Piercarlo Dondi, PhD – Curriculum Vitae (short version)

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Personal details

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Known languages: Italian (mother tongue), English (fluent)

Summary of the research activity

Main research topics: Computer Vision, Human-Computer Interaction (HCI), Computer Graphics, Digital Humanities.

Piercarlo Dondi is an Assistant Professor (RTDA) at the Department of Electrical, Computer and Biomedical Engineering of the University of Pavia (Italy). He carries out his research activity at the "Computer Vision and Multimedia Laboratory".

During his PhD he focused on the integration of multi-channel video streams (using RGB and Time-of-Flight cameras) for the creation of multimodal applications, such as gesture-based interaction and augmented reality [14]. For this goal, he developed algorithms for human segmentation and tracking, as well as various GPGPU optimizations (on CUDA) for guaranteeing the real-time execution.

Between 2013 and 2014, he worked as *Google Trusted Tester* for the Google Earth Engine platform as part of a university research project financed by the Google Foundation for the analysis of satellite images of urban areas [13].

Since 2014 he started focusing on Digital Humanities, in collaboration with the "Arvedi Laboratory of Non-Invasive Diagnostics". He developed various image processing algorithms for the analysis of historical musical instruments [12], as well as interactive applications for the visualization of the obtained data, both for helping experts in their work and for scientific dissemination in museums [10].

Since 2019, he collaborates with the SATIE Lab of the Université Paris-Saclay for the development of new automatic methods to monitor the state of conservation of violins and detect alterations on their surfaces [2] [6]. This collaboration then extended to a new topic, namely the development of algorithms for the reconstruction of destroyed frescoes, on which the BIPlab of University of Salerno is involved, too. One of the first results of this research activity was the creation of DAFNE, to date the largest dataset of artificially created fresco fragments [7].

Regarding 3D modeling, he participated in the definition of a protocol for the 3D scanning of historical musical instruments [11], and digitalized numerous instruments and relics held in the "Museo del Violino" of Cremona (Italy) and in other important Italian museums. He also co-supervised the creation of large 3D models (e.g., the reconstruction of the city of Pavia in the Renaissance) made by students of master's degree in Computer Engineering of University of Pavia, as part of a new teaching approach [8].

His recent HCI activities focused mainly on gaze-based interaction, both explicit and implicit. For explicit communication, he developed various interactive applications, including one for improving accessibility in museums [5] (project *ProtoLab "Occhio all'Arte!"*), and two for non-calibrated gaze-based writing (SPEye [3] e Leyenes [1]). Regarding implicit communication, he participated in various studies including a behavioral analysis of luthiers [9], and a soft-biometric study, concerning the use of eye movements as a method for identification and verification [4].

From 2021 he was involved in a European Horizon 2020 project (*TeamAware*), in collaboration with the EUCENTRE foundation, regarding the application of 3D modeling and Deep Learning techniques for structural damage detection in buildings and bridges in the aftermath of an earthquake.

He is author/co-author of more than 40 articles on international journals, conference proceedings, and book chapters. **H-index**: 11 (Scopus), 11 (Google Scholar).

Academic career

- 2021 – date: **Assistant Professor (RTDA)** at Department of Electrical, Computer and Biomedical Engineering, University of Pavia
- 2019 – 2021: **Research Fellow (assegnista)** at Department of Electrical, Computer and Biomedical Engineering, University of Pavia
- 2017 – 2019: **Research Fellow (assegnista)** at Department of Civil Engineering and Architecture, University of Pavia
- 2014 – 2017: **Post-doctoral researcher (borsista)** at CISRiC (Centro Interdipartimentale di Studi e Ricerche per i Beni Culturali), University of Pavia
- 2013 – 2014: **Post-doctoral researcher (borsista)** at Department of Electrical, Computer and Biomedical Engineering, University of Pavia

Education

- 2008 – 2012: **PhD in Electronic, Computer and Electrical Engineering** at University of Pavia
- 2005 – 2008: **Master's degree in computer engineering** at University of Pavia, Italy
- 2001 – 2005: **Bachelor's degree in computer engineering** at University of Pavia, Italy
- 1996 – 2001: **High School Diploma** at Liceo Classico "Ugo Foscolo" of Pavia, Italy

Teaching activity

University courses:

