



Chiara Romanengo

Curriculum vitae

La sottoscritta Chiara Romanengo ai sensi degli art.46 e 47 DPR 445/2000, consapevole delle sanzioni penali previste dall'art.76 del DPR 445/2000 e successive modificazioni ed integrazioni per le ipotesi di falsità in atti e dichiarazioni mendaci, dichiara sotto la propria responsabilità quanto segue

Contacts

Address
Mobile
E-mail
PEC mail
Fiscal code
Date of birth
Nationality

Affiliation and Contact Information

Affiliation **CNR-Italian National Research Council, IMATI-Institute for Applied Mathematics and Information Technologies**

Postal address **CNR-IMATI, Via De Marini, 6, 16149 Genova (Italy)**

Home Page **<https://www.imati.cnr.it/mypage.php?idk=PG-127>**

ORCID **orcid.org/0000-0002-9459-6209**

Google Scholar **cQXIZ4kAAAAJ**

Web of Science **AFT-1183-2022**

Research interests

- Curves and surfaces recognition
- Curves and surfaces approximation

- Hough transform
- Shape analysis
- 3D Modeling

Research contracts and activities

from **Fixed-term researcher (III level), BANDO N. 400. 002.IMATI.GE. PNRR**
17/07/2013 CNR-IMATI

Project *Robotics and AI for Socioeconomic Empowerment (RAISE)* - SPOKE 1 for the following topic: *"Semantic City Models: acquisition, reconstruction and annotation"*.

11/2022 - **Research fellowship, BANDO N. IMATI-013-2022-GE**
07/2023 CNR-IMATI

Project *"Metodi e modelli per lo sviluppo di Gemelli Digitali"* for the following topic: *"Analisi e segmentazione di nuvole di punti per la ricostruzione di elementi semantici 3D in modelli urbani"*.

11/2019 - **Research activities during the Ph.D. in Mathematics and Application**
10/2022 CNR-IMATI

09/2019 - **Extracurricular internship**
10/2019 CNR-IMATI

Internship focused on the following topic: *"Definizione e sviluppo di librerie per l'estrazione di curve caratteristiche su oggetti 3D"*.

09/2018 - **Curricular internship**
11/2018 CNR-IMATI

Internship focused on the following topic: *"Analisi e sviluppo di metodi basati sulla trasformata di Hough per l'individuazione di elementi geometrici caratterizzanti"*.

Education

Qualifications

11/2019 - **Ph.D. in Mathematics and Applications (XXXV Cycle)**
10/2022 Università degli Studi di Genova. Dipartimento di Matematica DIMA.

Curriculum *"Metodi matematici per l'analisi dati"* for the following topic: *"Metodi matematici per il riconoscimento di parti caratteristiche sulla superficie di oggetti 3D"* Thesis title: Recognition and representation of curve and surface primitives in digital models via the Hough transform.

Advisors: Silvia Biasotti, Bianca Falcidieno.

Thesis defence: 12 January 2023.

09/2017 – **Master Degree in Mathematics**
03/2019 Università degli Studi di Genova. Dipartimento di Matematica DIMA.

Thesis title: *"Riconoscimento di curve caratteristiche di oggetti 3D mediante la tecnica della trasformata di Hough"*.

Supervisors: Silvia Biasotti, Bianca Falcidieno.

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Grade: 110/110 cum laude.

Description: In the master thesis, I investigated the Hough transform technique for recognition of spatial profile of points extracted from a 3D model that can be locally projected onto the regression plane, exploiting families of plane curves.

09/2012 - **Bachelor Degree in Mathematics**

03/2017 Università degli Studi di Genova. Dipartimento di Matematica DIMA.

Thesis title: Polinomi ortogonali.

Supervisors: Claudia Fassino.

Grade: 100/110.

2007 - 2012 **High School diploma - Liceo Linguistico**

Liceo Linguistico "G. Soleri", Saluzzo (Cuneo, CN).

Grade: 85/100.

■ Specialization courses

- Machine Learning Crash Course 2022, Università degli Studi di Genova, 24 hours, July 2022.
- STAG 2021 Graduate School, EG Conference Smart Tools and Applications in Graphics (STAG 2021), 8 hours, virtual mode, November 2021.
- Machine Learning - A Computational Intelligence Approach, Università degli Studi di Genova, 20 hours, virtual mode, June 2021.
- Python Programming: A Concise Introduction, Coursera online lectures, virtual mode, September 2021.
- Topological Data Analysis, 24 hours, Università degli Studi di Genova, virtual mode, February-March 2021.
- SGP 2020 Graduate School, Symposium on Geometry Processing, Utrecht, 12 hours, virtual mode, November 2020.
- Deep-learning: a hands-on introduction, 20 hours, Università degli Studi di Genova, virtual mode, July 2020.

