

Marco Fratarcangeli Curriculum Vitæ

Research interests

Interactive graphics, visual computing, physically-based simulation, nonlinear optimization methods, massively parallel graphics hardware.

Experience

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| 2020–2021 | <i>Professor, Computer Science and Engineering, Chalmers University, Sweden.</i> |
| 2016–2020 | <i>Associate Professor, Computer Science and Engineering, Chalmers University, Sweden.</i> |
| 2014–2016 | <i>Senior Lecturer, Information Technology, Chalmers University, Sweden.</i> |
| 2011–2014 | <i>Assistant Professor, Computer Engineering, Sapienza University of Rome, Italy.</i> |

Education

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| 2004–2009 | <i>Ph.D. in Computer Engineering, Sapienza University of Rome, Italy.</i> |
| 2004 | <i>M.Sc. (Laurea) in Computer Engineering. Sapienza University of Rome, Italy.</i> |

Other Significant Experience

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| 2017–2021 | <i>Consultant, Disney Research Studios Zurich, Switzerland.</i>
Facial geometry capture and animation for Hollywood movies. See Anyma page. |
| 2006–2021 | <i>Board member, Visage Technologies AB, Sweden.</i>
Ranked among the Sweden Technology Fast 50 companies for 2017, 2018 and 2019. |
| 2009–2011 | <i>Software Engineer at Taitus Software srl, Italy.</i>
Visualization tools, analysis and planning for the European Space Agency. |

Fellowships and Grants

- 2019 *Hybrid energy-efficient CPU-GPU streaming analysis at the edge*. Chalmers Area of Advance ICT and Energy, Seed project, Principal Investigator with Vincenzo Gulisano, 150.000 SEK (total: 300.000 SEK, ~30.000 EUR)
- 2016–2018 *Interactive 3D deformable bodies*. Vetenskapsrådet (Swedish Research Council), Starting grant, Sole applicant, 2.453.000 SEK (~245.000 EUR).
- 2016–2018 *Interactive cloth animation research*. IKEA Communications AB, Industrial research project, Sole applicant, 800.000 SEK (~80.000 EUR).
- 2017 *Parallel Algorithms for Interactive Simulations of 3D Soft Tissues*. Stiftelsen för internationalisering (STINT), Principal Investigator with Yin Yang. Collaborative Institutions: Chalmers University of Technology (Sweden), University of New Mexico (USA). 150.000 SEK (15.000 EUR).
- 2016–2017 *ImageLife2 & ImageLife*. Chalmers Area of Advance ICT, Seed projects, Principal Investigator, 300.000 SEK (total: 600.000 SEK ~60.000 EUR)
- 2012–2015 *Surgical Threads Simulations Based on a Novel Information-Theory Approach*, Qatar National Research Foundation. Collaborative Institutions: Texas A&M University, TX, Weill Cornell Medical College at Qatar, Chalmers University of Technology, Sweden, \$75.000 (total: \$1.032.559).
- 2014 *Anatomically-inspired Face Animation for Behavioral Realization*. Telecom – ParisTech, sole applicant, 8.000 EUR
- 2004 Three years fellowship awarded from the Italian Ministry of Research (MIUR) to support my PhD studies.

Publications

Journal Articles

16. RONNOW M. J., ASSARSSON U., FRATARCANGELI M.: Fast analytical motion blur with transparency. *Computers and Graphics* 95 (2021), 36–46
15. FRATARCANGELI M., BRADLEY D., GRUBER A., ZOSS G., BEELER T.: Fast Nonlinear Least Squares Optimization of Large-Scale Semi-Sparse Problems. *Computer Graphics Forum (Eurographics)* 39, 2 (2020)
14. GRUBER A., FRATARCANGELI M., ZOSS G., CATTANEO R., BEELER T., GROSS M., BRADLEY D.: Interactive Sculpting of Digital Faces Using an Anatomical Modeling Paradigm. *Computer Graphics Forum (Symposium on Geometric Processing)* 39, 5 (2020)
13. LEI L., LUO R., FRATARCANGELI M., XU W., WANG H., GUO X., YAO J., YANG Y.: Medial elastics: Efficient and collision-ready deformation via medial axis transform. *ACM Trans. Graph. Invited to SIGGRAPH 2020*. (June 2020)
12. WANG Z., WU L., FRATARCANGELI M., TANG M., WANG H.: Parallel Multigrid for Nonlinear Cloth Simulation. *Computer Graphics Forum (Pacific Graphics)*. *Best Paper Award*. (2018)
11. HUANG J., WANG Q., FRATARCANGELI M., YAN K., PELACHAUD C.: Multi-variate gaussian-based inverse kinematics. *Computer Graphics Forum* 36, 8 (Feb. 2017), 418–428

