NCSR Demokritos

Institute of Informatics & Telecommunications

Socially-Aware Robotics

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skel
THE AI LAB

Roboskel

1 | **the team**
about us | vision

Stasinos Konstantopoulos

Georgios Stavrinos

Maria Dagioglou

Rulah

Raphaelo

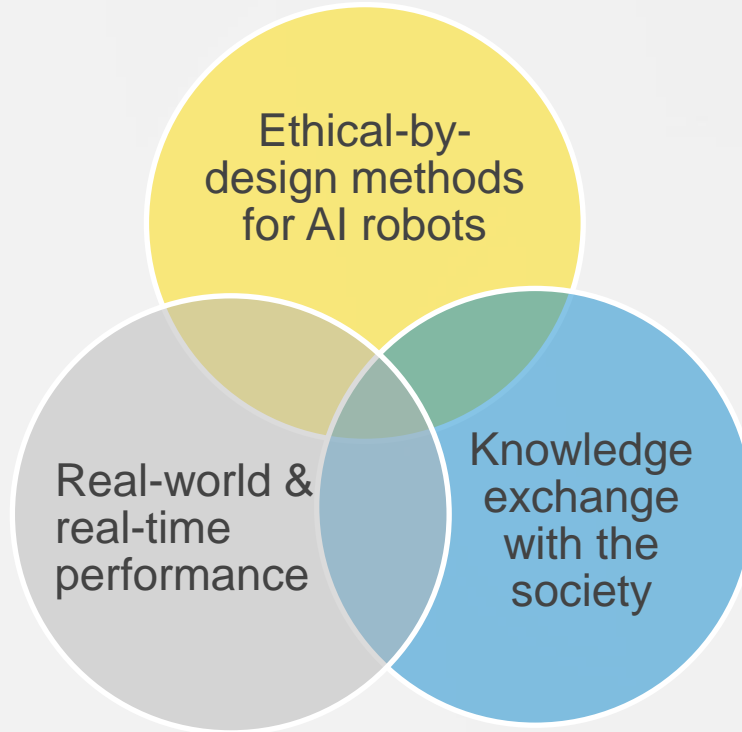Mano

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1

the team

about us

Robots integrated into society

Ethical-by-design methods for AI robots

Real-world & real-time performance

Knowledge exchange with the society

DEMOKRITOS

2 | **Research**

Socially – Aware Robotic behaviour

Safe and efficient navigation in challenging and unstructured settings

Recognize human actions and intentions

Collaborative learning

Transparent robot actions

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Autonomous outdoors navigation

- Compare IMU and odometry to autonomously decide actual traversability
- Collect a self-supervised dataset
- Train a deep-vision traversability model [1]

- Developed a suite of special manoeuvers:
- Climbing up a step or curb [2]
- Getting up steep inclines [3]

A robot that learns to recognize terrain that is not traversable using standard navigation and also what manoeuvre to apply to overcome the obstacle.

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2
Research
Results

Safe and efficient navigation in challenging and unstructured settings

[1] C.Sevastopoulos, K. M. Oikonomou, and S. Konstantopoulos, Improving Traversability Estimation through Autonomous Robot Experimentation. ICVS 2019
[2] https://vimeo.com/258146954, https://vimeo.com/258143191
[3] G. Kamaras, P. Stamatopoulos, and S. Konstantopoulos, Path planning for terrain of steep incline using Bezier curves. ICTAI 2020.

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Autonomous drone navigation
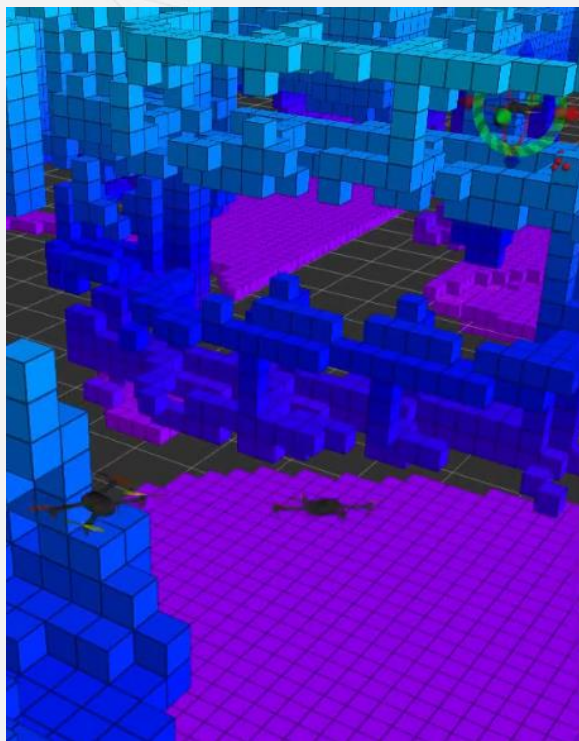
Aggressive quadcopter navigation through cluttered environments

