



Politecnico  
di Torino



PIC4SeR

# Politecnico di Torino Interdepartmental Centre for Service Robotics

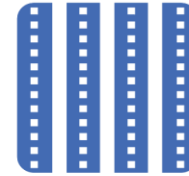
Marcello Chiaberge

[marcello.chiaberge@polito.it](mailto:marcello.chiaberge@polito.it)

Centre Coordinator



PRECISION  
AGRICULTURE



SMART CITY  
SEARCH &  
RESCUE



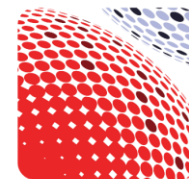
SERVICE  
ROBOTICS  
FOR  
WELLBEING



CULTURAL  
HERITAGE



UNDERWATER



SPACE



Politecnico  
di Torino



PIC4SeR



# PIC4SeR – Service robotics

**Service robots** assist human beings, typically by performing a job that is dirty, dull, distant, dangerous or repetitive, including [household chores](#). They typically are [autonomous](#) and/or operated by a built-in control system, with manual override options. The term "service robot" does not have a strict technical definition. The [International Organization for Standardization](#) defines a “service robot” as a robot “that performs useful tasks for humans or equipment [excluding industrial automation applications](#)”



Politecnico  
di Torino



# PIC4SeR – Service robotics

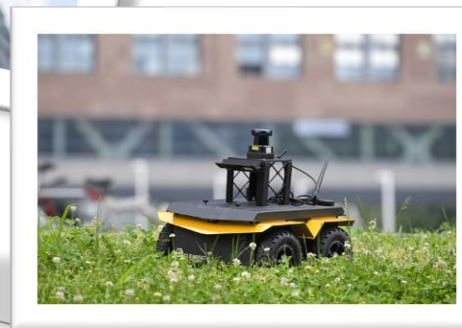


Industrial Robots

Key technologies shaping

PERCEPTION  
COGNITION  
ACTION

Future capabilities of robots



Service Robots



Politecnico  
di Torino



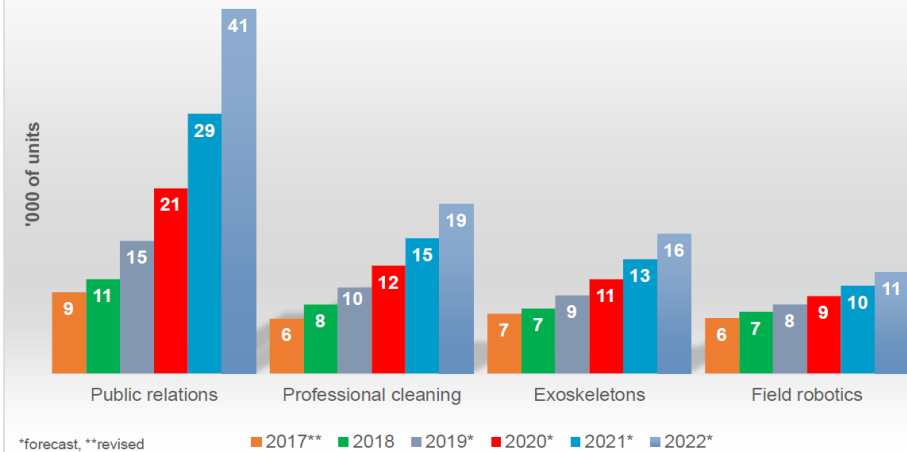
# PIC4SeR – Reference market

## IFR (International Federation of Robotics) “World Robotics 2019 – Service Robots”

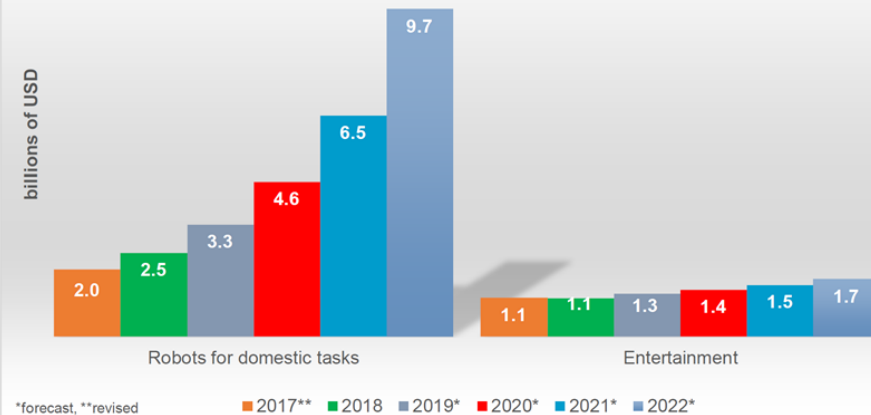
Service robots for professional use. Main Applications  
Unit sales 2017\*\* and 2018, forecast 2019\* and 2020\*-2022\*