10. WANG Z., FRATARCANGELI M., RUIMI A., SRINIVASA A.: Real time simulation of inextensible surgical thread with force output for haptic feedback applications. *International Journal of Solids and Structures* 113–114 (May 2017), 192–208
9. FRATARCANGELI M., TIBALDO V., PELLACINI F.: Vivace: A practical gauss-seidel method for stable soft body dynamics. *ACM Trans. Graph. (Siggraph ASIA)* 35, 6 (Nov. 2016), 214:1–214:9
Featured on *Two minutes papers*, a popular Youtube video channel disseminating "awesome research for everyone".
8. HUANG J., FRATARCANGELI M., DING Y., PELACHAUD C.: Inverse kinematics using dynamic joint parameters. *The Visual Computer* 33, 12 (December 2017), 1541–1553
7. FRATARCANGELI M., PELLACINI F.: Scalable partitioning for parallel position based dynamics. *Computer Graphics Forum (Eurographics)* 34, 2 (2015), 405–413
6. MARCUŠ N., FRATARCANGELI M., PANDZIC I., AHLBERG J.: Fast rendering of image mosaics and ascii art. *Computer Graphics Forum* 34, 6 (September 2015), 251–261
5. RUMMAN N. A., FRATARCANGELI M.: Position-based skinning for soft articulated characters. *Computer Graphics Forum. Best Paper Award.* 34, 6 (2015), 240–250
4. FRATARCANGELI M., PELLACINI F.: A GPU-based implementation of position based dynamics for interactive deformable bodies. *Journal of Graphics Tools* 17, 03 (2015), 59–66. Invited Paper
3. FRATARCANGELI M.: Position-based facial animation synthesis. *Computer Animation and Virtual Worlds* 23, 3-4 (2012), 457–466
2. ZARATTI M., FRATARCANGELI M., IOCCHI L.: A 3d simulator of multiple legged robots based on usarsim. *RoboCup 2006: Robot Soccer World Cup X 4434* (2007), 13–24
1. FRATARCANGELI M., SCHAERF M., FORCHHEIMER R.: Facial motion cloning with radial basis functions in mpeg-4 fba. *Graphical Models* 69, 2 (2007), 106–118

Patents

1. FRATARCANGELI M.: Method for interactive, real-time animation of soft body dynamics, May 12 2018. US10008020B1

Workshop Courses, Proceedings, Book Chapters and Posters

7. LI H., NAGANO K., GOLDWHITE M., SAN K., SEO J., YEN-CHUN C., FRATARCANGELI M.: Personalized avatars for real-time virtual try-on. *ACM SIGGRAPH Asia Real-Time Live!* (Nov. 2019)
6. FRATARCANGELI M., WANG H., YANG Y.: Parallel iterative solvers for real-time elastic deformations. In *SIGGRAPH Asia 2018 Courses* (New York, NY, USA, 2018), SA '18, ACM, pp. 14:1–14:45
5. FJELD M., FRATARCANGELI M., SJÖLIE D., STAADT O. G., UNGER J. (Eds.): *Proceedings of the 23rd ACM Symposium on Virtual Reality Software and Technology, VRST 2017, Gothenburg, Sweden, November 8-10, 2017* (2017), ACM
4. RUMMAN N. A., FRATARCANGELI M.: *Skin Deformation Methods for Interactive Character Animation*. Springer International Publishing, Cham, 2017, pp. 153–174
3. FRATARCANGELI M.: Interactive, musculoskeletal model for animating virtual faces. In *ACM Symposium on Facial Analysis and Animation* (September 2012), FAA '12, ACM, pp. 16:1–16:1
2. FRATARCANGELI M.: Gppu cloth simulation using glsl, opencl and cuda. In *Game Engine Gems 2*, Lengyel E., (Ed.), 1 ed. A K Peters/CRC Press, February 2011, ch. 22, pp. 365–379

1. FRATARCANGELI M.: A versatile and interactive anatomical human face model. In *Game Programming Gems 8*, Lake A., (Ed.), 1 ed. Cengage Learning PTR, March 2010, ch. 2.1, pp. 121–132

