

# Marwan Abdellah

Curriculum Vitæ

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## PERSONAL STATEMENT

Motivated, talented and innovative researcher and software engineer with a solid experience in three-dimensional modeling, visualization, physically-based rendering and high performance computing, all applied to computational biology and neuroscience. This comes with a proven track record in innovating and adapting research ideas and transferring them into efficient, scalable and open source software solutions with solid applications in industry and academia. More than 10 years of experience in scientific visualization as a researcher, three-dimensional media designer and software engineer. PhD in Neuroscience from the Blue Brain Project (EPFL) with ambitions to digitally reconstruct and simulate the mammalian brain.

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## EDUCATION

- 09.2012 – 09.2017    PH.D. · IN SILICO NEUROSCIENCE  
*Blue Brain Project · Neuroscience Doctoral School · École Polytechnique Fédéral de Lausanne (EPFL)*  
 Lausanne · Switzerland  
 THESIS — *In Silico Brain Imaging*  
 RESEARCH SCOPE — Bio-physically-based rendering and visualization of complex brain tissue models using computational modeling and simulation of optical microscopes.  
 ADVISORS — *Henry Markram · Felix Schürmann*  
 MENTORS — *Ahmet Bilgili · Stefan Eilemann · Jean-Philippe Thiran*
- 09.2009 – 05.2012    M.Sc. · BIOMEDICAL ENGINEERING  
*Systems & Biomedical Engineering Department · School of Engineering · Cairo University*  
 Cairo · Egypt  
 THESIS — *High Performance Fourier Volume Rendering on Graphics Processing Units (GPUs)*  
 RESEARCH SCOPE — Accelerating the generation of digitally-reconstructed radiographs (DRRs) on GPUs using Fourier slice theorem and frequency domain volume rendering.  
 ADVISORS — *Ayman Eldeib · Amr Sharawi*
- 09.2004 – 05.2009    B.Sc. · BIOMEDICAL ENGINEERING  
*Systems & Biomedical Engineering Department · School of Engineering · Cairo University*  
 Cairo · Egypt  
 THESIS — *Software Development for Low Cost, High quality, Real-time, 4D Ultrasound on Personal Computers*  
 PROJECT SCOPE — Investigating various rendering algorithms for accelerating 4D Ultrasound volume reconstruction on GPUs.  
 ADVISOR — *Yasser Kadah*

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## EXPERIENCE & EMPLOYMENT HISTORY

- 07.2011 – Present    SCIENTIFIC VISUALIZATION ENGINEER · DOCTORAL ASSISTANT · POST-DOCTORAL FELLOW  
*Blue Brain Project · École Polytechnique Fédéral de Lausanne (EPFL)*  
 Lausanne & Geneva · Switzerland  
 ROLE — High performance and distributed visualization, automated visualization workflows, and multimedia generation for neuroscientific data.  
 DIRECTOR — *Henry Markram* · PROJECT MANAGER & CO-DIRECTOR — *Felix Schürmann*  
 LEADS — *Stefan Eilemann · Samuel Lapere*
- 01.2013 – 10.2013    SOFTWARE ENGINEER  
*EPFL*  
 Lausanne · Switzerland  
 ROLE — Building automated grading and systematic evaluation workflows for C++ and JAVA courses offered by

EPFL on Coursera.

INSTRUCTORS — *Jean-Cédric Chappelier · Vincent Lepetit · Jamila Sam*

07.2010 – 04.2011	<p>RESEARCH INTERN</p> <p><i>SCI-STI-MM Multimedia Group · École Polytechnique Fédéral de Lausanne (EPFL)</i></p> <p><i>Lausanne · Switzerland</i></p> <p>ROLE — <i>Pursuing a research on H.264 and re-configurable video coding.</i></p> <p>LAB DIRECTOR — <i>Marco Mattavilli</i></p>
03.2010 – 07.2010	<p>ASSOCIATE BIOMEDICAL SOFTWARE ENGINEER</p> <p><i>Biomedical Group · Symbyo Technologies (360imaging)</i></p> <p><i>Cairo · Egypt</i></p> <p>ROLE — <i>Development of dental implant software.</i></p>
07.2009 – 07.2010	<p>INSTRUCTOR</p> <p><i>National Institute of Laser Advanced Sciences (NILES) · Cairo University</i></p> <p><i>Cairo · Egypt</i></p> <p>ROLE — <i>Instructing different topics of visualization and high performance computing.</i></p>
09.2009 – 02.2010	<p>BIOMEDICAL SOFTWARE ENGINEER</p> <p><i>Research and Development Team · International Biomedical Engineering (IBE) Technologies</i></p> <p><i>Cairo · Egypt</i></p> <p>ROLE — <i>Development of 4D ultrasound reconstruction software.</i></p>
01.2005 – 09.2010	<p>FREELANCER</p> <p><i>Web design</i></p>

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## RESEARCH & DEVELOPMENT INTERESTS

Visualization	<i>Scientific visualization · High performance, distributed, and scalable volume rendering · Transfer function design</i>
Rendering	<i>Physically-based Monte Carlo rendering · Rendering fluorescence materials with highly scattering heterogeneous media</i>
In Silico Neuroscience	<i>Physically-plausible simulation of different microscopic imaging techniques of the cortical brain tissue using digital reconstructions of 3D neuronal models including brightfield, fluorescence and light sheet microscopes</i>
HPC	<i>GPU computing (GPGPU) with CUDA · Heterogeneous computing with OpenCL · Parallel and distributed computing with OpenMP and sockets</i>
Computational Geometry	<i>Reconstruction of high fidelity polygonal meshes that can accurately represent the surface of neuronal morphologies extracted from optical microscopy stacks</i>
Medical Imaging	<i>High quality and high performance 3D/4D real-time volume reconstruction for medical data (CT, MRI and Ultrasound) · Digitally reconstructed radiograph generation with k-space volume rendering</i>