Service robots for professional use. All other applications -1-  
Unit sales 2017\*\* and 2018, forecast 2019\* and 2020\*-2022\*



Service robots for personal/domestic use.  
Estimated value 2017\*\* and 2018, forecast 2019\* and 2020\*-2022\*







Politecnico  
di Torino



PIC4SeR



## PIC4SeR – Why?

- Many of the current research, innovation and development in the service robotic field, can be classified as **disruptive technologies**
- Several uncorrelated research projects and industrial partnerships **must be harmonized** and coordinated to optimize the results
- To start a **common workplace**, a common knowledge and a common language
- To develop an **integrated approach** and technology development process in this booming area
- To help PoliTO reaching a **critical mass** in this sector (instead of several scattered initiatives)
- To **link together** technology needs coming from several industrial partners
- To start **interdisciplinary didactic activities** in this area
- To join several international research communities **with a unique “face”** and coordinated research proposals





Politecnico  
di Torino



# PIC4SeR in pills

- **5 PoliTO departments**
  - DET (Electronics & Telecoms)
  - DAUIN (Informatics & Control)
  - DIMEAS (Mechanics & Aerospace)
  - DIATI (Geomatics & Photogrammetry)
  - DAD (Design & Cultural Heritage)
- **50 people** involved
  - 21 staff
  - 12 researcher
  - 17 PhD students
- **Location:** c/o COVIVIO building
  - C.so Ferrucci 112 – Torino
  - 580mq of labs and offices
  - indoor & outdoor **facilities** available for testing





