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di Torino



PIC4SeR

Politecnico di Torino Interdepartmental Centre for Service Robotics

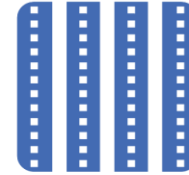
Marcello Chiaberge

marcello.chiaberge@polito.it

Centre Coordinator



PRECISION
AGRICULTURE



SMART CITY
SEARCH &
RESCUE



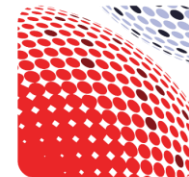
SERVICE
ROBOTICS
FOR
WELLBEING



CULTURAL
HERITAGE



UNDERWATER



SPACE



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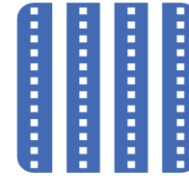
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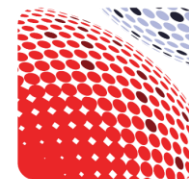
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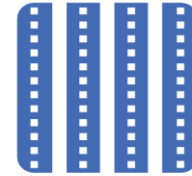
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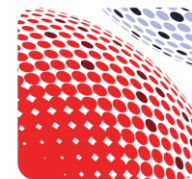
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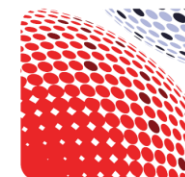
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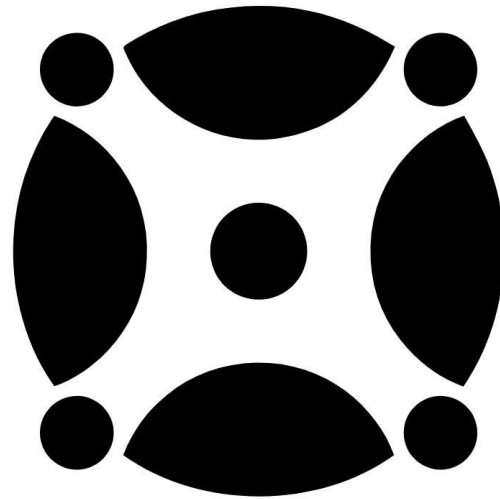


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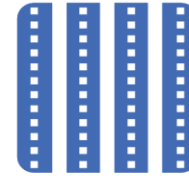
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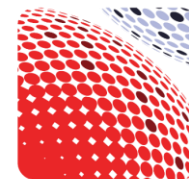
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PIC4SeR – Service robotics

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](#)”



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PIC4SeR – Service robotics



Industrial Robots

Key technologies shaping

PERCEPTION
COGNITION
ACTION

Future capabilities of robots



Service Robots



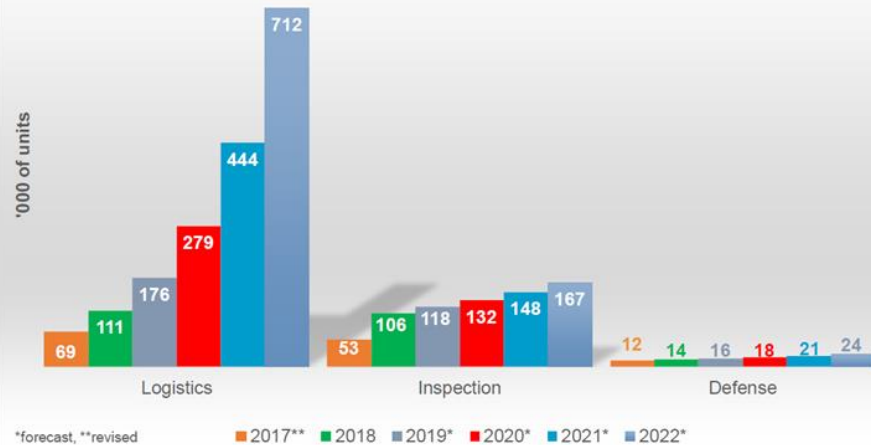
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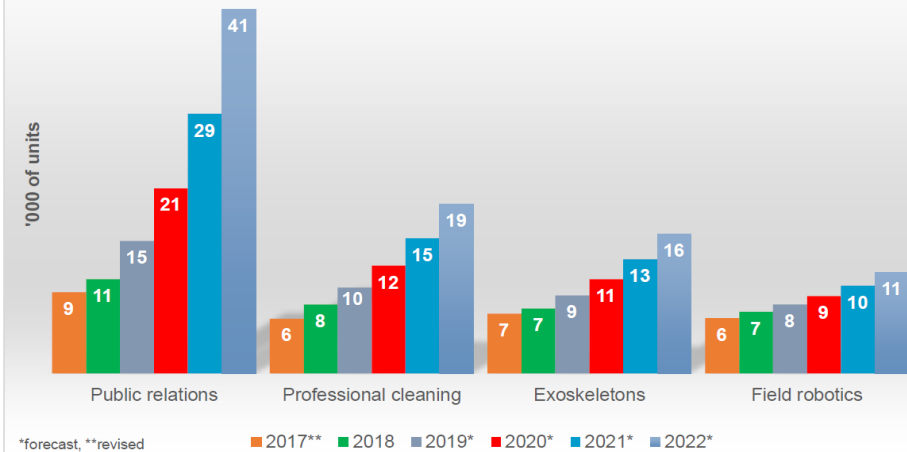
PIC4SeR – Reference market

