creates a reference point.

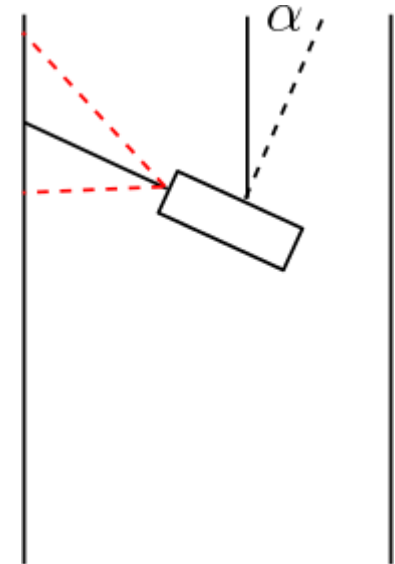
# | Collision prevention |

## Potential field

- Potential forces depended on the distances to the obstacles
- Create a repulsive force

# | Drive |

- Combines the attractive and repulsive force to drive towards the reference point without hitting an obstacle
- Side function:
  - Keep the robot aligned with the corridor
  - Make ' $\alpha$ ' zero



# | Current status |

- Status:
  - Obstacle detection ✓
  - Localization ✗
  - Mapping ✗
  - Reference point placement ✓
  - Potential field ✓
  - Drive ✓
  
- Main focus point for the coming week:
  - Localization ✓
  - Mapping ✓
  
- Week thereafter: Wiki

# | Questions |