Politecnico  
di Torino



# PIC4SeR – Enabling technologies

/Energy optimization

/GNSS navigation

/4G and 5G Networks

/Path planning

/Cooperative positioning

/SDR receivers

/Sensor integration

/Locomotion platforms

/ROS2

/Soft robotics

/Multimedia communication

/Control

/Coding

/Human Machine Interaction

/Internet of Things

/Machine Learning

/Artificial Intelligence

/Interaction visualization

/Data fusion

/Interaction design

/Edge-Fog-Cloud Computing

/System Co-Design

/Embedded Computing

/Co-living Design

/Ethics





Politecnico  
di Torino



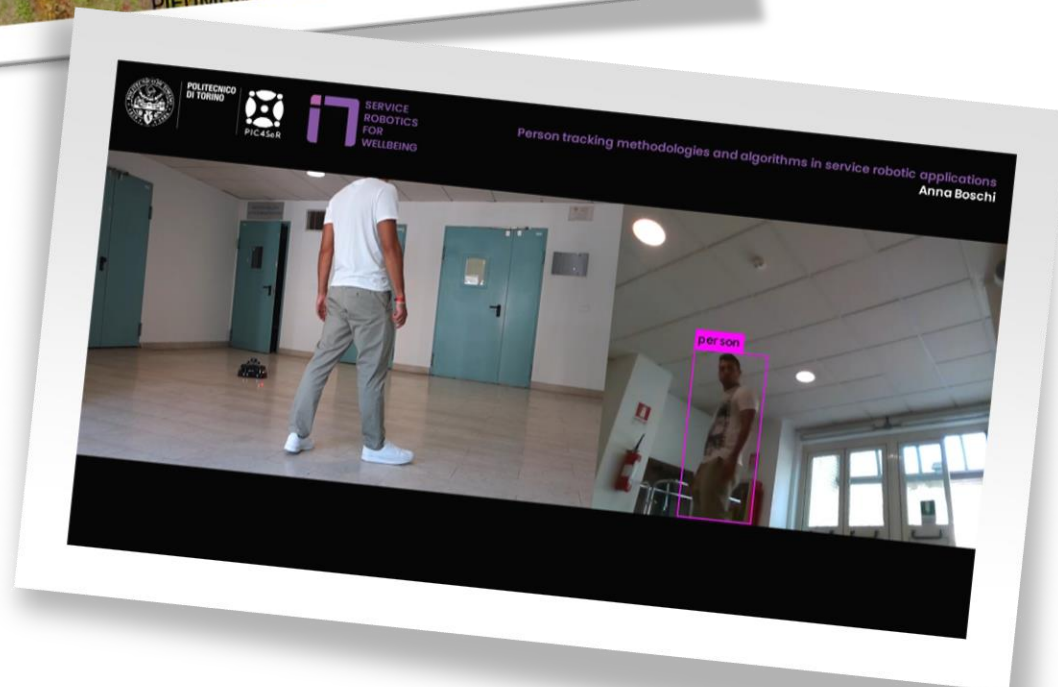
# PIC4SeR – key application areas



PRECISION  
AGRICULTURE



SERVICE ROBOTICS  
FOR WELLBEING







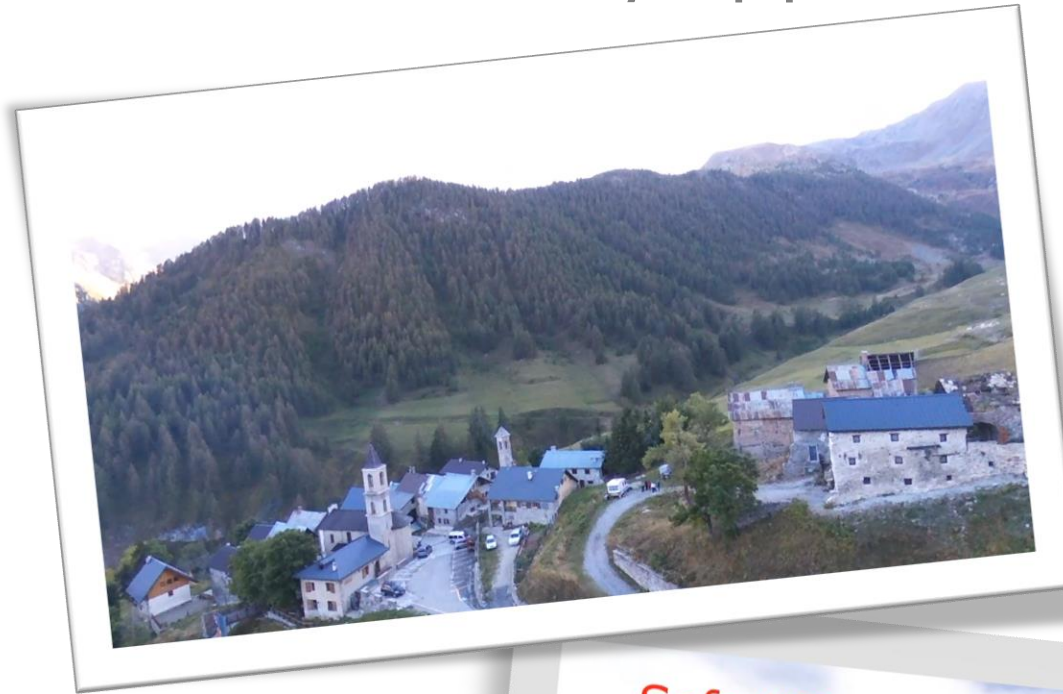
Politecnico  
di Torino



# PIC4SeR – key application areas



CULTURAL  
HERITAGE



SMART CITY  
SEARCH & RESCUE





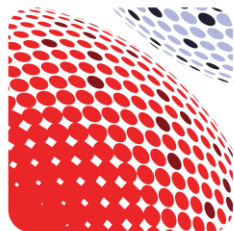
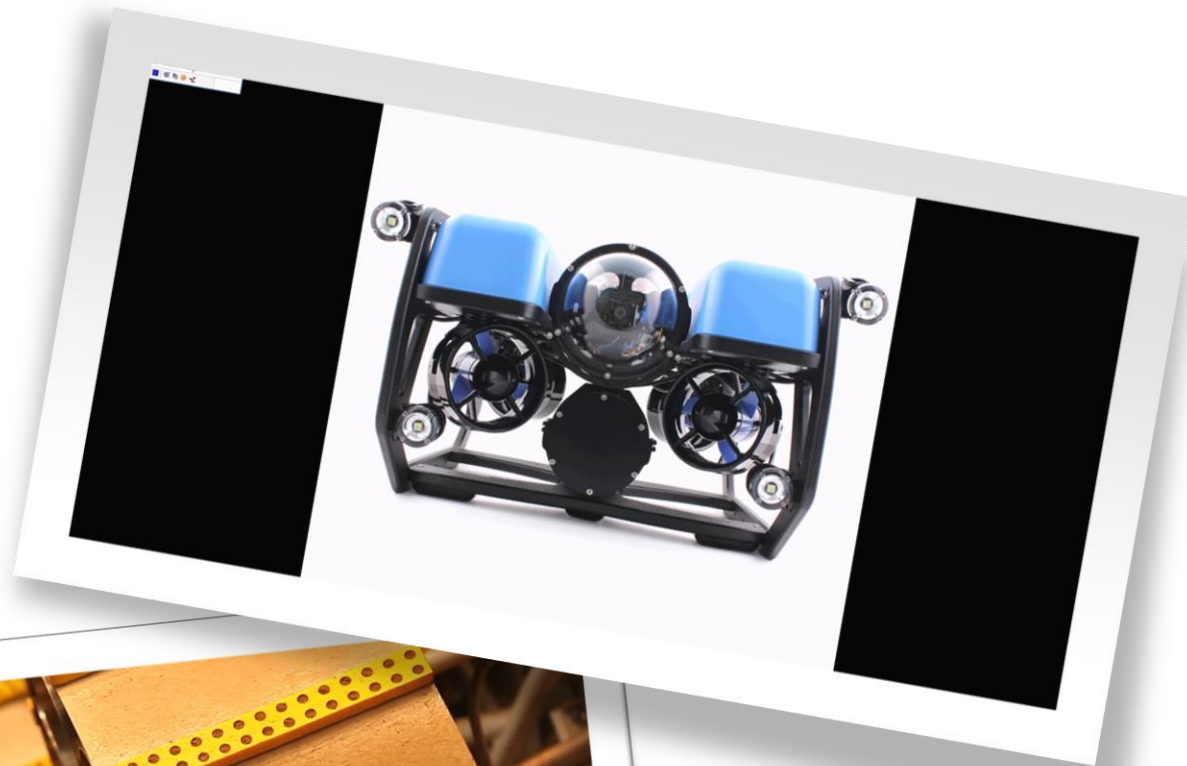
Politecnico  
di Torino