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

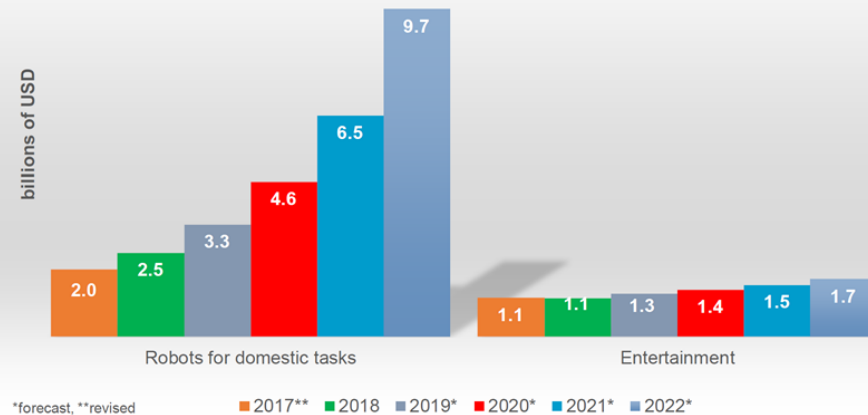
Service robots for professional use. Main Applications
Unit sales 2017** and 2018, forecast 2019* and 2020*-2022*



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*





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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





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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





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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



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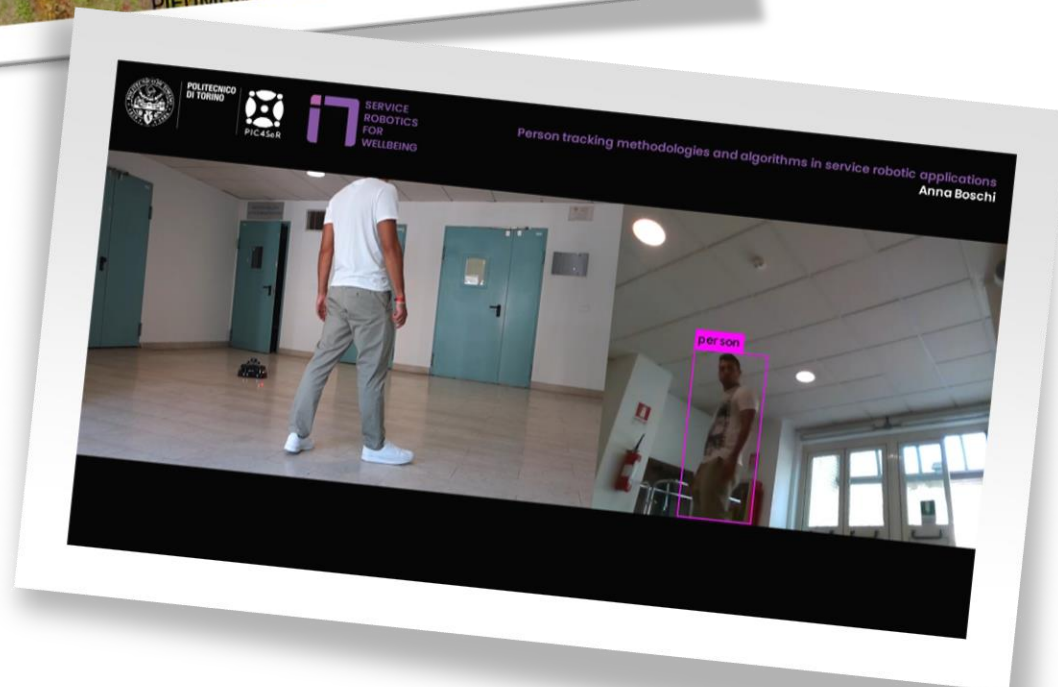
PIC4SeR – key application areas