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## SELECTED PROJECTS

2018 – Present	<p>RECONSTRUCTION OF HIGH FIDELITY POLYGONAL MESH MODELS OF NEUROSCIENTIFIC DATA</p> <p><i>Reconstruction of accurate and watertight mesh models of neuroscientific structures including neurons, glial cells and blood vessels from point clouds acquired from optical microscopes and non-watertight meshes or volumetric stacks obtained by electron microscopes.</i></p>
2016 – Present	<p>PHYSICALLY-PLAUSIBLE RECONSTRUCTION OF VOLUMETRIC MODELS OF NEURONAL MORPHOLOGIES</p> <p><i>Automated reconstruction of accurate volumetric models of neocortical neuronal morphologies obtained from optical microscopes.</i></p>
2015 – 2016	<p>PARALLEL RENDERING OF LARGE SCALE VOLUMES ON DISTRIBUTED HETEROGENEOUS COMPUTING PLATFORMS</p>

*OpenCL-based, distributed rendering engine for visualizing large scale volumes on parallel multi-GPU remote machines.*

2015 – 2016 **PHYSICALLY-BASED RENDERING OF HIGHLY SCATTERING FLUORESCENT BRAIN MODELS**  
*A novel rendering model for simulating light interaction with highly scattering fluorescent models based on a physically-plausible basis.*

2013 – Present **SIMULATION OF OPTICAL MICROSCOPY WITH MONTE CARLO RENDERING**  
*Simulation of the imaging pipelines in multiple optical microscopy techniques including brightfield and light sheet fluorescence microscopy.*

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## OPEN SOURCE CONTRIBUTIONS

2016 – Present **NEUROMORPHOVIS**  
*An interactive, extensible and cross-platform framework for building, visualizing and analyzing digital reconstructions of neuronal morphology skeletons extracted from microscopy stacks. The framework is capable of detecting, repairing tracing artifacts and generating high fidelity surface meshes and high resolution volumetric models for simulation and in silico imaging studies.*

2015 – 2016 **LIVRE**  
*Large scale interactive parallel volume rendering engine.*

2011 – 2015 **THE NEOCORTICAL MICROCIRCUIT COLLABORATION PORTAL**  
*This portal provides an online public resource of the Blue Brain Project's first release of a digital reconstruction of the microcircuitry of juvenile Rat somatosensory cortex, access to experimental data sets used in the reconstruction, and the resulting models.*

2011 – 2012 **EQUALIZER**  
*Equalizer is the standard middleware to create and deploy parallel OpenGL-based applications.*

2012 **THE PORTABLE HARDWARE LOCALITY (HWLOC)**  
*This software package provides a portable abstraction of the hierarchical topology of modern architectures, including NUMA memory nodes, sockets, shared caches, cores and simultaneous multithreading.*

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## HONORS & AWARDS

September 2019 **KEN BRODLIE PRIZE · EUROGRAPHICS UK CHAPTER**  
*Best Paper Award at CGVC 2019 · Generating High Fidelity Surface Meshes of Neocortical Neurons using Skin Modifiers*

August 2019 **PEOPLE'S CHOICE AWARD FROM NEUROART MBF NEUROSCIENCE**  
*USD 250.0 · The Neocortical Network*

July 2019 **INTERNATIONAL SOCIETY FOR COMPUTATIONAL BIOLOGY (ISCB) AWARD**  
*Inside the Neocortex - ISCB Art in Science Competition · Honorable Mention.*

July 2018 **INTERNATIONAL SOCIETY FOR COMPUTATIONAL BIOLOGY (ISCB) AWARD**  
*In Silico Brainbow - ISCB Art in Science Competition · Third Place.*

October 2017 **ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE (EPFL) PRIME SPECIALE**  
*1000.0 CHF*

January 2010 **ITIDA GRADUATION PROJECT AWARD**  
*My graduation project was awarded the first place in 2009 from the Minsters of Higher Education and Tele-Communication in Egypt during a celebration that was organized by ITIDA.*

June 2010 **NVIDIA AWARD · ICTP SUMMER SCHOOL ON HPC AND GRID COMPUTING**

NVIDIA GeForce GTX 9800 GPU awarded as a prize for accelerating ultrasound volume rendering application in *ICTP*.

July 2009     DISTINCTION WITH HONOR · B.Sc. BIOMEDICAL ENGINEERING  
Systems & Biomedical Engineering Department · Faculty of Engineering · Cairo University

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## GRANTS & FELLOWSHIPS

June 2018     ISMB FELLOWSHIP  
Travel award of USD 1000 to attend the *Conference on Intelligent Systems for Molecular Biology (ISMB)* in Chicago, USA.

September 2012     PH.D. FELLOWSHIP  
Fully funded Ph.D. fellowship from the *Blue Brain Project* · *École Polytechnique Fédérale de Lausanne (EPFL)*

January 2011     ICTP GRANT  
Travel award to attend the *Advanced Workshop in High Performance Computing & Grid Computing in the International Center for Theoretical Physics (ICTP)* in Trieste, Italy.