Features (Current):
- Dynamics and control-based planning
- Obstacle Avoidance
- OMPL, MoveIt2 & ROS2 Integration

2 Research
Results

Safe and efficient navigation in challenging and unstructured settings

DEMOKRITOS

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ADL recognition

Human walking pattern recognition

2
Research
Results

Recognize human actions and intentions

K. Zamani, G. Stavrinos, S. Konstantopoulos, Detecting and Measuring Human Walking in Laser Scans, SETN '18 Proceedings of the 10th Hellenic Conference on Artificial Intelligence
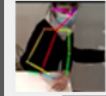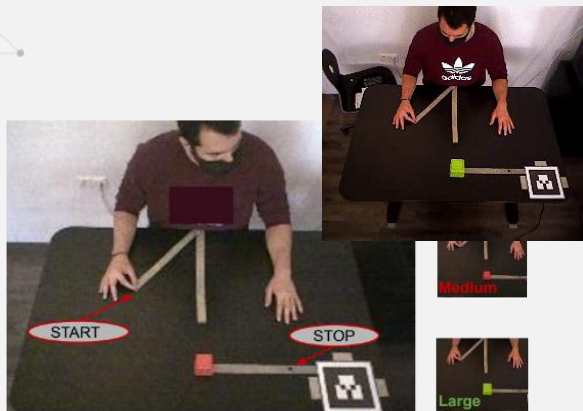
Human-Robot collaboration (HRC)

Human intention recognition

- Simple set-up (RGB-D sensor)
- Human movement observation

- Real-time feasibility

HCII 2022

Object Size Prediction from Hand Movement Using a Single RGB Sensor⋆

Maria Dagioglou[1], Nikolaos Soulounias[1,2], and Theodoros Giannakopoulos[1]

Real-time Feasibility of a Human Intention Method Evaluated Through a Competitive Human-Robot Reaching Game
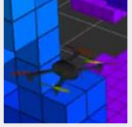
A.C.Tsitos, M.Dagioglou, T. Giannakopoulos, LBR in HRI 2022

Recognize human actions and intentions

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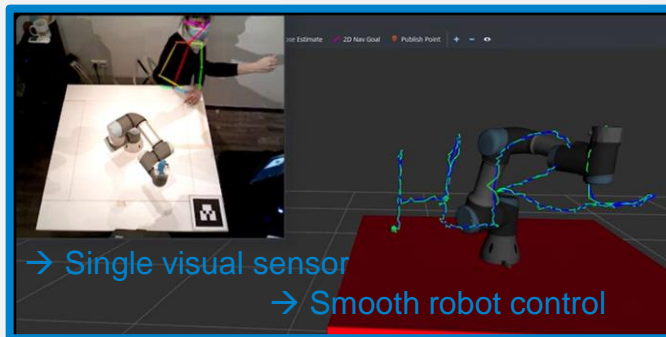
Recognize human actions and intentions

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Human-Robot collaboration (HRC)