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FOR WELLBEING





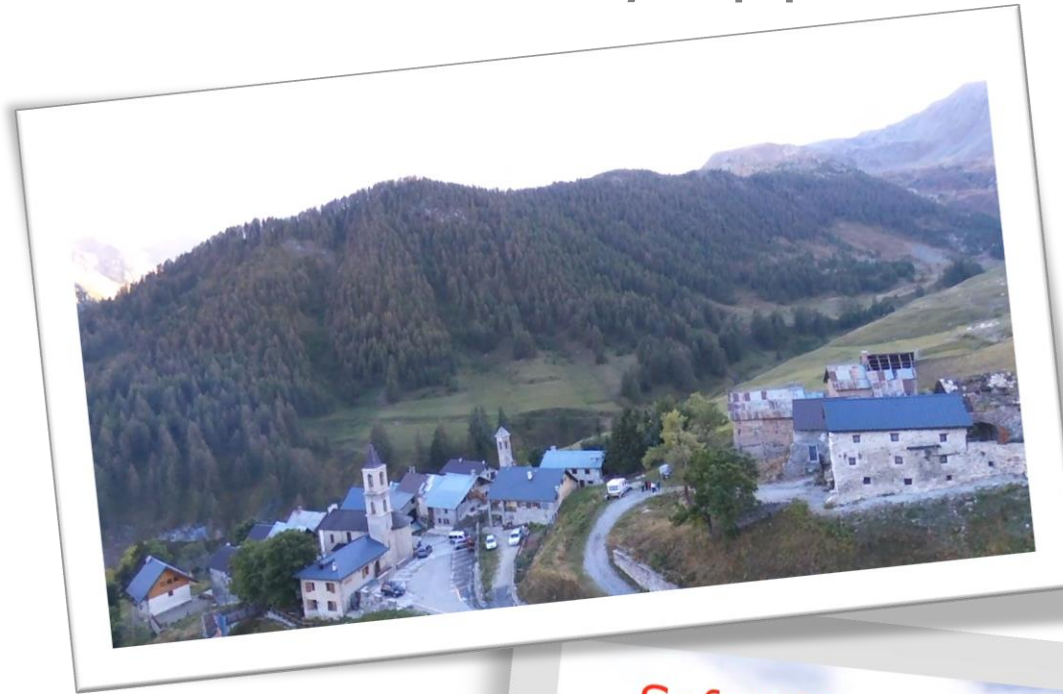
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PIC4SeR – key application areas



