Diego Dall'Alba

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Personal Information

Born: March 18, 1983 – Schio, Vicenza, Italy

Nationality: Italian

Last Position: Assistant Professor (Tenure Track), Dept. of Computer Science, Univ. of Verona, Italy

Education and training

PhD in Computer Science **Jan 2011 - Jun 2014**
University of Verona, Italy
Thesis: *"Navigation for percutaneous surgical interventions: ultrasound data processing, feature extraction and 3D organ reconstruction"*. Advisor: *Prof. Paolo Fiorini*.
During my PhD, I have designed and developed a feature detector and descriptor to localize and match salient points in ultrasound image. I have also developed and tested a compact navigation device for percutaneous interventions that integrate a small display directly onto the ablation tool to provide navigation indications.

MSc in Intelligent and Multimedia Systems **Jan 2008 - Dec 2010**
University of Verona, Italy Graded: 110/110 *cum laude*
Thesis: *"Acquisition and three-dimensional reconstruction of ultrasound data"*. Advisor: *Prof. Paolo Fiorini*.
During my MsC thesis, I have developed a new compact and lightweight 3D ultrasound system that is designed for surgery and emergency medicine. The system combines an optical tracking system with a compact USB ultrasound device.

BSc in Information Technology: Multimedia **Sep 2004 - Dec 2007**
University of Verona, Italy Graded: 110/110
Thesis: *"Engineering of a library for the management of psychophysical methods, optimized for experimental haptic"*. Advisor: *Prof. Paolo Fiorini*.
The thesis proposes a software architecture suitable for controlling the execution of multi-factorial psychophysical experiments. The library implements the principal methods available in the literature and makes the design of complex experiments straightforward.

Research and professional experience

Assistant Professor (Tenure Track) **April 2018 - Present**
University of Verona, Italy
Working on developing enabling technologies for autonomous robotic surgery, focusing in bio-mechanical real-time simulation and advanced sensing and control methods. The work is funded by ARS ERC EU project (www.ars-project.eu) and ATLAS ITN project (www.atlas-itn.eu).

Postdoctoral Research Assistant **Jul 2014 - Mar 2018**
University of Verona, Italy *Supervisor:* Prof. Paolo Fiorini

Working on robotically assisted ultrasound image acquisition and processing for multi-modal (CT and MRI) image fusion and registration. The work is funded by MURAB EU project (www.murabproject.eu) and ROBIOPSY project. Performing other research activities related to the development of surgical robotic technologies and objective analysis of the training process in robotic surgery.

Research Assistant **Jun 2012 - Jun 2014**
University of Verona, Italy *Supervisor:* Prof. Paolo Fiorini

Development of a real-time segmentation method for ultrasound images, focusing on tri-dimensional reconstruction and multi-modal registration. The work is inserted and founded by SAFROS (www.safros.eu) and ISUR (www.isur.eu/isur/) European projects.

Visiting Researcher **Nov 2011 - May 2012**
University of British Columbia, Vancouver, Canada *Supervisor:* Prof. Tim Salcudean

The work aims to monitor whether tissue has been properly frozen during cryoablation by using ultrasound elastography to measure tissue elasticity after thawing, when the ablated tissue can be imaged by US. An ex-vivo animal study confirms the feasibility of this approach.

Research Assistant **Jan 2011 - Oct 2011**
University of Verona, Italy *Supervisor:* Prof. Paolo Fiorini

Development of an image guidance system for abdominal surgeries based on tracked ultrasound data.The work was inserted into SAFROS European project (www.safros.eu)

Research scholarship **Mar 2008 - Dec 2010**
University of Verona, Italy

Task 4: Analysis of the available methods for the reconstruction of 3D models of anatomical structures from ultrasound data.

Task 3: Development of DataSeth software for CT medical image segmentation and patient specific 3D models generation.

Task 2: Development of ByoGear software that enables graphic comparison of the position of the same genes on different genome.

Task 1: Implementation using the C++ language of the PsychoGear software architecture designed during my BsC thesis for controlling the execution of multi-factorial psychophysical experiments.

Technical skills

Programming languages: Python, C, C++, Matlab/Octave, LaTeX, XML
Libraries and framework: OpenCV, PLUS toolkit, 3D-Slicer, VTK, ITK, OpenGL
Operating Systems: Windows (10/8/7/Vista/XP), Linux (Ubuntu, Debian), MacOS
Development tools: gcc/g++, Microsoft Visual Studio, CMake, Mercurial, cvs, Doxygen
Other tools:: Gimp, Microsoft Office and OpenOffice.org.