International Refereed Conferences

20. NYLÉN O., PALL P., ISHIWAKA Y., SUDA K., FRATARCANGELI M.: Interactive Assembly and Animation of 3D Digital Garments. In *Eurographics 2020 - Short Papers (2020)*, Wilkie A., Banterle F., (Eds.), The Eurographics Association
19. ZHANG Y., FJELD M., SAID A., FRATARCANGELI M.: Task-based Colormap Design Supporting Visual Comprehension in Process Tomography. In *EuroVis 2020 - Short Papers (2020)*, Kerren A., Garth C., Marai G. E., (Eds.), The Eurographics Association
18. ZHANG Y., MA Y., OMRANI A., YADAV R., FJELD M., FRATARCANGELI M.: Automatic image segmentation for microwave tomography (MWT): from implementation to comparative evaluation. In *Proceedings of the 12th International Symposium on Visual Information Communication and Interaction, VINCI 2019, Shanghai, China, September 20-22, 2019 (2019)*, ACM, pp. 26:1–26:2
17. PALL P., NYLEN O., FRATARCANGELI M.: Fast Quadrangular Mass-Spring Systems using Red-Black Ordering. In *Workshop on Virtual Reality Interaction and Physical Simulation (2018)*, Andrews S., Erleben K., Jaillet F., Zachmann G., (Eds.), The Eurographics Association
16. CALABRESE C., FRATARCANGELI M., PELLACINI F.: sLayer: a System for Multi-Layered Material Sculpting. In *Eurographics Symposium on Rendering - Experimental Ideas & Implementations (2017)*, Zwicker M., Sander P., (Eds.), The Eurographics Association
15. NELSON V., MCEVOY P. M., FRATARCANGELI M.: Practical offline rendering of woven cloth. In *Proceedings of the Conference on Smart Tools and Applications in Computer Graphics (Goslar Germany, Germany, 2016)*, STAG '16, Eurographics Association, pp. 63–70
14. RUMMAN N. A., FRATARCANGELI M.: State of the art in skinning techniques for articulated deformable characters. In *Proceedings of the 11th Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications: Volume 1: GRAPP (Portugal, 2016)*, GRAPP 2016, SCITEPRESS - Science and Technology Publications, Lda, pp. 200–212
13. DANCU A., FRATARCANGELI M., FOURGEAUD M., FRANJCIC Z., CHINDEA D., FJELD M.: Low-cost Experimental Setups for Mid-air 3D Reconstruction. In *Smart Tools and Apps for Graphics - Eurographics Italian Chapter Conference (2015)*, Giachetti A., Biasotti S., Tarini M., (Eds.), The Eurographics Association
12. RUMMAN N. A., FRATARCANGELI M.: Position based skinning of skeleton-driven deformable characters. In *ACM Spring Conference on Computer Graphics (2014)*, SCCG '14, ACM, pp. 83–90. Best paper award
11. FRATARCANGELI M., PELLACINI F.: Towards a massively parallel solver for position based dynamics. In *SIGRAD, Swedish Chapter of Eurographics (Göteborg, Sweden, June 2014)*, Computing V., (Ed.)
10. TIRITICCO D., FRATARCANGELI M., FERRARA R., MARRA S.: Near real-time multi-gpu ω k algorithm for sar processing. In *Big Data from Space (BiDS) (October 2014)*, Agency-ESRIN E. S., (Ed.), pp. 277–280
9. MURRU G., FRATARCANGELI M., EMLER T.: Practical augmented visualization on handheld devices for cultural heritage. In *Computer Graphics, Visualization and Computer Vision (2013)*, Agency V. S.-U., (Ed.)
8. FRATARCANGELI M., ANDOLFI M., STANKOVIC K., PANDZIC I.: Animatable face models from uncalibrated input pictures. In *IEEE Conference on Telecommunications. ConTEL (June 2009)*, pp. 177–184