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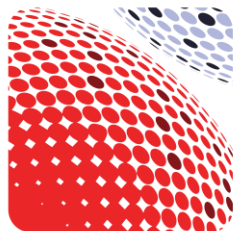
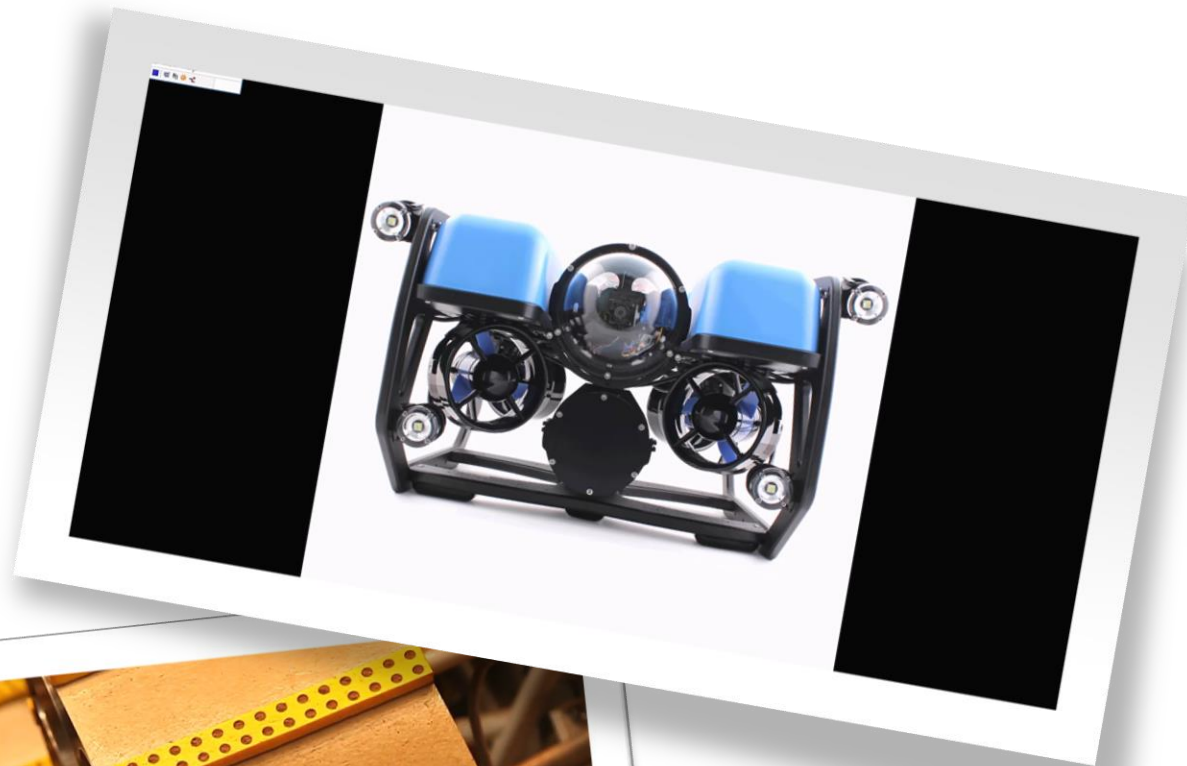
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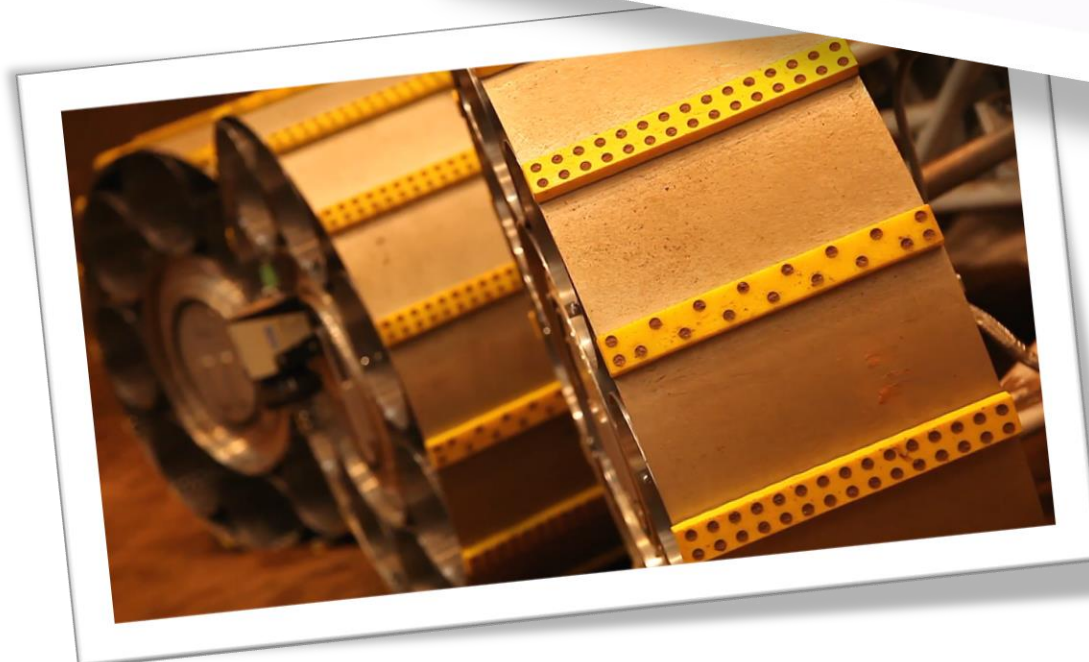
PIC4SeR – key application areas