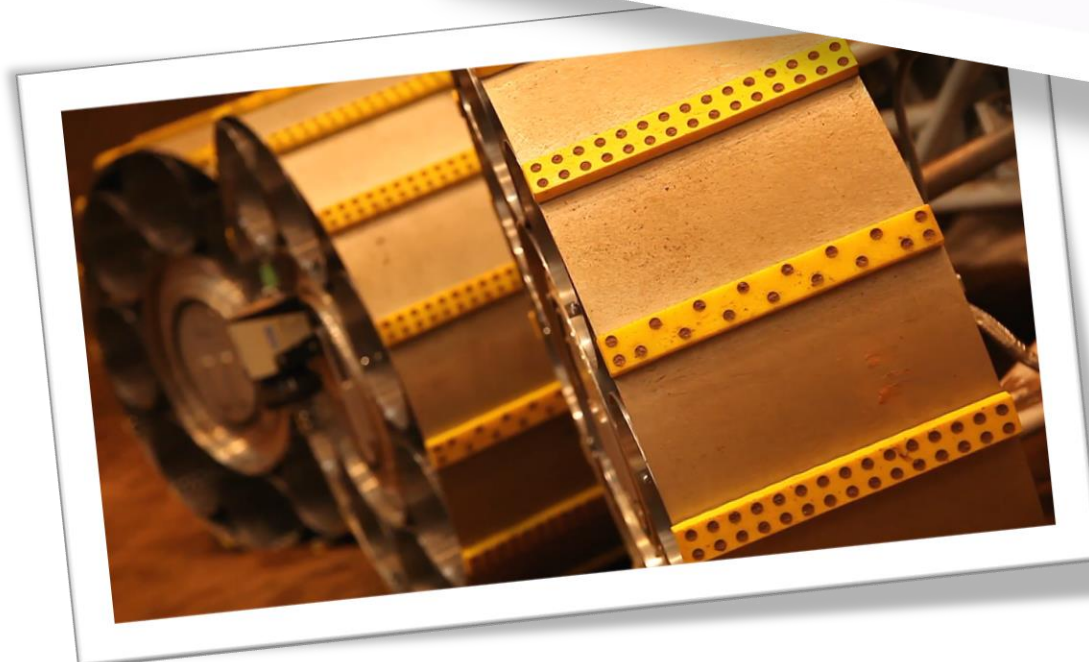
# PIC4SeR – key application areas



UNDERWATER



SPACE

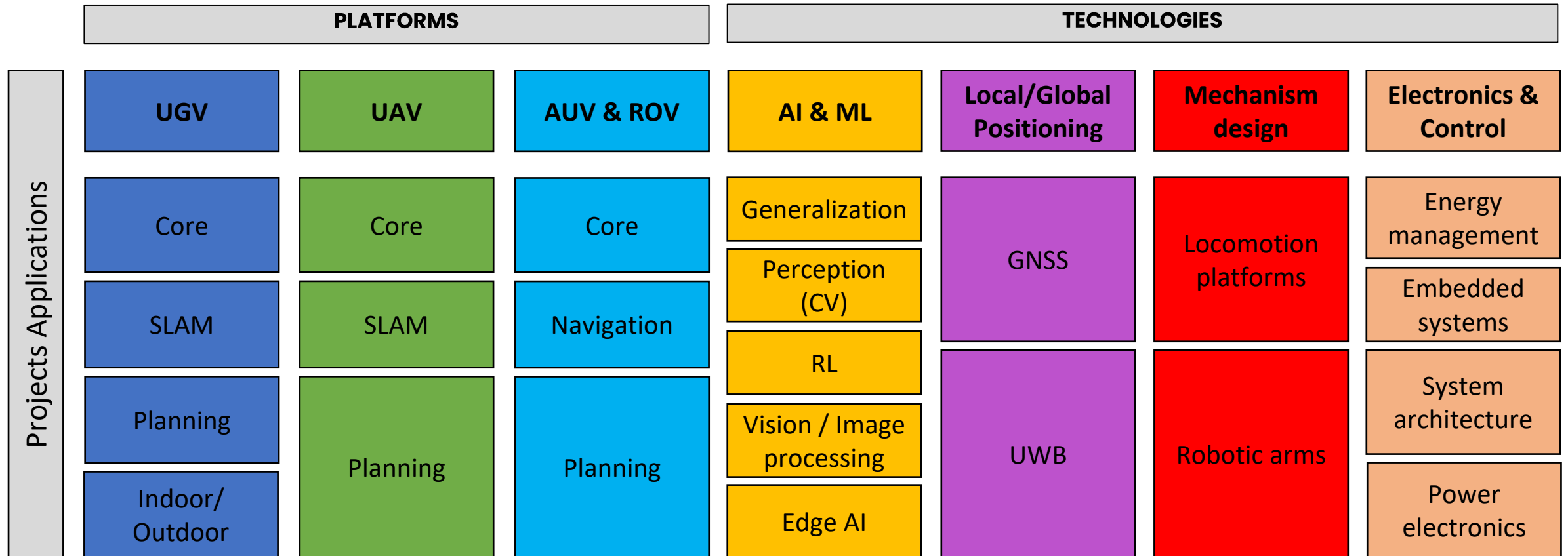




Politecnico  
di Torino



# PIC4SeR – Internal organization





# Companies & Research partners







Politecnico  