■ Participations and Collaborations in Research Projects

■ International

[IP1] Participation to the project "CHANTIER SCIENTIFIQUE NOTRE-DAME DE PARIS", collaboration between CNR-IMATI and MAP-CNRS, prot. 0001525/2022.

■ National

[NP1] Participation to the project "Robotics and AI for Socioeconomic Empowerment" (RAISE) - SPOKE 1 with a fixed-term researcher contract on the topic "Semantic City Models: acquisition, reconstruction and annotation".

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- [NP2] Participation to the project “Metodi e modelli per lo sviluppo di Gemelli Digitali” (DIT.AD021.125) with research grant on the topic “Analisi e segmentazione di nuvole di punti per la ricostruzione di elementi semantici 3D in modelli urbani”.
- [NP3] Collaboration with the project “INTER - CH: Interfacce innovative per la valorizzazione del patrimonio storico-artistico ligure”, DIT.AD011.057.001, prot. 0057459.
- [NP4] Participation to the project “Modellazione, analisi e confronto di forme 3D”, DIT.AD004.100.001, prot. 0001353/2020.
- [NP5] Participation to the project “Metodi informatico-matematici per la valutazione della similarità tra superfici”, DIT.AD021.080.001, prot. 0001524/2022.
- [NP6] Participation to the project “Tecniche avanzate per l’analisi e la sintesi di forme digitali 3D”, DIT.AD004.028.001, prot. 0001524/2022.

Teaching and Seminar Activities

Teaching support

2023-2024 **Algebra**

(60 hours) Università degli Studi di Genova, Dipartimento di Informatica, Bioingegneria, Robotica ed Ingegneria dei Sistemi (DIBRIS).

Bachelor’s Degree course.

Rep. n. 5876, 17/10/2023.

2022-2023 **Mathematical Analysis I**

(10 hours) Università degli Studi di Genova, Dipartimento di Ingegneria Meccanica Energetica Gestionale e dei Trasporti (DIME).

Bachelor’s Degree course.

Prot. n. 851_2023.

2022-2023 **Algebra and Logics for Computer Science**

(30 hours) Università degli Studi di Genova, Dipartimento di Informatica, Bioingegneria, Robotica ed Ingegneria dei Sistemi (DIBRIS).

Bachelor’s Degree course.

Rep. n. 3804, 19/9/2022.

2022-2023 **Introduction to programming**

(10 hours) Università degli Studi di Genova, Dipartimento di Informatica, Bioingegneria, Robotica ed Ingegneria dei Sistemi (DIBRIS).

Bachelor’s Degree course.

Rep. n. 5546, 17/10/2022.

2021-2022 **Introduction to programming**

(20 hours) Università degli Studi di Genova, Dipartimento di Informatica, Bioingegneria, Robotica ed Ingegneria dei Sistemi (DIBRIS).

Bachelor’s Degree course.

Rep. n. 4510/21.

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2021-2022 **Algorithms and data structures**

(10 hours) Università degli Studi di Genova, Dipartimento di Informatica, Bioingegneria, Robotica ed Ingegneria dei Sistemi (DIBRIS).

Bachelor's Degree course.

Rep. n. 647/2022.

2021-2022 **Algebra and Logics for Computer Science**

(30 hours) Università degli Studi di Genova, Dipartimento di Informatica, Bioingegneria, Robotica ed Ingegneria dei Sistemi (DIBRIS).

Bachelor's Degree course.

Rep. n. 4511/2021.

■ **Other teaching activity**

May 2019 **Teacher in high school**

Liceo Scientifico Statale Arturo Issel – Finale Ligure (Savona).

Substitute teaching activity in several high school classes.

2018-2019 **Tutoring activity in Elements of Mathematics**

Università degli Studi di Genova, Dipartimento di Scienze ambientali e naturali (DISTAV).

Bachelor's Degree course.

Project progetto A_SMFN_01 D.R. n.1889, 09/05/18.

2017-2018 **Tutoring activity in Elements of Mathematics**

Università degli Studi di Genova, Dipartimento di Scienze ambientali e naturali (DISTAV).

Bachelor's Degree course.

Project A_SMFN_01 D.R. n.1396, 24/04/17.