August 2009     ICTP GRANT  
Travel award to attend the *Advanced Workshop in High Performance Computing in the International Center for Theoretical Physics (ICTP)* in Trieste, Italy.

January 2009     ITIDA/ITAC GRANT  
Grant of USD 2000 from ITAC to support my graduation project.

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## TECHNICAL

Programming	C/C++ · Python · Java · Unix Shell · OOP · Design Patterns · TDD
Libraries	STL · Boost · Qt
Visualization & CG	OpenGL · Open Inventor · OpenSceneGraph · VTK · XIP · NVIDIA Cg · GLSL
Rendering	PBRT · LuxRender · Mitsuba
HPC	CUDA · OpenCL · OpenMP · SLURM
Web Development	HTML · CSS · JavaScript
Software Process	Agile · Scrum · Bamboo · Jira · Jenkins
Scientific Packages	MATLAB · Octave · Vensim
3D Graphics	Blender (scripting with Python) · Maya (including MEL scripting) · 3DSMax
Design & Web	Gimp · Adobe Photoshop · Adobe Illustrator · Adobe After Effects · Adobe Muse
Typography	L <sup>A</sup> T <sub>E</sub> X · Lyx · Microsoft Office
Others	Git · SVN · Doxygen

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## PROFESSIONAL ACTIVITIES

### PROFESSIONAL MEMBERSHIPS

01.2010 — Present	MEMBER <i>Institute of Electrical and Electronic Engineers (IEEE)</i>
01.2010 — Present	MEMBER <i>IEEE Engineering in Medicine and Biology Society (EMBS)</i>
02.2015 — Present	MEMBER <i>IEEE Engineering Computer Society</i>
04.2015 — Present	MEMBER

*The European Association of Computer Graphics (Eurographics)*

05.2015 — Present

MEMBER

*International Society for Computational Biology (ISCB)*

**CLASSES & TEACHING**

Spring 2014

**NUMERICAL ANALYSIS · MATH-251**

Spring 2013

*Life Sciences School · 4<sup>th</sup> Bachelor semester*

*École Polytechnique Fédérale de Lausanne (EPFL)*

TOPICS — Stability, condition number and convergence of numerical methods · Polynomial interpolation and least squares approximation · Numerical integration · Direct methods for the solution of linear systems · Iterative methods for the solution of linear and nonlinear systems · Numerical approximation of ordinary differential equations · Introduction to MATLAB and Octave

LECTURER — *Simone Deparis*

July 2010

**HIGH PERFORMANCE COMPUTING**

*National Institute of Laser Advanced Sciences (NILES)*

TOPICS — Basic theory of HPC topics like Amdahl's law, speed up, UMA and NUMA architectures · GPU architecture · CUDA · Parallel algorithms

October 2009

**COMPUTER GRAPHICS & VISUALIZATION**

*National Institute of Laser Advanced Sciences (NILES)*

TOPICS — OpenGL Pipeline · Surface rendering · Graphics Modeling using 3D Studio Max

**REVIEWER**

February 2020

FRONTIERS IN NEUROSCIENCE

July 2019

JOURNAL OF ELECTRONIC IMAGING (SPIE)

February 2019

IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING

December 2018

IEEE TRANSACTIONS ON COMPUTATIONAL IMAGING

April 2018

JOURNAL OF ELECTRONIC IMAGING (SPIE)

February 2018

BMC BIOINFORMATICS

January 2018

JOURNAL OF ELECTRONIC IMAGING (SPIE)

February 2017

JOURNAL OF MEDICAL IMAGING (SPIE)

May 2016

JOURNAL OF ELECTRONIC IMAGING (SPIE)

March 2016

EUROGRAPHICS SYMPOSIUM ON PARALLEL GRAPHICS & VISUALIZATION (EGPGV) 2016

January 2016

SOFTWAREX (ELSEVIER)

