



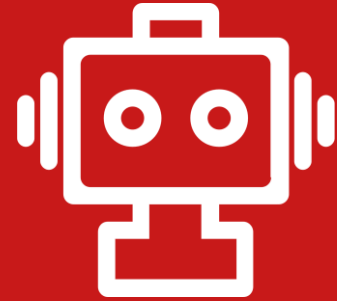
Initial Design

Embedded Motion Control [4SC020]

Group 9

Introduction

- PICO robot
- Escape Room Challenge
- Hospital Challenge



Requirements

Competition	Additional
Operate autonomously	Detect walls and exit
No bumps	Avoid obstacles
Time < 5 minutes	Map room
Standstill time < 30 seconds	Stop after crossing finish line
Rear wheels pass finish line	Operate as quick as possible
Software easy set-up	Avoid deadlocks or infinite executions



Functions

Low-level	Mid-level	High-level
Translate	Path following	Initialization & Shutdown
Rotate	Move parallel to wall	Identify position
Obtain laser data	Avoid obstacles	Path planning
Obtain encoder data	Identify exit and walls	Mapping
Track control effort	Track closest distance to wall	Mediation
	Compare data	Monitor progress



Components

Actuators:

- **Holonomic base with 3 omni-wheels**
- **Pan-tilt unit for head**

Sensors:

- **Laser Range Finder (LRF)**
- **Wheel encoders**

Computer:

- **Ubuntu 16.04**
- **Intel i7**



Specifications

PICO:

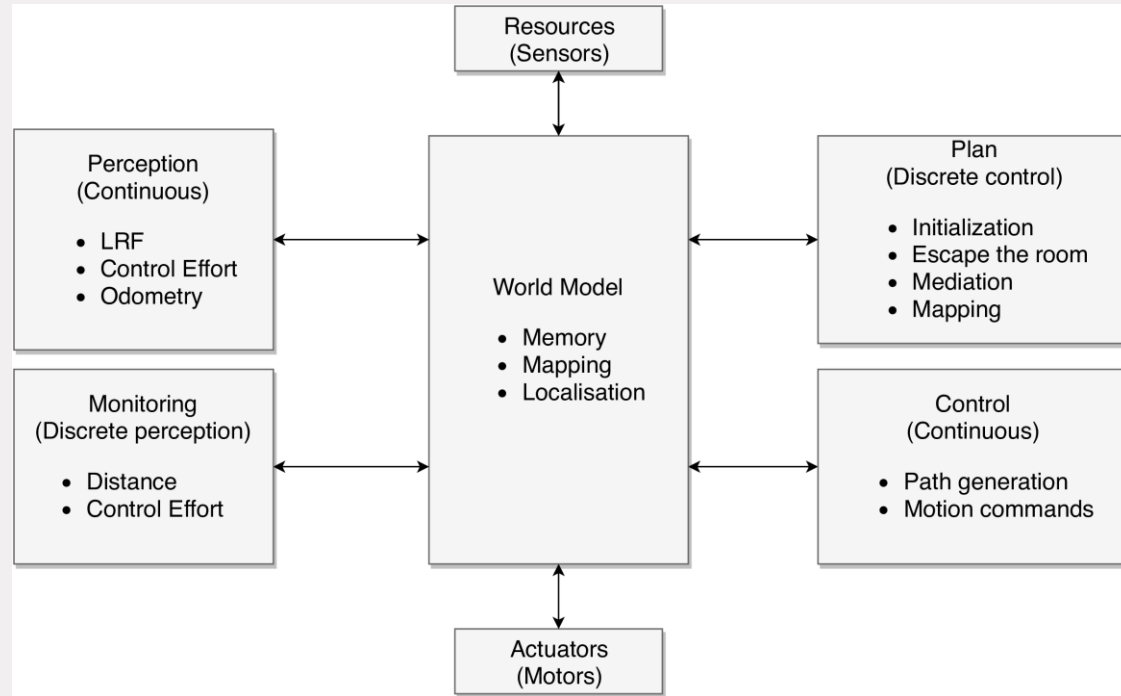
- Maximal translational velocity (0.5 m/s)
- Maximal rotational velocity (1.2 rad/s)
- Field of view of LRF (170°)
- Range and resolution LRF

Room:

- Rectangular
- Corridor width (0.5 – 1.5 m)
- Finish line after 3 m



Interfaces





Questions?