7. FANELLI G., FRATARCANGELI M.: A non-invasive approach for driving virtual talking heads from real facial movements. In *IEEE 3DTV Conference* (May 2007), pp. 1–4
6. KUBIAK B., PIETRONI N., GANOVELLI F., FRATARCANGELI M.: A robust method for real-time thread simulation. In *ACM Symposium on Virtual Reality Software and Technology* (2007), VRST '07, ACM, pp. 85–88
5. ZARATTI M., FRATARCANGELI M., IOCCHI L.: A 3d simulator of multiple legged robots based on usarsim. In *Springer Robocup 2006 Symposium* (2006), Springer. Best paper award
4. FRATARCANGELI M.: Physically based synthesis of animatable face models. In *Virtual Reality and Physical Simulation (Eurographics VRIPHYS)* (Pisa, Italy, November 2005), ISTI-CNR, Eurographics Association, pp. 32–39
3. FRATARCANGELI M., SCHAERF M.: Facial motion cloning using global shape deformation. In *Eurographics Short Papers* (Dublin, Ireland, August 2005), The Eurographics Association and The Image Synthesis Group, pp. 89–92
2. FRATARCANGELI M., SCHAERF M.: Fast facial motion cloning in mpeg-4. In *IEEE Image and Signal Processing and Analysis (ISPA)* (Zagreb, Croatia, September 2005), IEEE - Signal Processing Society, pp. 310–315
1. FRATARCANGELI M., SCHAERF M.: Realistic modeling of animatable faces in mpeg-4. In *Computer Animation and Social Agents* (Geneva, Switzerland, July 2004), MIRALAB, Computer Graphics Society (CGS), pp. 285–297

Awards

2018	<i>Best Paper Award</i> at Pacific Graphics (PG).
2014	<i>Best Paper Award</i> at ACM Spring conference on Computer Graphics (SCCG).
2006	<i>Best Paper Award</i> at RoboCup International Symposium.
2004	<i>Honorable mention for the best ICT Master Thesis in Italy.</i> Federcom-Aica yearly recognize the best Italian master thesis in ICT.

Visiting Scholar Programs

07/2017	Disney Research Zurich, Switzerland. Invited by Thabo Beeler and Derek Bradley. <i>Nonlinear solvers for performance-driven character animation.</i>
02-07 2014	Tèlècom ParisTech, France. Invited by Catherine Pelachaud. <i>Affective computing for virtual character animation.</i>
2004–2006	<i>Visiting Ph.D. Student</i> at Linköping Univ., Sweden. Invited by Robert Forchheimer. <i>Face animation for model-based coding.</i>

Conference Talks

- 05/2020 Eurographics, Norrköping, Sweden.
Fast Nonlinear Least Squares Optimization of Large-Scale Semi-Sparse Problems.
- 11/2019 SIGGRAPH Asia Real-Time Live!, Brisbane, Australia.
Personalized Avatars for Real-time Virtual Try-on.
- 12/2018 SIGGRAPH Asia courses, Tokyo, Japan.
Parallel iterative solvers for real-time elastic deformations.
- 12/2016 SIGGRAPH Asia, Macau, China.
Vivace: A practical Gauss-Seidel method for stable soft body dynamics.
- 05/2015 Eurographics, Zurich, Switzerland.
Scalable partitioning for parallel position based dynamics.
- 06/2014 SIGRAD, Eurographics Swedish Chapter, Gothenburg, Sweden.
Towards a massively parallel solver for position based dynamics.
- 09/2012 ACM Symposium on Facial Analysis and Animation. Vienna, Austria.
Interactive, musculoskeletal model for animating virtual faces.
- 05/2012 Computer Animation and Social Agents (CASA), Singapore.
Position-based facial animation synthesis.
- 09/2005 IEEE Image and Signal Processing and Analysis (ISPA). Zagreb, Croatia.
Fast facial motion cloning in MPEG-4.
- 08/2005 Eurographics, Short papers session. Dublin, Ireland.
Facial motion cloning using global shape deformation.
- 11/2005 Virtual Reality and Physical Simulations(VriPhys). Pisa, Italy.
Physically based synthesis of animatable face models.
- 07/2004 Computer Animation and Social Agents (CASA), Geneva, Switzerland.
Realistic modeling of animatable faces in MPEG-4.

Invited Talks

- 07/2019 Pinscreen Ltd, Los Angeles, USA. Invited by Hao Li.
Interactive Deformable Geometries
- 04/2018 University of New Mexico, Albuquerque, USA. Invited by Yin Yang.
Accurate Elastic Bodies in Real-Time
- 10/2017 ICCV Workshop on Image-based Modeling of Articulated and Deformable Objects, Venice, Italy. Invited by Fiora Pirri.
Fast, Interactive Deformable Bodies
- 06/2017 International Society for Information Studies Summit (IS4SI), Gothenburg, Sweden. Invited by Gordana Dodig-Crnkovic.
Sustainability in the digital world
- 02/2017 Bellairs Workshop on Computer Animation, Barbados. Invited by Paul Kry.
Interactive Solving of Large and Sparse Linear Systems.