August 2015

DESIGN AUTOMATION FOR EMBEDDED SYSTEMS

July 2015

COMPUTER GRAPHICS FORUM

March 2015

EUROGRAPHICS SYMPOSIUM ON PARALLEL GRAPHICS & VISUALIZATION (EGPGV) 2015

January 2014

JOURNAL OF MEDICAL IMAGING & HEALTH INFORMATICS

August 2012

IEEE, CAIRO INTERNATIONAL BIOMEDICAL ENGINEERING CONFERENCE (CIBEC) 2012

**ATTENDED EVENTS, CONFERENCES & WORKSHOPS**

October 2019

**BLENDER CONFERENCE (BCON) 2019** (SCIENTIFIC VISUALIZATION PANEL)

*Amsterdam · Netherlands*

September 2019

**EUROGRAPHICS COMPUTER GRAPHICS & VISUAL COMPUTING (CGVC) 2019** (SESSION CHAIR)

*Bangor · Wales · UK*

July 2019

**BIOLOGICAL DATA VISUALIZATION (BioVis 2019)** AT ISMB ECCB 2019

*Basel · Switzerland*

July 2018

**8<sup>th</sup> WORKSHOP ON BIOLOGICAL DATA VISUALIZATION (BioVis 2018)** AT ISMB 2018

	Chicago IL · USA
March 2018	THE 9 <sup>th</sup> INTERNATIONAL MEETING ON VISUALIZING BIOLOGICAL DATA (VIZBI 2018) Boston · Cambridge MA · USA
October 2017	THE HUMAN BRAIN PROJECT SUMMIT Glasgow · Scotland · UK
July 2017	7 <sup>th</sup> WORKSHOP ON BIOLOGICAL DATA VISUALIZATION (BioVis 2017) AT ISMB 2017 Prague · Czechia
October 2016	6 <sup>th</sup> WORKSHOP ON BIOLOGICAL DATA VISUALIZATION (BioVis 2016) AT IEEE VIS 2016 Baltimore · MD · USA
May 2016	THE BRAIN FORUM Lausanne · Switzerland
May 2016	EUROGRAPHICS 2016 Lisbon · Portugal
April 2016	37 <sup>th</sup> INTERNATIONAL SYMPOSIUM ON BIOMEDICAL IMAGING: FROM NANO TO MACRO (ISBI 2016) Prague · Czech Republic
October 2015	THE SECOND BIOMEDICAL ENGINEERING WORKSHOP (ORGANIZER) Systems & Biomedical Engineering Department · School of Engineering · Cairo University · Cairo · Egypt
October 2015	THE 2 <sup>nd</sup> IEEE EMBS INTERNATIONAL STUDENTS CONFERENCE (KEYNOTE) Cairo · Egypt
September 2015	THE HUMAN BRAIN PROJECT SUMMIT Madrid · Spain
August 2015	37 <sup>th</sup> INTERNATIONAL CONFERENCE OF THE IEEE EMB SOCIETY (EMBC 2015) Milan · Italy
July 2015	5 <sup>th</sup> SYMPOSIUM ON BIOLOGICAL DATA VISUALIZATION (BioVis 2015) AT ISMB/ECCB 2015 Dublin · Ireland
May 2015	EUROGRAPHICS 2015 Zürich · Switzerland
March 2015	THE BRAIN FORUM Lausanne · Switzerland
December 2014	IEEE, 7 <sup>th</sup> CAIRO INTERNATIONAL BIOMEDICAL ENGINEERING CONFERENCE (CIBEC 2014) Cairo · Egypt
December 2013	THE BRAIN FORUM Jeddah · The Kingdom of Saudi Arabia
October 2013	THE HUMAN BRAIN PROJECT SUMMIT École Polytechnique Fédéral de Lausanne (EPFL) · Lausanne · Switzerland
December 2012	THE FIRST BIOMEDICAL ENGINEERING WORKSHOP (ORGANIZER) Biomedical Engineering Department · School of Engineering · Cairo University · Cairo · Egypt
December 2012	IEEE, 6 <sup>th</sup> CAIRO INTERNATIONAL BIOMEDICAL ENGINEERING CONFERENCE (CIBEC 2012) Cairo · Egypt
November 2012	BRAIN MIND INSTITUTE (BMI) RETREAT MEETING Bex · VD · Switzerland
April 2011	ADVANCED SCHOOL IN HIGH PERFORMANCE COMPUTING & GRID COMPUTING International Center for Theoretical Physics (ICTP) · Trieste · Italy
November 2009	ADVANCED SCHOOL IN HIGH PERFORMANCE COMPUTING International Center for Theoretical Physics (ICTP) · Trieste · Italy
November 2009	IEEE, INTERNATIONAL CONFERENCE OF IMAGE PROCESSING (ICIP 2009) Cairo · Egypt
March 2009	URSI, 26 <sup>th</sup> NATIONAL RADIO SCIENCE CONFERENCE (NRSC) Cairo · Egypt
December 2008	IEEE, 4 <sup>th</sup> CAIRO INTERNATIONAL BIOMEDICAL ENGINEERING CONFERENCE (CIBEC 2008) Cairo · Egypt

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## OTHER INFORMATION

### PERSONAL

<i>Residence</i>	<i>Lausanne · Switzerland (Permit B since 2011)</i>
<i>Address</i>	<i>Chemin des Mines, 9 · Geneva · 1202</i>
<i>Mobile Phone</i>	<i>+41 (0) 79 470 XX XX</i>
<i>HomePage</i>	<i><a href="http://www.marwan-abdellah.com">www.marwan-abdellah.com</a></i>
<i>Emails</i>	<i><a href="mailto:abdellah.marwan@gmail.com">abdellah.marwan@gmail.com</a> · <a href="mailto:marwan.m.abdellah@ieee.org">marwan.m.abdellah@ieee.org</a> · <a href="mailto:marwan.abdellah@epfl.ch">marwan.abdellah@epfl.ch</a></i>
<i>Languages</i>	<i>ENGLISH — Fluent · FRENCH — Good · ARABIC — Mothertongue</i>