HRC test-bed

→ Single visual sensor

→ Smooth robot control

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ΙΔΡΥΜΑ ΣΤΑΥΡΟΣ ΝΙΑΡΧΟΣ
STAVROS NIARCHOS FOUNDATION

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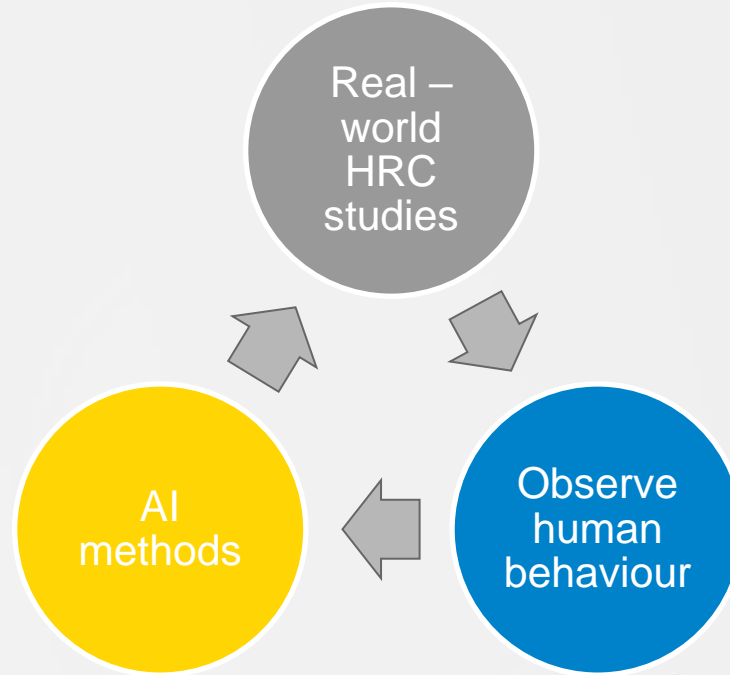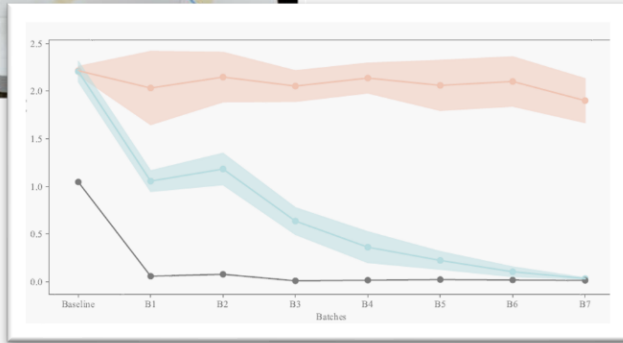
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Research
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Transparent robot actions

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Human-Robot collaboration (HRC)

Real – world HRC studies

Observe human behaviour

AI methods

A.C.Tsitos, M. Dagioglou, Enhancing team performance and adherence with **transfer learning during real-world human-robot collaborative learning** [Under review]

Collaborative learning

Transparent robot actions

DEMOKRITOS

3 | **Innovation**

Products and Services development

Robotics software components.

Applications: UAV/UGV inspection, assistive robotics, robotic arm teleoperation, collaborative pick-and-place, et al.

Human-Robot Collaboration testbed

ahedd » Services » HUMAN-ROBOT COLLABORATION TESTBED

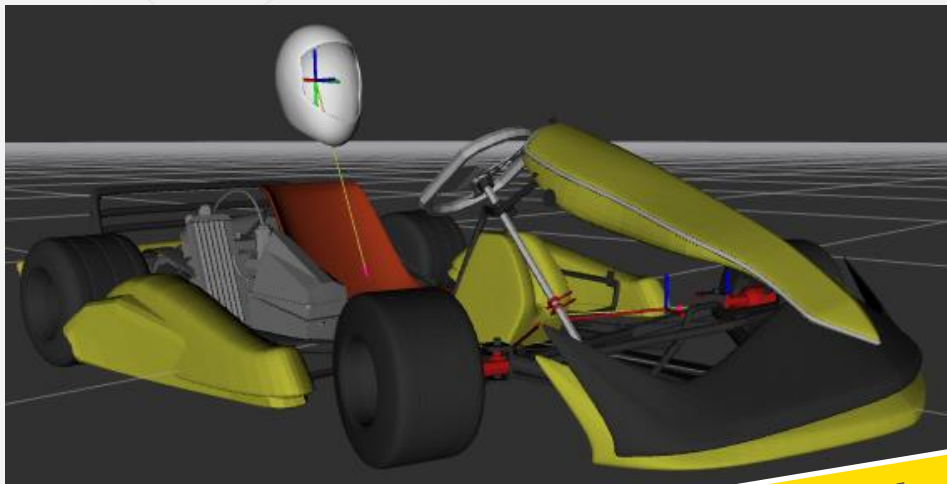September 26, 2022

HUMAN-ROBOT COLLABORATION TESTBED

3
Innovation

ROS2 training & challenge

Expected mid-November

Stay tuned!

Feel Free to Contact us!

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Github:
https://github.com/roboskel,
https://github.com/Roboskel-Manipulation

Demos:
https://vimeo.com/roboskel