Languages

Italian: Fluent *mother tongue*
English: Excellent *Fluent in reading and writing.*

Conferences and Publications

2021 Bombieri, Marco, Marco Rospocher, et al. (2021). "Automatic detection of procedural knowledge in robotic-assisted surgical texts". In: *International Journal of Computer Assisted Radiology and Surgery*, pp. 1–9.

Cheng, Zhuoqi, Kim Lindberg Schwaner, et al. (2021). "An electrical bioimpedance scanning system for subsurface tissue detection in Robot Assisted Minimally Invasive Surgery". In: *IEEE Transactions on Biomedical Engineering*.

Liao, Guiqiu, Oscar Caravaca-Mora, et al. (2021). "Data Stream Stabilization for Optical Coherence Tomography Volumetric Scanning". In: *IEEE Transactions on Medical Robotics and Bionics*.

Liao, Guiqiu, Oscar Caravaca Mora, et al. (2021). "Rotational distortion compensation with deep learning for proximal-scanning endoscopic optical coherence tomography". In: *Endoscopic Microscopy XVI*. Vol. 11620. International Society for Optics and Photonics, p. 1162005.

Marzari, Luca et al. (2021). "Towards Hierarchical Task Decomposition using Deep Reinforcement Learning for Pick and Place Subtasks". In: *arXiv preprint arXiv:2102.04022*.

Mora, Oscar Caravaca et al. (2021). "OCT image-guidance of needle injection for robotized flexible interventional endoscopy". In: *Endoscopic Microscopy XVI*. Vol. 11620. International Society for Optics and Photonics, p. 116200D.

Ramesh, Sanat et al. (2021). "Multi-task temporal convolutional networks for joint recognition of surgical phases and steps in gastric bypass procedures". In: *International Journal of Computer Assisted Radiology and Surgery*, pp. 1–9.

Tagliabue, Eleonora, Diego Dall'Alba, Micha Pfeiffer, et al. (2021). "Data-driven intraoperative estimation of anatomical attachments for autonomous tissue dissection". In: *IEEE Robotics and Automation Letters* 6.2, pp. 1856–1863.

2020 Abedin, Jaynal et al. (2020). "Reviewers with more than 1 review in 2019". In: *International Journal of Computer Assisted Radiology and Surgery* 15, pp. 179–181.

Bombieri, Marco, Diego Dall'Alba, et al. (2020). "Joints-Space Metrics for Automatic Robotic Surgical Gestures Classification". In: *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE, pp. 3061–3066.

Groenhuis, Vincent, Eleonora Tagliabue, et al. (2020). "Deformation compensation in robotically-assisted breast biopsy". In: *Proc. 11th Int. Conf. Inf. Process. Comput. Assist. Interv.(IPCAI)*, p. 4.

Menegozzo, Giovanni, Diego Dall'Alba, and Paolo Fiorini (2020). "Causal interaction modeling on ultra-processed food manufacturing". In: *2020 IEEE 16th International Conference on Automation Science and Engineering (CASE)*. IEEE, pp. 200–205.

Tagliabue, Eleonora, Diego Dall'Alba, Enrico Magnabosco, Igor Peterlik, et al. (2020). "Biomechanical modelling of probe to tissue interaction during ultrasound scanning". In: *International Journal of Computer Assisted Radiology and Surgery* 15, pp. 1379–1387.

Tagliabue, Eleonora, Ameya Pore, et al. (2020). "Soft tissue simulation environment to learn manipulation tasks in autonomous robotic surgery". In: *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE, pp. 3261–3266.

2019 Cheng, Zhuoqi, Diego Dall'Alba, et al. (2019). "Design and integration of electrical bio-impedance sensing in surgical robotic tools for tissue identification and display". In: *Frontiers in Robotics and AI* 6, p. 55.

Ginesi, Michele et al. (2019). "Dynamic movement primitives: Volumetric obstacle avoidance". In: *2019 19th International Conference on Advanced Robotics (ICAR)*. IEEE, pp. 234–239.

Menegozzo, Giovanni, Diego Dall'Alba, Andrea Roberti, et al. (2019). "Automatic process modeling with time delay neural network based on low-level data." In: *Procedia Manufacturing* 38, pp. 125–132.