## PUBLICATIONS

### PEER-REVIEWED JOURNAL ARTICLES

- January 2019    **1. OBJECTIVE MORPHOLOGICAL CLASSIFICATION OF NEOCORTICAL PYRAMIDAL CELLS**  
*Oxford Cerebral Cortex*  
 AUTHORS — Lida Kanari, Srikanth Ramaswamy, Ying Shi, Sebastien Morand, Julie Meystre, Rodrigo Perin , **Marwan Abdellah**, Yun Wang, Kathryn Hess and Henry Markram
- September 2018    **2. A PROCESS FOR DIGITIZING AND SIMULATING BIOLOGICALLY REALISTIC OLIGOCELLULAR NETWORKS DEMONSTRATED FOR THE NEURO-GLIO-VASCULAR ENSEMBLE**  
*Frontiers in Neuroscience*  
 AUTHORS — Jay S. Coggan, Corrado Cali, Daniel Keller, Marco Agus, Daniya Boges, **Marwan Abdellah**, Kalpana Kare, Heikki O. Lehtvaslaiho, Stefan Eilemann, Renaud B. Jolivet, Markus Hadwiger, Henry Markram, Felix Schürmann, Pierre J. Magistretti
- June 2018    **3. NEUROMORPHOVIS: A COLLABORATIVE FRAMEWORK FOR VISUALIZATION AND ANALYSIS OF NEURONAL MORPHOLOGY SKELETONS RECONSTRUCTED FROM MICROSCOPY STACKS**  
*Oxford Bioinformatics*  
 AUTHORS — **Marwan Abdellah**, Juan Hernando, Stefan Eilemann, Samuel Lapere, Nicolas Antille, Henry Markram, and Felix Schürmann
- September 2017    **4. RECONSTRUCTION AND VISUALIZATION OF LARGE-SCALE VOLUMETRIC MODELS OF NEOCORTICAL CIRCUITS FOR PHYSICALLY-PLAUSIBLE IN SILICO OPTICAL STUDIES**  
*BMC Bioinformatics 2017*  
 AUTHORS — **Marwan Abdellah**, Juan Hernando, Nicolas Antille, Stefan Eilemann, Henry Markram, and Felix Schürmann
- February 2017    **5. BIO-PHYSICALLY PLAUSIBLE VISUALIZATION OF HIGHLY SCATTERING FLUORESCENT NEOCORTICAL MODELS FOR IN SILICO EXPERIMENTATION**  
*BMC Bioinformatics 2017 · Volume 18 · Supplement 2:62*  
 AUTHORS — **Marwan Abdellah**, Ahmet Bilgili, Stefan Eilemann, Julian Shillcock, Henry Markram, and Felix Schürmann
- October 2015    **6. RECONSTRUCTION AND SIMULATION OF NEOCORTICAL MICROCIRCUITRY**  
*Cell*  
 AUTHORS — Henry Markram, Eilif Muller, Srikanth Ramaswamy, Michael W. Reimann, **Marwan Abdellah**, Carlos Aguado Sanchez, Anastasia Ailamaki, Lidia Alonso Nanclares, Nicolas Antille, Selim Arsever, Guy Antoine Atenekeng Kahou, Thomas K. Berger, Ahmet Bilgili, Nenad Buncic, Athanassia Chalimourda, Giuseppe Chindemi, Jean-Denis Courcol, Fabien Delalandre, Vincent Delattre, Shaul Druckmann, Raphael Dumusc, James Dynes, Stefan Eilemann, Eyal Gal, Michael Emiel Gevaert, Jean-Pierre Ghobril, Albert Gidon, Joe W. Graham, Valentin Haenel, Etay Hay, Thomas Heinis, Juan B. Hernando, Michael Hines, Lida Kanari, Daniel Keller, John Kenyon, Georges Khazen, Yihwa Kim, James G. King, Zoltan Kisvarday, Pramod Kumbhar, Sebastien Lasserre, Bruno R.C. Magalhaes, Angel Merchán-Pérez, Julie Meystre, Benjamin Roy Morrice, Jeffrey Muller, Alberto Munoz-Cespedes, Shruti Muralidhar, Keerthan Muthurasa, Daniel Nachbaur, Taylor H. Newton, Max Nolte, Aleksandr Ovcharenkov, Juan Palacios, Luis Pastor, Rodrigo Perin, Rajnish Ranjan, Imad Riachi, José-Rodrigo Rodríguez, Roman Juan Luis Riquelme, Christian Andreas Rössert, Ying Shi, Julian C. Shillcock, Ricardo Silva, Farhan Tauheed, Martin Telefont, Maria Toledo-Rodriguez, Thomas Tränkler, Werner Van Geit, Jafet Villafranca Diaz, Richard Walker, Yun Wang, Stefano M. Zaninetta, Javier DeFelipe, Sean L. Hill, Idan Segev and Felix Schürmann
- August 2015    **7. THE NEOCORTICAL MICROCIRCUIT COLLABORATION PORTAL: A RESOURCE FOR RAT SOMATOSENSORY CORTEX**  
*Frontiers in Neural Circuits*  
 AUTHORS — Srikanth Ramaswamy, Jean-Denis Courcol, **Marwan Abdellah**, Stanislaw Adaszewski, Nicolas Antille, Selim Arsever, Atenekeng Kahou Guy Antoine, Ahmet Bilgili, Yury Brukau, Giuseppe Chindemi, Raphael Dumusc, Stefan Eilemann, Lida Kanari, Daniel Keller, James G. King, Rajnish Ranjan, Michael Wolfgang Reimann, Christian Roessert, Martin Telefont, Werner Van Geit, Jafet Villafranca Diaz, Richard Walker, Yun



Wang, Stefano Zaninetta, Javier DeFelipe, Sean L Hill, Jeffrey Muller, Idan Segev, Felix Schürmann, Eilif Benjamin Muller and Henry Markram

August 2015    **8. PHYSICALLY-BASED IN SILICO LIGHT SHEET MICROSCOPY FOR VISUALIZING FLUORESCENT BRAIN MODELS**  
*BMC Bioinformatics* 2015 · Volume 16 · Supplement 11:S8  
 AUTHORS — **Marwan Abdellah**, Ahmet Bilgili, Stefan Eilemann, Henry Markram, and Felix Schürmann

