# Fabio Vigoriti

## Tutor: Vincenzo Lippiello

### co-Tutor: Fabio Ruggiero

### XXXII Cycle - I year presentation

## Manipulation of deformable objects

New control methods and algorithms to be
implemented in the industry

# - <u>Background</u>

- Master's degree in Automation Engineering in 2016 with the thesis in "*IMPEDANCE CONTROL IN THE NULL-SPACE OF A MOBILE MANIPULATOR ON OMNIDIRECTIONAL BASE*".

- Since 2015, I collaborate with PRISMA Lab group of prof. Bruno Siciliano in Human Robot Interaction field.

- From July 2016 to February 2017, I worked with a consulting company in the automotive field.

# - Problems

- Within my PON Ph.D. thesis, I investigate the problem of deformable objects manipulation through robots

- In particular, my interest is in improving the autonomy of robot within tasks involving deformable objects (*e.g.*, manufactory processes, surgery applications, food industries), without neglecting the safety of the task execution.

- In this Ph.D. project, AtomGroup Company is involved.

# - Research Activities

- Testing different technologies for 3D scanning.

- Visit to AtomGroup company

- Design new control laws to increase safety in those tasks where human-robot interaction occurs.

# - Products

- F. Vigoriti, F. Ruggiero, V. Lippiello, L. Villani, "***Control of redundant robot arms with null-space compliance and singularity-free orientation representation***", Robotics and Autonomous Systems, vol. 100, pp. 186-193, 2018.

- F. Vigoriti, F. Ruggiero, V. Lippiello and L. Villani, "***Tracking control of redundant manipulators with singularity-free orientation representation and null-space compliant behavior***", in Human Friendly Robotics. 10th International Worhshop, Springer Proceedings in Advaced Robotics (**SPAR**), Ficuciello F., Ruggiero F., Finzi A.(eds), 2018 (to appear).

# - Research Activities

Tracking control of redundant manipulators with singularity-free
orientation representation and null-space compliant behviour

Fabio Vigoriti, Fabio Ruggiero, Vincenzo Lippiello, Luigi Villani

PRISMA Lab
Department of Electrical Engineering and Information Technology
University of Naples Federico II
www.prisma.unina.it

Fabio Vigoriti

# - Next Year

| | Credits year 1 | | | | | | | | Credits year 2 | | | | | | | | Credits year 3 | | | | | | | | Total | Check |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | | | 1 | 2 | 3 | 4 | 5 | 6 | | | 1 | 2 | 3 | 4 | 5 | 6 | | | |
| | Estimated | bimonth | bimonth | bimonth | bimonth | bimonth | bimonth | Summary | Estimated | bimonth | bimonth | bimonth | bimonth | bimonth | bimonth | Summary | Estimated | bimonth | bimonth | bimonth | bimonth | bimonth | bimonth | Summary | Total | Check |
| Modules | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | | | | | | | 0 | | | | | | | | 0 | 0 | 30-70 |
| Seminars | 13 | 0,8 | 0,4 | | 0,4 | 0 | | 1,6 | 10 | | | | | | | 0 | | | | | | | | 0 | 1,6 | 10-30 |
| Research | 34 | 5 | 5 | 5 | 9 | 3 | 7 | 34 | 42 | | | | | | | 0 | | | | | | | | 0 | 34 | 80-140 |
| | 65 | 5,8 | 5,4 | 5 | 9,4 | 3 | 7 | 36 | 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 36 | 180 |

Expected credits:

- 30 credits for modules
- 10 credits for seminars