■ **Seminars**

- *Mathematical methods for the recognition of curves and surfaces on 3D objects*, CNR-IMATI 16/07/2021.
- *Mathematical methods for the recognition and representation of curves and surfaces of 3D objects*, CNR-IMATI 28/05/2020.

■ **Invited Talks**

- *Recognition and representation of curves and surfaces in digital models via the Hough transform*, Department of Mathematics of the University of Trento, 2024 Trento.
- *Feature curves extraction for artefacts and fragment characterization*, Mathematical modeling and Analysis of degradation and restoration in Cultural Heritage (MACH), 2023 Roma [A2].
- *Curve and surface fitting in 3D objects using a technique based on the Hough transform*, International Symposium New Trends in Approximation and Applications, June 2022, Oujda Marocco [A6].
- *Hough transform for recognizing curves or primitive surfaces in 3D objects*, Università di Bologna, December 2021, Bologna.

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Professional Services

■ Reviewing Activity

- **Journals:** Computer & Graphics, Sensors, Applied Sciences, Processes, Computer Graphics Forum, Graphics and Visual Computing, Computational and Applied Mathematics, The Visual Computer, Graphical Models.
- **Conferences:** Symposium on Solid and Physical Modeling 2022, Conference on Computer Graphics, Visualization and Computer Vision 2022, Conference on Computer Graphics, Visualization and Computer Vision 2023, Shape Modeling International 2022, Pacific Graphics 2023, Shape Modeling International 2023.

■ Organization of Scientific Events

- Member of the **local organization committee** of the International Geometry Summit 2023, Genova 2023.
- **Student volunteer** at Eurographics Workshop on 3D Object Retrieval (3DOR), Genova 2019.
- **Student volunteer** at the Eurographics Conference, Genova 2019.

■ Organization of Scientific Contests and Tracks

- **Organizer of the SHREC track** "Detection of symmetries on 3D point clouds representing simple shapes", 3D Shape Retrieval Challenge 2023 within the Symposium on 3D Object Retrieval 2023, Lille.
- **Organizer of the SHREC track** "SHREC 2022 track: Fitting and recognition of simple geometric primitives on point clouds", 3D Shape Retrieval Challenge 2022 within the Symposium on 3D Object Retrieval 2022, Firenze.
- **Organizer of the SHREC track** "SHREC'21 track: Fitting simple geometric primitives on point clouds from CAD objects", 3D Shape Retrieval Challenge 2021 within the Symposium on 3D Object Retrieval 2021, online.

Publications

■ International Journals

- [IJ1] Ulderico Fugacci, **Chiara Romanengo**, Bianca Falcidieno, Silvia Biasotti, *Reconstruction and Preservation of Feature Curves in 3D Point Cloud Processing*, Computer-Aided Design, vol 167, pp. 103649 (2023), <https://doi.org/10.1016/j.cad.2023.103649>.
- [IJ2] **Chiara Romanengo**, Ulderico Fugacci, Bianca Falcidieno, Silvia Biasotti, *Piecewise polynomial approximation of spatial curvilinear profiles using the Hough transform*, Applied Mathematics and Computation, vol 457, pp. 128213 (2023), <https://doi.org/10.1016/j.amc.2023.128213>.
- [IJ3] **Chiara Romanengo**, Andrea Raffo, Silvia Biasotti, Bianca Falcidieno, *Recognising geometric primitives in 3D point clouds of mechanical CAD objects*, Computer-Aided Design, vol. 157, pp. 103479 (2023), <https://doi.org/10.1016/j.cad.2023.103479>.
- [IJ4] Andrea Raffo, **Chiara Romanengo**, Bianca Falcidieno, Silvia Biasotti, *Fitting and recognition of geometric primitives in segmented 3D point clouds using a localized voting procedure*, Computer

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Aided Geometric Design, vol. 97, pp. 102123 (2022), <https://doi.org/10.1016/j.cagd.2022.102123>.