January 2015    **9. HIGH PERFORMANCE GPU-BASED FOURIER VOLUME RENDERING**  
*International Journal of Biomedical Imaging* · Article ID 590727  
 AUTHORS — **Marwan Abdellah**, Ayman Eldeib and Amr Sharawi

#### CONFERENCE PROCEEDINGS

October 2019    **10. HIGH FIDELITY VISUALIZATION OF LARGE SCALE DIGITALLY RECONSTRUCTED BRAIN CIRCUITRY WITH SIGNED DISTANCE FUNCTIONS**  
*IEEE Visualization Conference (IEEE Vis 2019)* · Vancouver, Canada  
 AUTHORS — Jonas Karlsson, **Marwan Abdellah**, Sebastien Speierer, Alessandro Foni, Samuel Lapere, and Felix Schürmann

September 2019    **11. GENERATING HIGH FIDELITY SURFACE MESHES OF NEOCORTICAL NEURONS USING SKIN MODIFIERS**  
*EG Computer Graphics & Visual Computing (CGVC) 2019* · Bangor, Wales, UK  
 AUTHORS — **Marwan Abdellah**, Cyrille Favreau, Juan Hernando, Samuel Lapere, and Felix Schürmann

July 2018    **12. NEUROMORPHOVIS: A COLLABORATIVE FRAMEWORK FOR VISUALIZATION AND ANALYSIS OF NEURONAL MORPHOLOGY SKELETONS RECONSTRUCTED FROM MICROSCOPY STACKS**  
*Workshop on Biological Data Visualization (BioVis 2018), ISMB 2018* · Chicago, USA  
 AUTHORS — **Marwan Abdellah**, Juan Hernando, Stefan Eilemann, Samuel Lapere, Nicolas Antille, Henry Markram, and Felix Schürmann

October 2017    **13. FROM BIG DATA TO BIG DISPLAYS HIGH-PERFORMANCE VISUALIZATION AT BLUE BRAIN**  
*International Conference on High Performance Computing, ISC High Performance 2017* · Frankfurt, Germany  
 AUTHORS — Stefan Eilemann, **Marwan Abdellah**, Nicolas Antille, Ahmet Bilgili, Grigory Chevtchenko, Raphael Dumusc, Cyrille Favreau, Juan Hernando, Daniel Nachbaur, Pawel Podhajski, Jafet Villafranca and Felix Schürmann

July 2017    **14. RECONSTRUCTION AND VISUALIZATION OF LARGE-SCALE VOLUMETRIC MODELS OF NEOCORTICAL CIRCUITS FOR PHYSICALLY-PLAUSIBLE IN SILICO OPTICAL STUDIES**  
*7<sup>th</sup> Workshop on Biological Data Visualization (BioVis 2017), ISMB 2017* · Prague, Czechia  
 AUTHORS — **Marwan Abdellah**, Juan Hernando, Nicolas Antille, Stefan Eilemann, Henry Markram, and Felix Schürmann

October 2016    **15. BIO-PHYSICALLY PLAUSIBLE VISUALIZATION OF HIGHLY SCATTERING FLUORESCENT NEOCORTICAL MODELS FOR IN SILICO EXPERIMENTATION**  
*6<sup>th</sup> Workshop on Biological Data Visualization (BioVis 2016), IEEE VIS 2016* · Baltimore, MD, USA  
 AUTHORS — **Marwan Abdellah**, Ahmet Bilgili, Stefan Eilemann, Julian Shillcock, Henry Markram, and Felix Schürmann

August 2016    **16. EFFICIENT RENDERING OF DIGITALLY RECONSTRUCTED RADIOGRAPHS ON HETEROGENEOUS COMPUTING ARCHITECTURES USING CENTRAL SLICE THEOREM**  
*38<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBS) (EMBC 2016)* · Orlando, FL, USA  
 AUTHORS — **Marwan Abdellah**, Mohamed Abdallah, Mohamed Alzanati, and Ayman M. Eldeib

August 2016    **17. PARALLEL GENERATION OF DIGITALLY RECONSTRUCTED RADIOGRAPHS ON HETEROGENEOUS MULTI-GPU WORKSTATIONS**  
*38<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBS) (EMBC 2016)* · Orlando, FL, USA

AUTHORS — **Marwan Abdellah**, Asem Abdelaziz, Eslam Ali, Sherief Abdelaziz, Abdelrahman Sayed, Mohamed I. Owis, and Ayman M. Eldeib