- A.Y. 2021/22 – date (three editions): **Professor** of the course *"Computer Programming, Algorithms and Data Structures"* module 2 (SSD: INF/01, 6 CFU) for the bachelor's degree in "Artificial Intelligence", University of Pavia, University of Milano, University of Milano-Bicocca
- A.Y. 2020/21: **Professor** of the module "Informatica" (SSD: INF/01, 2 CFU) of the course "Fisica, Statistica ed Informatica", for the bachelor's degree in "Professioni Sanitarie della Riabilitazione – Classe 2", University of Pavia
- A.Y. 2009/10 – A.Y. 2019/20: **Teaching assistant** for various courses at University of Pavia:
  - "Sistemi di elaborazione delle informazioni" (SSD: ING-INF/05)
  - "Tecnologie digitali per la comunicazione" (SSD: ING-INF/05)
  - "IT per il management della comunicazione" (SSD: ING-INF/05)
  - "Web Design and Technologies" (SSD: ING-INF/05)
  - "Computer Vision" (SSD: ING-INF/05)

PhD courses:

- 06/2024: **Teacher** of the course "3D Computer Graphics" for the PhD School in Electronics, Computer Science and Electrical Engineering of University of Pavia, 3 CFU
- 01/2023: **Teacher** and **Organizer** of the "Short Course on 3D Computer Graphics" for the PhD School in Electronics, Computer Science and Electrical Engineering of University of Pavia, 14 hours
- 04/2021 – **Organizer** of the workshop "Theoretical Introduction and Applications of Machine and Deep Learning - A two-day workshop in collaboration with AWS Italy and Neosperience", 11 hours
- 2018 – Date: **Lecturer** of various seminars for the PhD School in Electronics, Computer Science and Electrical Engineering of University of Pavia

Certifications and Affiliations

- IEEE Senior Member (from 04/2022)
- Engineering License (06/2008 at University of Pavia)

Chari for conference/workshop and TPC member

- **Co-Chair** for the international workshop PART2021 (1st International Workshop "PArts can woRth like The whole") held in conjunction with ICIAP2021
- **Co-Chair** for the international workshop ETTAC 2020 (1st Workshop on Eye Tracking Techniques, Applications and Challenges) held in conjunction with ICPR2020
- **Member of the Technical Program Committee (TPC)** for the international conferences ETRA2023 and ETRA2024, ACM Symposium on Eye Tracking Research & Applications

Editor and reviewer activity

- **Guest editor** for a special issue on Pattern Recognition Letters ("Computer Vision Solutions for Part-based Image Analysis and Classification")
- **Guest editor** for two special issues on MDPI Sensors ("Eye Tracking Techniques, Applications and Challenges" and "Sensors and Data Processing Techniques for Cultural Heritage")
- **Reviewer** for various scientific journals and international conferences

Project involvement (selection)

- 2021 – date: **ARTEAK** (Collaborating Markov Point Processes and Neural Networks: Application to Fresco Reconstruction) – ANR project, in collaboration with Université Paris-Saclay
- 2021 – 2024: **TeamAware** (Team Awareness Enhanced with Artificial Intelligence and Augmented Reality) – Horizon 2020 project, in collaboration with EUCENTRE
- 2020 – 2022: **MUSICOM** (MUSical Instrument Conservation with Optical Monitoring) – Galileo project for the cooperation between Italy and France
- 2019: **ProtoLab** "**Occhio all'Arte!**" – project funded by Confindustria Pavia (Italy), as **Lead Developer**
- 2018 – 2019: **STO164090 SAMIC** (Sound Archives & Musical Instruments Collections) – project financed by Fondazione Compagnia di San Paolo
- 2015 – 2016: **VIVA MUSICA** (Il VIolino e la sua VAlorizzazione MUSeale: la fruizione Integrata multimediale e il CAtalogo digitale) – project funded by Regione Lombardia
- 2014 – 2015: "**Opificio del Suono**", project funded by Fondazione Cariplo
- 2013 – 2014: **"Automatic multitemporal mapping of urban areas for risk-related exposure analysis"** – project financed by Google Foundation (Google Earth Engine Award) as **Google Truster Tester**

Responsibility of research activity

- 02/2022 – 07/2023: **Responsible** for a research scholarship entitled "Creazione di un dataset artificiale di danni a strutture e edifici a partire da modelli 3D scansionati"

Tutor/co-tutor activity

- 2023 – date: **Tutor/Co-tutor** of two PhD students at the PhD school in Electronics, Computer Science and Electrical Engineering, University of Pavia
- 2022 – date: **Tutor** of eight internship students from Université Paris Saclay
- 2011 – date: **Tutor/Co-tutor** of more than 20 thesis for bachelor's and master's degree at University of Pavia (complete list available at https://vision.unipv.it/people/dondi/theses_list.html)