- [IJ5] **Chiara Romanengo**, Andrea Raffo, Silvia Biasotti, Bianca Falcidieno, Vlassis Fotis, Ioannis Romanelis, Eleftheria Psatha, Konstantinos Moustakas, Ivan Sipiran, Quang-Thuc Nguyen, Chi-Bien Chu, Khoi-Nguyen Nguyen-Ngoc, Dinh-Khoi Vo, Tuan-An To, Nham-Tan Nguyen, Nhat-Quynh Le-Pham, Hai-Dang Nguyen, Minh-Triet Tran, Yifan Qie, Nabil Anwer, *SHREC 2022: Fitting and recognition of simple geometric primitives on point clouds*, Computers & Graphics, vol 107, pp. 32-49 (2022), <https://doi.org/10.1016/j.cag.2022.07.004>.
- [IJ6] **Chiara Romanengo**, Bianca Falcidieno, Silvia Biasotti, *Hough transform based recognition of space curves*, Journal of Computational and Applied Mathematics, vol. 415, pp. 114504 (2022), <https://doi.org/10.1016/j.cam.2022.114504>.
- [IJ7] **Chiara Romanengo**, Silvia Biasotti, Bianca Falcidieno, *Hough Transform for Detecting Space Curves in Digital 3D Models*, Journal of Mathematical Imaging and Vision, vol. 64, pp. 284–297 (2022), <https://doi.org/10.1007/s10851-021-01066-8>.
- [IJ8] **Chiara Romanengo**, Andrea Raffo, Yifan Qie, Nabil Anwer, Bianca Falcidieno, *Fit4CAD: A point cloud benchmark for fitting simple geometric primitives in CAD objects*, Computers & Graphics, vol. 102, pp. 133-143 (2022), <https://doi.org/10.1016/j.cag.2021.09.013>.
- [IJ9] **Chiara Romanengo**, Silvia Biasotti, Bianca Falcidieno, *HT-Based identification of 3D feature curves and their insertion into 3D meshes*, Computers & Graphics, vol. 89, pp. 105-116 (2020), <https://doi.org/10.1016/j.cag.2020.05.012>.
- [IJ10] **Chiara Romanengo**, Silvia Biasotti, Bianca Falcidieno, *Recognising decorations in archaeological finds through the analysis of characteristic curves on 3D models*, Pattern Recognition Letters, vol. 131, pp. 405-412 (2020), <https://doi.org/10.1016/j.patrec.2020.01.025>.

■ International Conference Papers

- [CP1] **Chiara Romanengo**, Daniela Cabiddu, Simone Pittaluga, Michela Mortara, *Semantic Segmentation of High-resolution Point Clouds Representing Urban Contexts*, Smart Tools and Applications in Graphics proceedings (STAG 2023), <https://doi.org/10.2312/stag.20231296>.
- [CP2] I. Sipiran, **C. Romanengo**, B. Falcidieno, S. Biasotti, G. Arvanitis, C. Chen, V. Fotis, J. He, X. Lv, K. Moustakas, S. Peng, I. Romanelis, W. Sun, C. Vlachos, Z. Wu, Q. Xie, *SHREC 2023: Detection of symmetries on 3D point clouds representing simple shapes*, In Eurographics Workshop on 3D Object Retrieval (3DOR 2023).
- [CP3] **Chiara Romanengo**, Erika Brunetto, Silvia Biasotti, Chiara Eva Catalano, Bianca Falcidieno, *Recognition, Modelling and Interactive Manipulation of Motifs or Symbols Represented by a Composition of Curves*, Smart Tools and Applications in Graphics proceedings (STAG 2020), <https://doi.org/10.2312/stag.20201237>.
- [CP4] **Chiara Romanengo**, Silvia Biasotti, Bianca Falcidieno, *HT-based Recognition of Patterns on 3D Shapes Using a Dictionary of Mathematical Curves*, Smart Tools and Applications in Graphics proceedings (STAG 2019).

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[CP5] E. Moscoso Thompson, G. Arvanitis, K. Moustakas, N. Hoang-Xuan, E. R. Nguyen, M. Tran, T. Lejembre, L. Barthe, N. Mellado, **C. Romanengo**, S. Biasotti, B. Falcidieno, *SHREC'19 track: Feature Curve Extraction on Triangle Meshes*, In Eurographics Workshop on 3D Object Retrieval (3DOR 2019), <https://hal.science/hal-02126739>.

■ Book Chapters

[BC1] E. Moscoso Thompson, **C. Romanengo**, A. Scalas, C.E. Catalano, M. Mortara, S. Biasotti, B. Falcidieno, M. Spagnuolo, *Mathematical Modeling and Analysis of degradation and restoration in Cultural Heritage*, In: Bretti, G., Cavaterra, C., Solci, M., Spagnuolo, M. (eds) *Mathematical Modeling in Cultural Heritage*, MACH 2021, the Springer INdAM Series, vol 55 (2023), https://doi.org/10.1007/978-981-99-3679-3_7.