- May 2016    **18. PHYSICALLY-BASED RENDERING OF HIGHLY SCATTERING FLUORESCENT SOLUTIONS USING PATH TRACING**  
Eurographics 2016 · Lisbon, Portugal  
AUTHORS — **Marwan Abdellah**, Ahmet Bilgili, Stefan Eilemann, Henry Markram, and Felix Schürmann
- April 2016    **19. INTERACTIVE HIGH RESOLUTION RECONSTRUCTION OF 3D ULTRASOUND VOLUMES ON THE GPU**  
2016 IEEE International Symposium on Biomedical Imaging: From Nano to Macro · Prague, Czech Republic  
AUTHORS — **Marwan Abdellah**, Asem Abdelaziz, and Ayman M. Eldeib
- April 2016    **20. OPTIMIZED GPU-ACCELERATED FRAMEWORK FOR X-RAY RENDERING USING  $k$ -SPACE VOLUME RECONSTRUCTION**  
XIV Mediterranean Conference on Medical & Biological Engineering & Computing (MEDICON 2016) · Paphos, Cyprus  
AUTHORS — **Marwan Abdellah**, Yassin Amer, and Ayman Eldeib
- August 2015    **21. ACCELERATING DRR GENERATION USING FOURIER SLICE THEOREM ON THE GPU**  
37<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBS) (EMBC 2015) · Milan, Italy  
AUTHORS — **Marwan Abdellah**, Ayman M. Eldeib, and Mohamed Owis
- August 2015    **22. GPU ACCELERATION FOR DIGITALLY RECONSTRUCTED RADIOGRAPHS USING BINDLESS TEXTURE OBJECTS AND CUDA/OPENGL INTEROPERABILITY**  
37<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBS) (EMBC 2015) · Milan, Italy  
AUTHORS — **Marwan Abdellah**, Ayman M. Eldeib, and Mohamed Owis
- July 2015    **23. PHYSICALLY-BASED IN SILICO LIGHT SHEET MICROSCOPY FOR VISUALIZING FLUORESCENT BRAIN MODELS**  
5<sup>th</sup> Symposium on Biological Data Visualization (BioVis 2015) · Dublin, Ireland  
AUTHORS — **Marwan Abdellah**, Ahmet Bilgili, Stefan Eilemann, Henry Markram, and Felix Schürmann
- May 2015    **24. A COMPUTATIONAL MODEL OF LIGHT-SHEET FLUORESCENCE MICROSCOPY USING PHYSICALLY-BASED RENDERING**  
Eurographics 2015 · Zürich, Switzerland  
AUTHORS — **Marwan Abdellah**, Ahmet Bilgili, Stefan Eilemann, Henry Markram, and Felix Schürmann
- December 2014    **25. MATLAB-BASED FOURIER VOLUME RENDERING FRAMEWORK**  
IEEE, Proceedings of the 7<sup>th</sup> Cairo International Biomedical Engineering Conference (CIBEC 2014) · Cairo, Egypt  
AUTHORS — **Marwan Abdellah**, Ayman Eldeib and Amr Sharawi
- December 2014    **26. OFFLINE LARGE SCALE FOURIER VOLUME RENDERING ON LOW-END HARDWARE**  
IEEE, Proceedings of the 7<sup>th</sup> Cairo International Biomedical Engineering Conference (CIBEC 2014) · Cairo, Egypt  
AUTHORS — **Marwan Abdellah**, Ayman Eldeib and Amr Sharawi
- April 2014    **27. CUFFTSHIFT: HIGH PERFORMANCE CUDA-ACCELERATED FFT-SHIFT LIBRARY**  
Proceedings of the High Performance Computing Symposium (HPC '14), Article No. 5 · Tampa, FL, USA  
AUTHORS — **Marwan Abdellah**
- December 2012    **28. CONSTRUCTING A FUNCTIONAL FOURIER VOLUME RENDERING PIPELINE ON HETEROGENEOUS PLATFORMS**  
IEEE, Proceedings of the 6<sup>th</sup> Cairo International Biomedical Engineering Conference (CIBEC 2012) · Cairo, Egypt  
AUTHORS — **Marwan Abdellah**, Ayman Eldeib and Amr Shaarawi
- December 2012    **29. HIGH PERFORMANCE MULTI-DIMENSIONAL (2D/3D) FFT-SHIFT IMPLEMENTATION ON GRAPHICS PROCESSING UNITS (GPUS)**

IEEE, Proceedings of the 6<sup>th</sup> Cairo International Biomedical Engineering Conference (CIBEC 2012) · Cairo, Egypt  
 AUTHORS — **Marwan Abdellah**, Ayman Eldeib and Amr Shaarawi

December 2012 **30. HIGH PERFORMANCE CUDA-BASED IMPLEMENTATION FOR THE 2D VERSION OF THE MAXIMUM SUBARRAY PROBLEM (MSP)**  
 IEEE, Proceedings of the 6<sup>th</sup> Cairo International Biomedical Engineering Conference (CIBEC 2012) · Cairo, Egypt  
 AUTHORS — Salah Saleh, **Marwan Abdellah**, Ahmed A. Abdel Raouf and Yasser M. Kadah

May 2012 **31. PARALLEL RENDERING ON HYBRID MULTI-GPU CLUSTERS**  
 Eurographics Symposium on Parallel Graphics and Visualization (EGPGV'12) · Cagliari, Italy  
 AUTHORS — Stefan Eilemann, Ahmet Bilgili, **Marwan Abdellah**, Juan Hernando, Maxim Makhinya, Renato Pajarola, and Felix Schürmann

September 2009 **32. GPU-BASED RECONSTRUCTION AND DISPLAY FOR 4D ULTRASOUND DATA**  
 2009 IEEE International Ultrasonics Symposium · Rome, Italy  
 AUTHORS — Ahmed Elnokrashy, Ahmed Elmalky, Tamer Hosny, **Marwan Abdellah**, Alaa Megawer, Abubakr Alsebai, Abou-Bakr Youssef and Yasser Kadah

March 2009 **33. SOFTWARE DEVELOPMENT FOR LOW COST, HIGH QUALITY, REAL-TIME, 4D ULTRASOUND ON PERSONAL COMPUTERS**  
 IEEE, 26<sup>th</sup> National Radio Science Conference (NRSC), Union Radio Scientifique Internationale (URSI) · Cairo, Egypt  
 AUTHORS — **Abdellah M.**, Megawer A. and Kadah Y. Mh

