Marco Fratarcangeli Curriculum Vitæ

Research interests

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

Experience

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

Education

2004–2009	*Ph.D. in Computer Engineering, Sapienza University of Rome, Italy.*
2004	*M.Sc. (Laurea) in Computer Engineering. Sapienza University of Rome, Italy.*

Other Significant Experience

2017–2021	*Consultant*, Disney Research|Studios Zurich, Switzerland. Facial geometry capture and animation for Hollywood movies. See Anyma page.
2006–2021	*Board member, Visage Technologies AB, Sweden.* Ranked among the Sweden Technology Fast 50 companies for 2017, 2018 and 2019.
2009–2011	*Software Engineer at Taitus Software srl, Italy.* 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

2. GRUBER A., FRATARCANGELI M., BRADLEY D. E., ZOSS G., BEELER D. T.: Techniques for sculpting digital faces based on anatomical modeling, 6 2022. US20220005268A1

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.: Gpgpu 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 ωk 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., EMPLER 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	*Best Paper Award* at Pacific Graphics (PG).
2014	*Best Paper Award* at ACM Spring conference on Computer Graphics (SCCG).
2006	*Best Paper Award* at RoboCup International Symposium.
2004	*Honorable mention for the best ICT Master Thesis in Italy.* 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. *Nonlinear solvers for performance-driven character animation*.
02-07 2014	Tèlècom ParisTech, France. Invited by Catherine Pelachaud. *Affective computing for virtual character animation*.
2004–2006	*Visiting Ph.D. Student* at Linköping Univ., Sweden. Invited by Robert Forchheimer. *Face animation for model-based coding*.

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 Kosiǹski*, 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