di Torino



SCAN ME



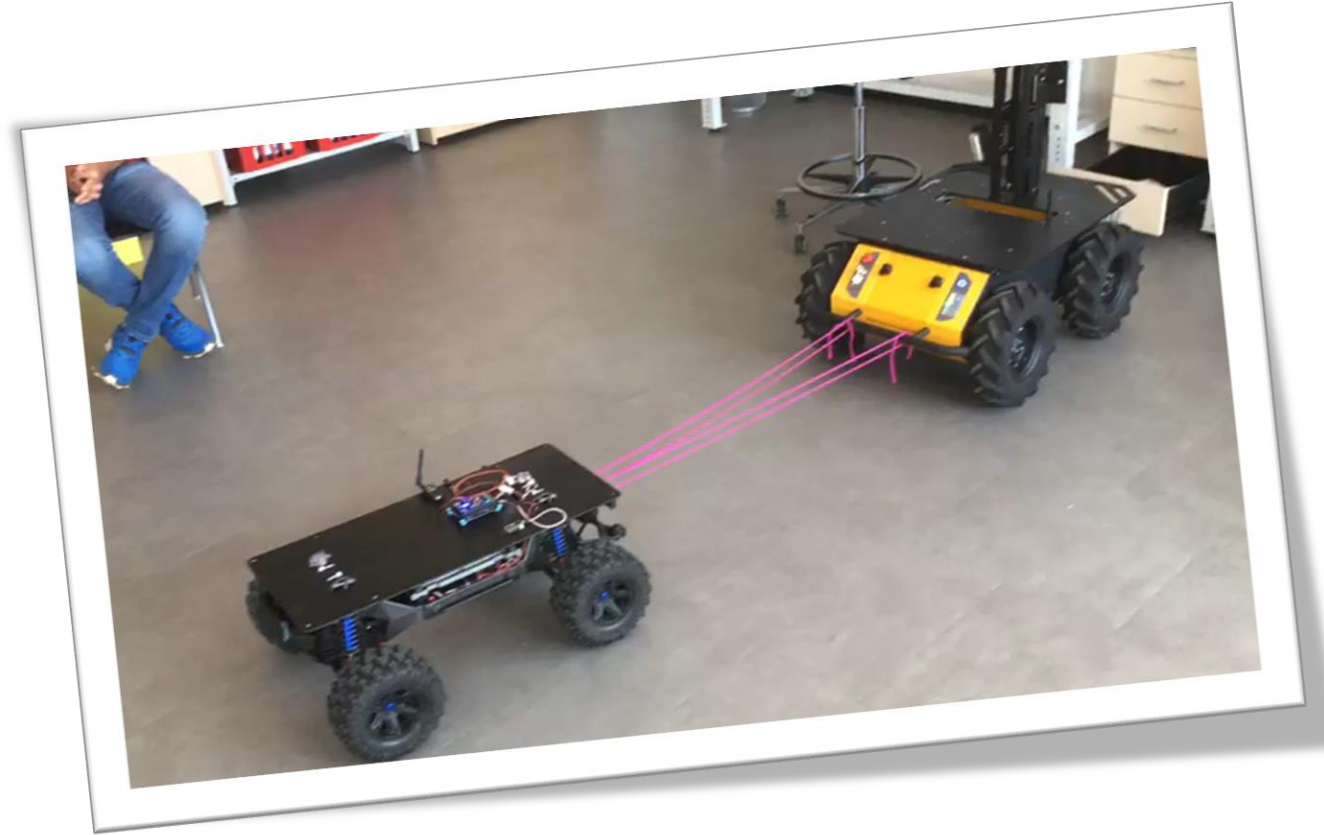
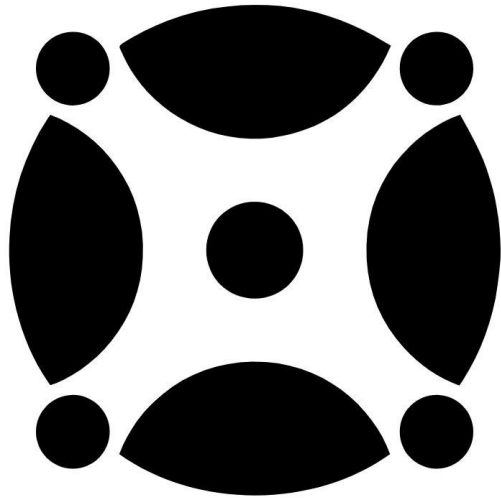
Politecnico  
di Torino



PIC4SeR



# Thank you



[www.pic4ser.polito.it](http://www.pic4ser.polito.it)