



UNIVERSITÀ DI PISA
DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE
Dottorato di Ricerca in Ingegneria dell'Informazione

Doctoral Course

“Middleware and robotic software programming”

Prof. Lorenzo Natale

Istituto Italiano di Tecnologia, Genova, Italy

Short Abstract:

YARP is an open source platform that was developed for robot programming (www.yarp.it). It supports code re-use by providing a platform independent interface to the hardware and operating system and by supporting modular programming. The main features are a library for interprocess communication that promotes peer-to-peer communication (synchronous and asynchronous) and a plugin-system that allows extending YARP adding support for new protocols and devices. This course will introduce the main features of YARP and will show in practical examples how it can be used to control a humanoid robot. The course is organized as a set of tutorials; students are invited to bring their own laptop to follow the tutorials.

Course Contents in brief:

- Robotic middleware and component based programming. Introduction to YARP.
- Ports, Modules and threading.
- Interface Definition Languages in YARP, interoperability with ROS.
- Interfacing with OpenCV, image processing and motor control.

Total # of hours: 10 hours

References:

- [1] D. Brugali and P. Scandurra. Component-based Robotic Engineering. Part I: Reusable building blocks. In IEEE Robotics and Automation Magazine, December 2009
- [2] Paikan, A., Tikhanoff, V., Metta, G., and Natale, L., Enhancing software module reusability using port plug-ins: an experiment with the iCub robot, in Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems, Chicago, Illinois, 2014
- [3] Fitzpatrick, P., Metta, G., and Natale, L., Towards Long-Lived Robot Genes, Robotics and Autonomous Systems, Volume 56, Issue 1, pp. 29-45, Elsevier 2008
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CV of the Teacher

Lorenzo Natale received his degree in Electronic Engineering (with honours) in 2000 and Ph.D. in Robotics in 2004 from the University of Genoa. He was later postdoctoral researcher at the MIT Computer Science and Artificial Intelligence Laboratory. He was invited professor at the University of Genova where he taught the courses of Natural and Artificial Systems and Antropomorphic Robotics for students of the Bioengineering curriculum. At the moment he is Tenure-Track Researcher at the IIT.

In the past ten years Lorenzo Natale worked on various humanoid platforms. He was one of the main contributors to the design and development of the iCub platform, working in particular on the software architecture. His research interests range from vision and tactile sensing to software architectures for robotics. He has contributed as co-PI in several EU funded projects (CHRIS, Walkman, Xperience, TACMAN, KOROIBOT and WYSIWYD) and he is author of about 100 papers in international peer-reviewed journal and conferences. He served as Program Chair of ICDL-Epirob 2014 and has been associated editors of international conferences (RO-MAN, ICDL-Epirob, Humanoids) and journals (IJHR, IJARS and the Humanoid Robotics specialty of frontiers in Robotics and AI).

Room and Schedule

Day 1: Aula Riunioni del Dipartimento di Ingegneria dell'Informazione, **Largo Lucio Lazzarino**, Pisa

Day 2 - Day 4: Aula Riunioni del Dipartimento di Ingegneria dell'Informazione, **via G. Caruso 16**, Pisa – Ground Floor

Schedule:

Day 1: May 10, 10:30-12:30

Day 2: May 13, 15:00-17:00

Day 3: May 18, 15:00-18:00

Day 4: May 20, 15:00-18:00