Menegozzo, Giovanni, Diego Dall'Alba, Chiara Zandonà, et al. (2019). "Surgical gesture recognition with time delay neural network based on kinematic data". In: *2019 International Symposium on Medical Robotics (ISMR)*. IEEE, pp. 1–7.

Schwaner, Kim Lindberg et al. (2019). "Robotically assisted electrical bio-impedance measurements for soft tissue characterization: a feasibility study". In: *The Hamlyn Symposium on Medical Robotics*. The Hamlyn Centre, pp. 31–32.

Tagliabue, Eleonora, Diego Dall'alba, and Paolo Fiorini (2019). "Biomechanical modeling of probe to tissue interaction in robotic ultrasound scanning". In: *SWS19-SOFA Week Symposium*.

Tagliabue, Eleonora, Diego Dall'Alba, Enrico Magnabosco, Chiara Tenga, et al. (2019). "Position-based modeling of lesion displacement in ultrasound-guided breast biopsy". In: *International journal of computer assisted radiology and surgery* 14.8, pp. 1329–1339.

Visentin, Francesco et al. (2019). "Iterative simulations to estimate the elastic properties from a series of MRI images followed by MRI-US validation". In: *Medical & biological engineering & computing* 57.4, pp. 913–924.

2018 Diodato, Alessandro et al. (2018). "Soft robotic manipulator for improving dexterity in minimally invasive surgery". In: *Surgical innovation* 25.1, pp. 69–76.

Foti, Simone et al. (2018). "Advanced User Interface for Augmented Information Display on Endoscopic Surgical Images". In: *Proceeding of Joint Workshop on Computer/Robot Assisted Surgery (CRAS)*.

Groenhuis, Vincent, Francesco Visentin, et al. (2018). "Analytical derivation of elasticity in breast phantoms for deformation tracking". In: *International journal of computer assisted radiology and surgery* 13.10, pp. 1641–1650.

2017 Dall'Alba, Diego, Iris Dimbwadyo, et al. (2017). "ViTAS gaming suite: virtual therapy against stroke". In: *Converging Clinical and Engineering Research on Neurorehabilitation II*. Springer, Cham, pp. 407–411.

Fiorini, P et al. (2017). "Mining Robotic Surgery Data: Training and Modeling using the DVRK". In: *The Hamlyn Symposium on Medical Robotics*, p. 45.

Malapelle, Francesco et al. (2017). "Cost effective quality assessment in industrial parts manufacturing via optical acquisition". In: *Procedia Manufacturing* 11, pp. 1207–1214.

Zerbato, Davide and Diego Dall'Alba (2017). "Role of virtual simulation in surgical training". In: *Journal of visualized surgery* 3.

2016 Carletti, Marco, Diego Dall'Alba, et al. (2016). "A Robust Particle Filtering Approach with Spatially-dependent Template Selection for Medical Ultrasound Tracking Applications." In: *VISIGRAPP (3: VISAPP)*, pp. 524–533.

Mathiassen, Kim, Diego Dall'Alba, et al. (2016). "Robust real-time needle tracking in 2-D ultrasound images using statistical filtering". In: *IEEE Transactions on Control Systems Technology* 25.3, pp. 966–978.

2015 Carletti, Marco, Davide Zerbato, et al. (2015). "Robust 3D Pose Estimation of a Laparoscopic Instrument with three Landmarks." In: *STAG*, pp. 7–14.

Dall'Alba, Diego and Paolo Fiorini (2015). "BIPCO: ultrasound feature points based on phase congruency detector and binary pattern descriptor". In: *International journal of computer assisted radiology and surgery* 10.6, pp. 843–854.

Salcudean, Septimiu et al. (Mar. 2015). *Elastography-based assessment of cryoablation*. US Patent App. 14/035,843.

2013 Mathiassen, Kim, Diego Dall'Alba, et al. (2013). "Real-time biopsy needle tip estimation in 2D ultrasound images". In: *2013 IEEE International Conference on Robotics and Automation*. IEEE, pp. 4363–4369.

2012 Alba, Diego Dall et al. (2012). "Monitoring cryoablation lesions with quantitative ultrasound elastography: A feasibility study". In: *2012 IEEE International Ultrasonics Symposium*. IEEE, pp. 1390–1393.

Dall'Alba, Diego, Bogdan Maris, and Paolo Fiorini (2012). "A compact navigation system for free hand needle placement in percutaneos procedures". In: *2012 IEEE/RSJ International Conference on Intelligent Robots and Systems*. IEEE, pp. 2013–2018.