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SPACE

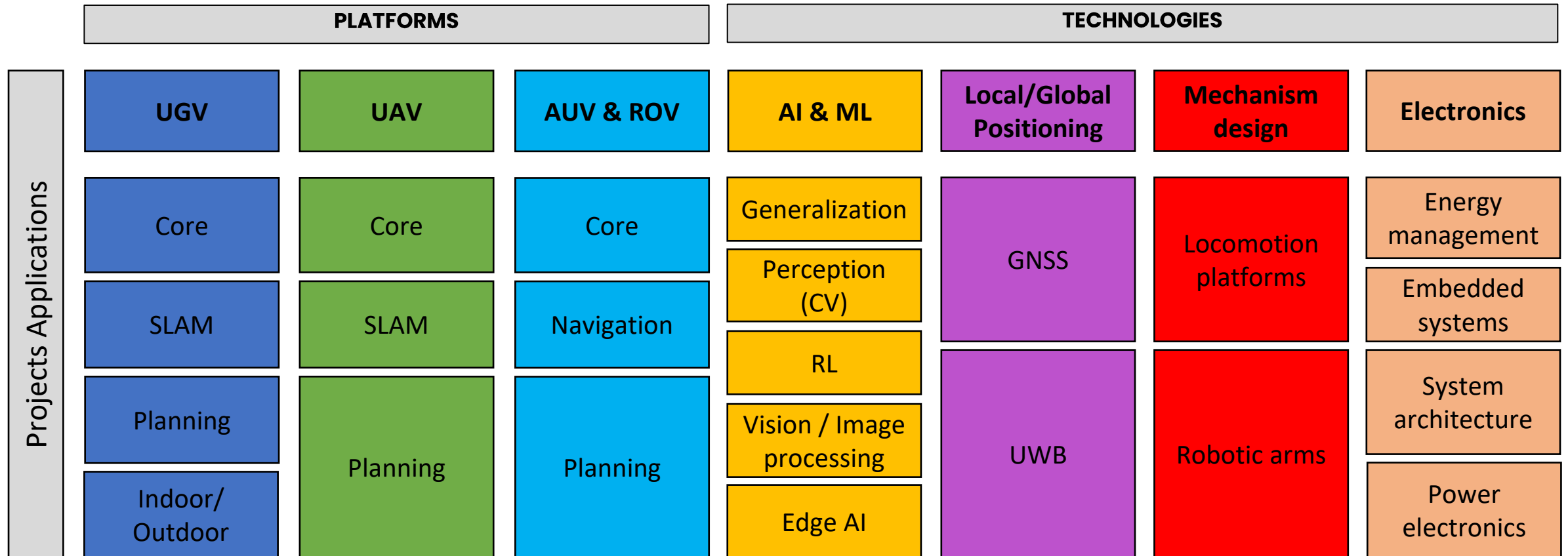




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PIC4SeR – Internal organization



Companies & Research partners





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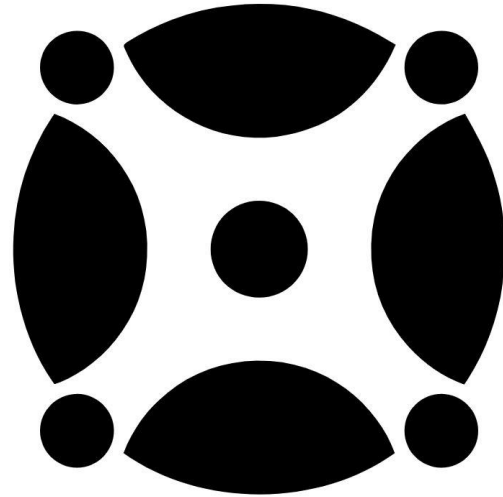
SCAN ME