#### PRE-PRINTS

October 2019 **34. VOLTAGE-SENSITIVE DYE IMAGING REVEALS INHIBITORY MODULATION OF ONGOING CORTICAL ACTIVITY**  
 bioRxiv  
 AUTHORS — Taylor H Newton, **Marwan Abdellah**, Grigori Chevtchenko, Eilif B Muller, Henry Markram

January 2018 **35. OBJECTIVE CLASSIFICATION OF NEOCORTICAL PYRAMIDAL CELLS**  
 bioRxiv  
 AUTHORS — Lida Kanari, Srikanth Ramaswamy, Ying Shi, Sebastien Morand, Julie Meystre, Rodrigo Perin, **Marwan Abdellah**, Yun Wang, Kathryn Hess, Henry Markram

January 2018 **36. A PHYSICALLY PLAUSIBLE MODEL FOR RENDERING HIGHLY SCATTERING FLUORESCENT PARTICIPATING MEDIA**  
 arXiv.org  
 AUTHORS — **Marwan Abdellah**, Ahmet Bilgili, Stefan Eilemann, Henry Markram, Felix Schürmann

#### POSTER ABSTRACTS

July 2019 **37. ADVANCES IN NEURONAL MORPHOLOGY ANALYSIS, MESHING AND VISUALIZATION WITH NEUROMORPHOVis**  
 Biological Data Visualization at International Society of Molecular Biology (ISMB) · Basel, Switzerland  
 AUTHORS — **M. Abdellah**, Samuel Lapere, F. Schürmann, H. Markram

November 2016 **38. CHARACTERIZATION OF DETECTION ISO-CONTOURS IN A SINGLE FIBER PHOTOMETRY SYSTEM**  
 2017 Society for Neuroscience (SFN) Meeting · Washington DC, USA  
 AUTHORS — M. Mansy, **M. Abdellah**, H. Kim, F. Schürmann and K. Oweiss

July 2017 **39. RECONSTRUCTION AND VISUALIZATION OF LARGE-SCALE VOLUMETRIC MODELS OF NEOCORTICAL CIRCUITS FOR PHYSICALLY-PLAUSIBLE IN SILICO OPTICAL STUDIES**  
 5<sup>th</sup> Symposium of Biological Data Visualization · Prague, Czech Republic  
 AUTHORS — **M. Abdellah**, Stefan Eilemann, Juan Hernando, F. Schürmann, H. Markram

November 2016 **40. IN SILICO VOLTAGE SENSITIVE DYE IMAGING IN A DIGITAL RECONSTRUCTION OF SOMATOSENSORY CORTEX**

2016 Society for Neuroscience (SFN) Meeting · San Diego, USA

AUTHORS — T. H. Newton, **M. Abdellah**, E. Muller, F. Schürmann, H. Markram

October 2012

**41. A UNIFYING MODEL OF THE NEOCORTICAL COLUMN 15: HIGH PERFORMANCE COMPUTING AND SOFTWARE DEVELOPMENT CHALLENGES**

2012 Society for Neuroscience (SFN) Meeting, 268.A Unifying Model of the Neocortical Column · New Orleans, USA

AUTHORS — F. Delalondre, **M. Abdellah**, C. Aguado Sanchez, A. Bilgili, N. Buncic, J.-D. Courcol, S. Eilemann, V. Haenel, S. L. Hill, T. Heunus, J. B. Hernando, M. Hines, J. G. King, E. Muller, B. R. C. Magalhaes, G. Mateescu, J. Muller, K. Murthuras, D. Nachbaur, L. Pastor, J. M. Pena, R. Ranjan, M. W. Reimann, F. Tauheed, W. Van Geit, A. Ailamaki, H. Markram, F. Schürmann

**TECHNICAL REPORTS**

February 2015

**42. COMPUTATIONAL MODELS AND SIMULATORS OF FUNCTIONAL MRI**

A literature review report submitted to Prof. Rolf Gruetter · Neuroscience Doctoral School · École Polytechnique Fédérale de Lausanne (EPFL) · Lausanne · Switzerland

AUTHORS — **Marwan Abdellah**

**THESES**

September 2017

**43. IN SILICO BRAIN IMAGING: PHYSICALLY-PLAUSIBLE METHODS FOR VISUALIZING NEOCORTICAL MICROCIRCUITRY**

Ph.D. Thesis · Blue Brain Project · Neuroscience Doctoral School · École Polytechnique Fédérale de Lausanne (EPFL) · Lausanne, Switzerland

AUTHORS — **Marwan Abdellah**

February 2012

**44. HIGH PERFORMANCE FOURIER VOLUME RENDERING ON GRAPHICS PROCESSING UNITS (GPUs)**

M.Sc. Thesis · Systems & Biomedical Engineering Department, School of Engineering, Cairo University · Cairo, Egypt

AUTHORS — **Marwan Abdellah**

July 2009

**45. HIGH QUALITY, HIGH PERFORMANCE, 3D REAL-TIME ULTRASOUND VOLUME RECONSTRUCTION ON GRAPHICS PROCESSING UNITS (GPUs)**

B.Sc. Thesis · Systems & Biomedical Engineering Department, School of Engineering, Cairo University · Cairo, Egypt

AUTHORS — **Marwan Abdellah**, Alaa Megawer, and Yasser Kaddah

February 6, 2020