2010 Dall'Alba, D et al. (2010). "Computed Maxillofacial Imaging in Dental Implantology". In: *Int J CARS* 5.1, S222–S228.

Vicentini, Marco, Marco Righele, et al. (2010). "MEASURING PLIABLE PERCEPTION CAPABILITIES IN TELEOPERATED AND VIRTUAL ENVIRONMENTS". In: *Proceedings of Fechner Day* 26, pp. 403–408.

2009 Dall'Alba, Diego, Marco Vicentini, and Debora Botturi (2009). "PSYCHOGEAR, YET ANOTHER PSYCHOPHYSICS LIBRARY". In: *Proceedings of Fechner Day* 25, pp. 453–458.

Vicentini, Marco, Diego Dall'Alba, and Debora Botturi (2009). "STOPPING RULE DETERMINATION FOR GREEN'S MAXIMUM-LIKELIHOOD ADAPTIVE PROCEDURE WITH PSYCHOGEAR LIBRARY". In: *Proceedings of Fechner Day* 25, pp. 465–470.

Patents

Europe 2012: SYSTEM AND METHOD FOR GUIDING THE MANUAL INSERTION OF A NEEDLE INTO THE BODY OF A PATIENT DURING A PERCUTANEOUS SURGICAL PROCEDURE – D. Dall'Alba, B. Maris, P. Fiorini, Univ. of Verona (I).

USA & Canada 2012: ELASTOGRAPHY-BASED ASSESSMENT OF CRYOABLATION – D. Dall'Alba, Univ. of Verona (I), C. Schneider, C. Nguan, A. Baghani, R. Rohling, S. Salcudean, Univ. of British Columbia (CA).

Awards

SMIT 2017: 3rd position – "Best Abstract Award" 29th conference of the international Society for Medical Innovation and Technology, 9 - 10 November 2017, Torino Italy

CRAS 2018: 1st position – "Best Paper Award" 8th Conference on New Technologies for Computer and Robot Assisted Surgery, 10- 11 September 2018, London, United Kindoms

NVIDIA 2018: Winner of Nvidia GPU Seeding grant

International training activities

SSSR 2011: Summer School on Surgical Robotics organized by LIRMM, CNRS-Universite'

Montpellier 2 – Montpellier, France September 2011

HWSIV 2015: Hamlyn Winter School on Surgical Imaging and Vision, Imperial College London, December 2015

Editorial activities

2018 - present: Reviewer for International Journal of Computer Assisted Radiology and Surgery

2017 - present: Reviewer for Journal of Medical Robotics Research.

2017: Evaluator of H2020-FETOPEN EU proposals as an expert in the fields of biomedical engineering, surgical robotics, image processing and computer vision.

2016 - present: Reviewer for IET Computer Vision Journal

2012 - present: Reviewer for IEEE International Conference on Intelligent Robots and Systems (IROS) and IEEE International Conference on Robotics and Automation (ICRA).

2016 - present: Organizer of Da Vinci Research Kit (DVRK) European User Group Meeting, jointly with 6th and 7th Joint Workshop on New Technologies for Computer/Robot Assisted Surgery.

2016: Member of Organizing Committee for Summer School on Control of Surgical Robots (COSUR 2016 and 2018)

2016: Reviewer for IEEE Transaction on Medical Imaging.

2016: Reviewer for 2016 IEEE International Conference on Multisensor Fusion and Integration for Intelligent Systems

2016: Reviewer for Hamlyn Symposium on Medical Robotics

2012: Reviewer for 2012 IEEE International Conference on Biomedical Robotics and Biomechatronics

Other academic activities

Conferences: I have attended to international conferences for presenting research results (oral presentations and posters): SMIT 2017, FAIM 2017, CARS 2019-2009, CRAS 2019-2013, IPCAI 2015

European projects: I have worked in 4 European projects (MURAB, ISUR, Safros and AccuRobAs) and I have participated regularly to integration and review meetings. I am currently involved in 2 European project related to autonomous robotic surgery: ARS and ATLAS.

Student Supervising: I have supervised BSc, MSc and PhD students in the development of research activities and final thesis. I have also collaborated with visiting researcher in joint research activities.

Interests

Sports: I love hiking and snowboarding in the mountains. I also like practicing yoga.

Other: I am interested in cinema and I like cooking traditional Italian dishes.