PERSONAL INFORMATION   Lorenzo Govoni

EDUCATION AND TRAINING

2022-Current	**Sapienza university of Rome**, *Rome*, Italy
	– PhD in Automatic Control, Bioengineering and Operations Research (ABRO)
2020-2022	**Sapienza university of Rome**, *Rome*, Italy
	– MSc in Control Engineering, *110/110 cum laude*
	– Thesis: "Observer based residuals for fault and collision isolation in robot manipulators"
2017-2020	**Sapienza university of Rome**, *Rome*, Italy
	– BSc in Computer and System Engineering, *110/110 cum laude*
	– Thesis: "Synthesis of optimal trajectories in non-holonomic robots with limited field of view"
2021-2017	**Liceo Scientifico Statale Stanislao Cannizzaro**, *Rome*, Italy
	– High school degree, *100/100 cum laude*

October 2020	### Master Thesis
Title	Observer based residuals for fault and collision isolation in robot manipulators
Supervisor	Andrea Cristofaro
Description	The goal of this work, implemented at the Robotics Lab in Università di Roma "La Sapienza", is to develop a collision detection framework on a real Kuka LWR 4+ through approximated momentum-based residual based on a reduced-order velocity observer. The main problem is that in simulation the measurements of the joint velocities are given for granted, but when we deal with real robots, speed sensor are not used due to the presence of noise. So in order to improve the estimation of the joint speeds obtained through numerical differentiation, a reduced-order observer has been implemented. Results have been compared also with the case of the use of a full-state observer, and has been stated that the estimation given by the reduced-order observer leads to a residual signal less noisy, which is preferable in the context of collision detection for achieving fast responses in case of collisions

RELEVANT PROJECTS

Consensus problem in multi-agent hybrid systems   *Control of Multi Robot Systems*

Analysis of the behavior of multi-agent systems over networks subject to time-driven jumps. Characterization of the hybrid multi-consensus behaviour when dealing with agents that communicate through distinct communication graphs at jump and flow times. The work has been applied first to simple integrator agents and then extended to the nonlinear case where each robot is modelled as a unicycle. (MATLAB)

Analyzing the Performances of a Compliant 3R Planar Robot using the ESP Control   *Underactuated Robot project*

Analysis of the ESP control approach as a way of assigning a damping to the link variables of robots with compliant transmissions, in order to overcome oscillatory behaviours when a fast/hard impact occurs on the robot while it is performing regulation/tracking tasks. (MATLAB)

Enforcing mobile robot safety under input constraints   *Autonomous and Mobile Robotics project*

Analysis of the Control Barrier Functions as a way to enforce some safety constraint by ensuring that the inputs will not make the system leave the safe set and will be inside the input constraints. The goal is to generate Input Constrained Control Barrier Functions for solving the Adaptive Cruise Control problem and simulate different scenarios. (MATLAB)

Redundancy in robots with elastic joints: (local) minimization of elastic torques
Robotics2 project

Analysis of the local minimization of the weighted elastic torque in a redundant 3R planar robot with elastic joints while following a desired trajectory by comparing different weighting matrices and trajectories. (Simulink/MATLAB)

Optimal Tuning of LQR controller for Quadrotor Helicopters using GA and PSO
Optimal Control project

Design of an LQR controller for a quadrotor helicopter with the use of two metaheuristicts, Genetic Algorithm (GA) and Particle Swarm Optimization (PSO), for the optimal tuning of the matrices Q and R. (MATLAB)

PERSONAL SKILLS

Mother tongue   Italian

Other languages

UNDERSTANDING		SPEAKING		WRITING
Listening	Reading	Spoken interaction	Spoken production	
English				
B2	B2	C1	C1	B2

Levels: A1 and A2: Basic user – B1 and B2: Independent user – C1 and C2: Proficient user
Common European Framework of Reference for Languages

Computer skills
– competent in C/C++, MATLAB, Simulink, LaTeX
– experience with Python, Java
– operating systems: Ubuntu and Windows