■ Communications at International Conferences and Workshops

[A1] Daniela Cabiddu, **Chiara Romanengo**, Andreas Scalas, Alice Bellazzi, Lorenzo Belussi, Ludovico Danza, Matteo Ghellere, *3D feature recognition for the assessment of buildings' energy efficiency*, BUILDing a Digital Twin: requirements, methods, and applications (BUILD-IT), extended abstract, 2023 Roma.

[A2] **Chiara Romanengo**, Bianca Falcidieno, Silvia Biasotti, *Feature curves extraction for artefacts and fragment characterization*, Mathematical modeling and Analysis of degradation and restoration in Cultural Heritage (MACH), extended abstract, 2023 Roma.

[A3] **Chiara Romanengo**, Silvia Biasotti, Bianca Falcidieno, *Extending the Hough transform to recognise space curves in point clouds*, SIAM Conference on Computational Geometric Design (SIAM-GD), extended abstract, 2023 Genova.

[A4] **Chiara Romanengo**, Silvia Biasotti, Bianca Falcidieno, *Approximation of geometric primitives in point clouds using the Hough transform*, Mathematical And Computational Modelling, Approximation and Simulation (MACMAS), extended abstract, 2023 Torino.

[A5] **Chiara Romanengo**, Silvia Biasotti, Bianca Falcidieno, *Recognition and fitting of curves and surfaces in 3D digital models via the Hough Transform technique*, Subdivision, Geometric and Algebraic Methods, Isogeometric Analysis and Refinability in Italy (SMART), extended abstract, 2022 Rimini.

[A6] Silvia Biasotti, **Chiara Romanengo**, Bianca Falcidieno, *Curve and surface fitting in 3D objects using a technique based on the Hough transform*, International Symposium New Trends in Approximation and Applications (NT2A), extended abstract, 2022 Oujda Morocco.

[A7] **Chiara Romanengo**, Silvia Biasotti, Bianca Falcidieno, *Recognition and approximation of space curves on 3D digital models*, Curves & Surfaces, extended abstract, 2022 Arcachon France.

■ Technical reports

[TR1] **Chiara Romanengo**, Silvia Biasotti, Bianca Falcidieno, *Recognising characteristic elements through the analysis of curves on 3D models*, IMATI Report Series n. 01/19, 2019.

■ Other publications

[O1] **Chiara Romanengo**, *Recognition and representation of curve and surface primitives in digital models via the Hough transform*, PhD thesis, 2023.

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[O2] **Chiara Romanengo**, *Recognition of curves and surfaces on 3D models*, Doctoral Consortium, Eurographics'2021, Vienna.

■ Papers under review

[P1] Andrea Raffo, Andrea Ranieri, **Chiara Romanengo**, Bianca Falcidieno, Silvia Biasotti, *CurveML: a benchmark for evaluating and training learning-based methods of classification, recognition, and fitting of plane curves*, The Visual Computer, first revision done.

[P2] **Chiara Romanengo**, Bianca Falcidieno, Silvia Biasotti, *Extending the Hough transform to recognize and approximate space curves in 3D models*, Computer Aided Geometric Design, submitted.

[P3] **Chiara Romanengo**, Bianca Falcidieno, Silvia Biasotti, *Discretisation of the Hough parameter space for fitting and recognising geometric primitives*, Mathematics and Computers in Simulation, submitted.

Dataset and software

[S1] **Software** *fitting_geometric_primitives* (see [IJ4])

Authors: Chiara Romanengo

Role: author and developer

Year: 2022

Link: https://github.com/chiararomanengo/fitting_geometric_primitives

[S2] **Dataset and software** *SHREC2022* (see [IJ5])

Authors: Chiara Romanengo, Andrea Raffo

Role: author and developer

Year: 2022

Link: dataset <https://github.com/chiararomanengo/SHREC2022> and software https://github.com/rea1991/SHREC2022_evaluation.git

Replicability stamp obtained

[S3] **Dataset and software** *Fit4CAD* (see [IJ8])

Authors: Chiara Romanengo, Andrea Raffo

Role: author and developer

Year: 2021

Link: <https://github.com/chiararomanengo/Fit4CAD>

Replicability stamp obtained

Skills

■ Languages

Italian: Mother tongue

English: Proficient

French: Basic

■ Informatics

Editing: Microsoft Office, LaTeX

OS: Microsoft Windows, Linux, MacOS

Open source hosting: GitHub

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Software for scientific computing and simulation: Matlab, CoCoA
Mesh and point cloud processing: Meshlab, Cloudcompare, ReMesh
Data analysis and collaborative environment: COLAB, TensorFlow

Date

Signature

June 26, 2024