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Thank you



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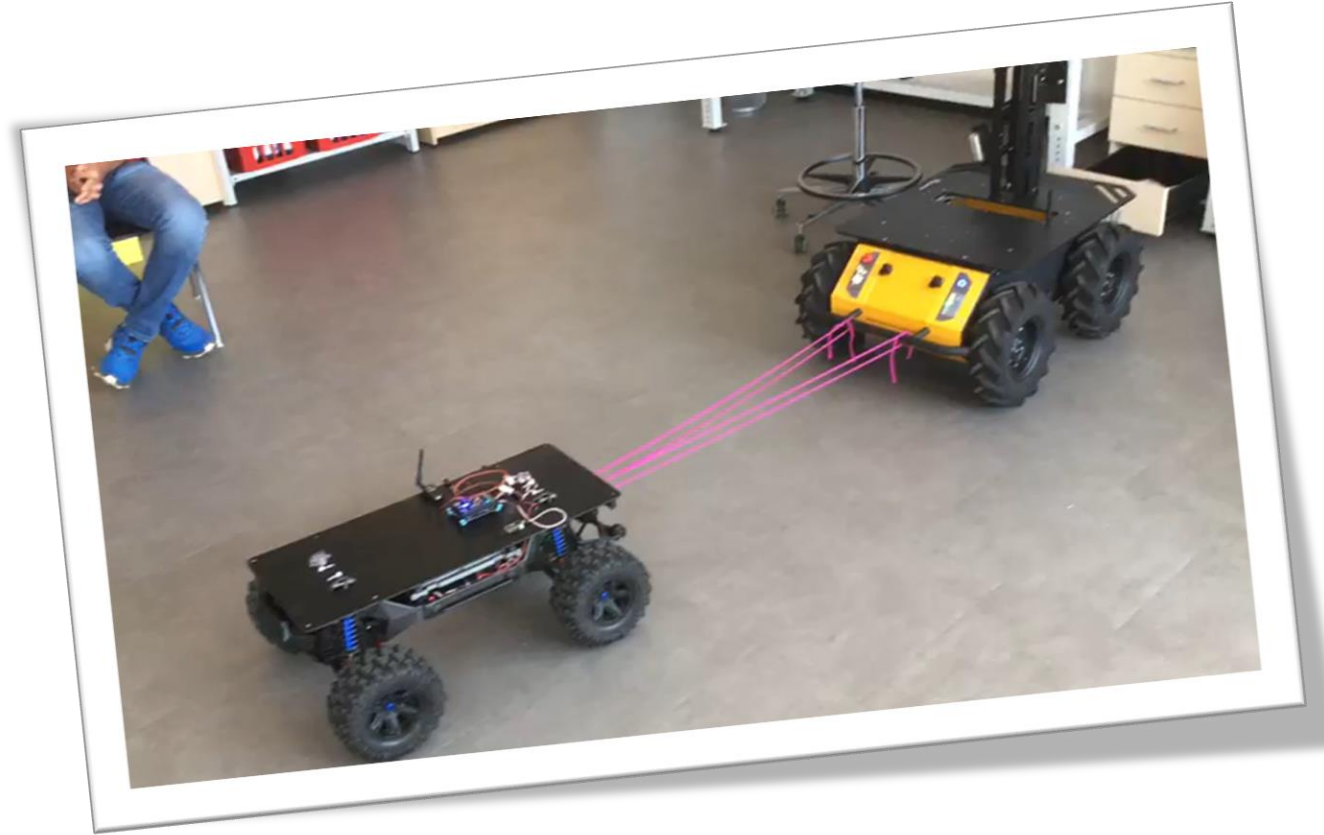
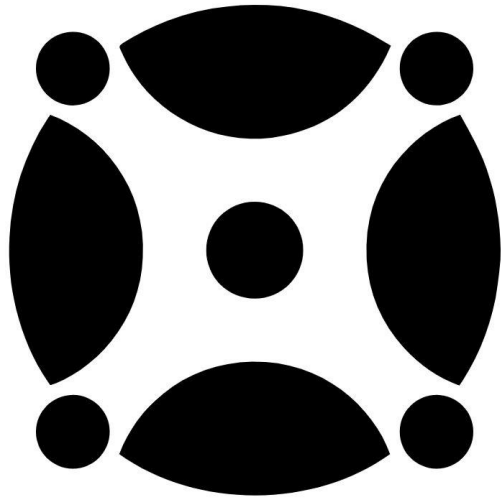
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Thank you



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