Selected publications

Complete list available at: [Scopus](#), [Google Scholar](#), [Research Gate](#)

[1] **Dondi P.**, Sapuppo S., Porta M. (2024) "Leyenes: A gaze-based text entry method using linear smooth pursuit and target speed", Journal of Human Computer Studies, vol. 184, article 103204, DOI: 10.1016/j.ijhcs.2023.103204

[2] Rezaei A., Aldea E., **Dondi P.**, Le Hégarat-Mascle S., Malagodi M. (2023) "Multi-temporal image analysis for preventive conservation of historical musical instruments", inviato a ACM Journal on Computing and Cultural Heritage, Vol. 16, Issue 2, No 35, pp 1-19, DOI: 10.1145/3575866

[3] Porta M., **Dondi P.**, Pianetta A., Cantoni V. (2022) "SPEye: A Calibration-Free Gaze-Driven Text Entry Technique Based on Smooth Pursuit", IEEE Transactions on Human-Machine Systems, Vol. 52, Issue 2, pp. 312-323 DOI: 10.1109/THMS.2021.3123202

[4] Porta M., **Dondi P.**, Zangrandi N., Lombardi L. (2022) "Gaze-based biometrics from free observation of moving objects", Vol. 4, Issue 1, pp. 85-96, DOI: 10.1109/TBIOM.2021.3130798

[5] **Dondi P.**, Porta M., Volpe G., DonVito A. (2022) "A gaze-based interactive system to explore artwork imagery", Journal of Multimodal User Interfaces, Vol 16, Issue 1, pp. 55-67, DOI: 10.1007/s12193-021-00373-z

[6] Rezaei A., Le Hégarat-Mascle S., Aldea E., **Dondi P.**, Malagodi M. (2022) "A-contrario framework for detection of alterations in varnished surfaces", Journal of Visual Communication and Image Representation, Vol. 83, article 103357, pp.1-11, DOI: 10.1016/j.jvcir.2021.103357

[7] **Dondi P.**, Lombardi L., Setti A. (2020) "DAFNE: a dataset of fresco fragments for digital anastylosis" in Pattern Recognition Letters, Vol. 138, pp. 631-637, DOI: 10.1016/j.patrec.2020.09.015

[8] Cantoni V., **Dondi P.**, Lombardi L., Setti A. (2019) "Teaching Computer Graphics through Digital Humanities Project" in IEEE Computer Graphics & Applications, Vol. 39, Issue 2, pp. 89-94, DOI: 10.1109/MCG.2019.2895487

[9] **Dondi P.**, Lombardi L., Porta M., Rovetta T., Invernizzi C., Malagodi M. (2019) "What do luthiers look at? An eye tracking study on the identification of meaningful areas in historical violins" in Multimedia Tools and Applications, Vol 78, Issue 14, pp. 19115-19139, DOI: 10.1007/s11042-019-7276-2

[10] **Dondi P.**, Lombardi L., Rocca, I., Malagodi M., Licchelli M. (2018) "Multimodal workflow for the creation of interactive presentations of 360 spin images of historical violins" in Multimedia Tools and Applications, Vol. 77, Issue 21, pp. 28309–28332, DOI: 10.1007/s11042-018-6046-x

[11] **Dondi P.**, Lombardi L., Malagodi M., Licchelli M. (2017) "3D modelling and measurements of historical violins" in ACTA IMEKO, Vol. 6, No. 3, pp. 29 - 34, September 2017, DOI: 10.21014/acta_imeko.v6i3.455

[12] **Dondi P.**, Lombardi L., Invernizzi C., Rovetta T., Malagodi M., Licchelli M. (2017) "Automatic analysis of UV induced fluorescence imagery of historical violins", in ACM Journal on Computing and Cultural Heritage, Vol. 10, Issue 2, pp. 12:1--12:13, DOI: 10.1145/3051472

[13] Trianni G., Lisini G., Angiuli E., Moreno E., **Dondi P.**, Gaggia A., Gamba P. (2015) "Scaling up to National/Regional Urban Extent Mapping Using Landsat Data", in IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, vol.8 no.7, pp. 3710-3719, DOI: 10.1109/JSTARS.2015.2398032

[14] **Dondi P.**, Lombardi L., Porta M. (2014) "Development of gesture based human computer interaction applications by fusion of depth and colour video streams", in IET Computer Vision, 2014, Volume 8, Issue 6, pp. 568 – 578, December 2014 DOI: 10.1049/iet-cvi.2013.0323