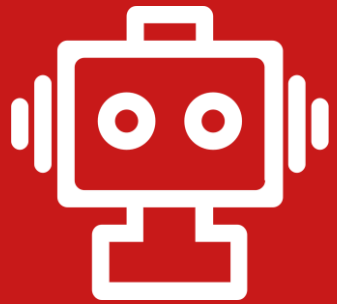
Initial Design

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

TU/e

Functions

Low-level	Mid-level	High-level
Translate	Identify position in room	Initialize sensors
Rotate	Move parallel to wall	Path planning
Obtain laser data	Avoid obstacles	Mediation
Obtain encoder data	Identify exit	Monitor progress
Initialize motion	Turn to corridor	Mapping
Stop motion	Move to corridor	Stop and shut down

TU/e

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**

TU/e

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**

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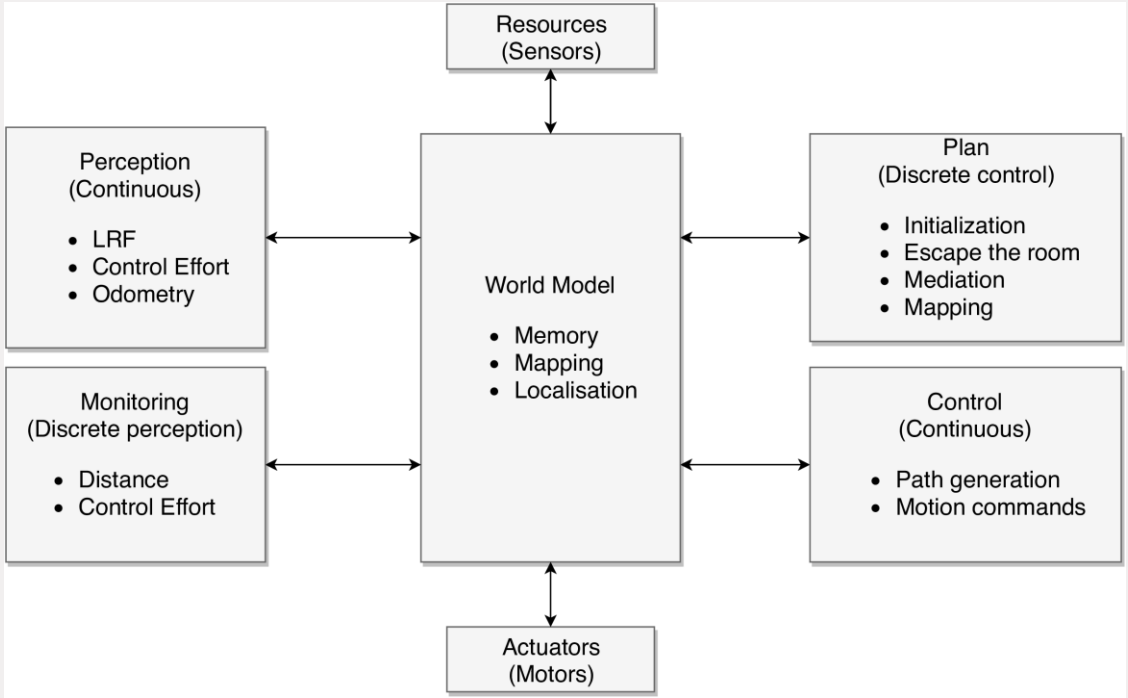
Interfaces


Resources
(Sensors)
Perception
(Continuous)
LRF
Control Effort
Odometry
World Model
Memory
Mapping
Localisation
Plan
(Discrete control)
Initialization
Escape the room
Mediation
Mapping
Monitoring
(Discrete perception)
Distance
Control Effort
Control
(Continuous)
Path generation
Motion commands
Actuators
(Motors)

Questions?