Teaching

- *Game Engine Architecture* (M.Sc.), 2021, 2020, 2019, 2018, 2017, 2016, 2015.
Course responsible. Chalmers University of Technology. *Designed novel curriculum.*

- *Technology-Driven Experimental Game Design* (M.Sc.), 2020, 2019, 2018.
Course responsible. Chalmers University of Technology. *Co-designed novel curriculum.*
- *Master's thesis in Computer science and engineering* (M.Sc.), 2020, 2019.
Course coordinator. Chalmers University of Technology.
- *Computer Graphics* (M.Sc.), 2012, 2011.
Course responsible. Sapienza University of Rome. *Designed novel curriculum.*
- *Interactive Objects in Gaming Application* (Ph.D.), 2011.
Lecturer. Sapienza University of Rome. *Designed novel curriculum.*
- *Computer Graphics* (M.Sc.), 2007, 2004.
Teaching Assistant. Sapienza University of Rome. *Designed novel lab sessions.*

Supervision of Ph.D. students

As a supervisor:

- *Mads Jeppe Lyngholm Rønnow*. Chalmers, Sweden. 2018–2021
- *Nadine Abu Rumman*. Sapienza, Italy. 2012–2015

As a co-supervisor:

- *Yuchong Zhang*, Chalmers, Sweden. 2018–*present*
- *Tomasz Kosinski*, Chalmers, Sweden. 2016–*present*

I have also supervised 41 M.Sc. students and 76 B.Sc. students.

Doctoral Committee

- *Khanh Duy Le*. Chairman, Chalmers, Sweden. 2019.
- *Ehsan Miandji*. Committee member, Linköping University, Sweden. 2018.
- *Sara Casti*. Committee member, University of Cagliari, Italy. 2018.
- *Malek al-Sadeq*. Opponent (75% report), Chalmers, Sweden. 2018.
- *Jasper Molin*. Chairman, Chalmers, Sweden. 2016.
- *Viktor Kämpe*. Committee member, Chalmers, Sweden. 2016.
- *Valentina Tibaldo*. Committee member, Sapienza, Rome, Italy, 2015.
- *Christian Santoni*. Committee member, Sapienza, Rome, Italy, 2015.
- *Claudio Calabrese*. Committee member, Sapienza, Rome, Italy, 2015.
- *Jon Denning*. Committee member, Dartmouth College, USA. 2014.

Funding Referee Service

- Östersjöstiftelsen, 2018
- Italian Ministry of Education, Universities and Research (MIUR) for the Young Researchers Program "Rita Levi Montalcini", 2018.
- Italian Ministry of Education, Universities and Research (MIUR) for Projects of national interest (PRIN), 2016.
- Icelandic Research Fund (IRF) for Grant of excellence, 2016.
- Ministry of Business, Innovation & Employment of New Zealand, 2014.

Conference Chair

- ACM Virtual Reality Software and Technology (VRST), 2017.

International Program Committees

- Symposium for Computer Animation 2021
- Eurographics 2020, 2019
- ACM Symposium on Computer Animation (SCA), 2018.
- Eurographics Smart Tools and Apps in Computer Graphics 2020, 2019, 2018, 2017 2016, 2015.
- ACM NordiCHI, Nordic Conference on Human-Computer Interaction, 2018, 2016.
- Affective Computing and Intelligent Interaction (ACII), 2017.
- Digital Games Research, Foundations of Digital Games (DIGRA/FDG), 2017, 2016.
- Eurographics Swedish Chapter (SIGRAD), 2014.

Conference Session Chair

- Eurographics 2020

Referee Service

- ACM SIGGRAPH
- ACM SIGGRAPH Asia
- ACM Transaction on Graphics
- ACM Transactions on Affective Computing
- ACM Transactions on Haptics
- ACM Symposium of Computer Animation
- Eurographics
- Eurographics short papers

- Eurographics education track
- Pacific Graphics
- Computer Graphics Forum
- Graphical Models
- Computer Animation and Virtual Worlds
- Computer & Graphics
- Journal of Graphical tools
- IEEE Transactions on Circuits and Systems for Video Technology
- International Journal of High Performance Computing
- Computer Animation and Social Agents
- CGI
- Virtual Reality Interaction and Physical Simulation