

# Marwan Abdellah

Curriculum Vitæ

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## PERSONAL STATEMENT

Motivated, talented and innovative researcher and software engineer with solid experience in three-dimensional modeling, large-scale visualization, physically-based rendering and high performance computing, all applied to bioinformatics, computational neuroscience and biology. 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 powerful applications in industry and academia. More than 12 years of experience in scientific visualization as a software engineer, researcher engineer, and three-dimensional media designer. PhD in Neuroscience from the Blue Brain Project at the Swiss Federal Institute of Technology (EPFL) with ambitions to 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>

*OpenGL-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 **ULTRALISER**  
*High performance large scale mesh and volume reconstruction for neuroscientific models.*

2019 – Present **VessMORPHOVis**  
*A Blender-based add-on for visual analysis of digital reconstructions of blood vessels morphological skeletons. The add-on is used to visualize, analyze large-scale vasculature graphs and create polygonal meshes and high quality renderings using Cycles.*

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

July 2020 **INTERNATIONAL SOCIETY FOR COMPUTATIONAL BIOLOGY (ISCB) AWARD**  
*Brain Vasculature - ISCB Art in Science Competition · Third Place.*

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 FÉDÉRAL 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

July 2020 **ISMB FELLOWSHIP**  
*Intelligent Systems for Molecular Biology (ISMB) Fellowship Award 2020 of the International Society of Computational Biology (ISCB).*

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 Fédéral 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++ 14, 17 · Python · Unix Shell · OOP · Design Patterns · TDD
Libraries	STL · Qt · Boost
Visualization	Scientific Visualization · Volume & Surface Rendering · Immersive Visualization · VR · Mesh Reconstruction
3D Graphics	OpenGL · Open Inventor · OpenSceneGraph · VTK · XIP · NVIDIA Cg · GLSL
Rendering	PBRT · LuxRender · Mitsuba
HPC	CUDA · OpenCL · OpenMP · SLURM
Web Development	HTML · CSS · JavaScript · React
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 <i>The European Association of Computer Graphics (Eurographics)</i>
05.2015 — Present	MEMBER <i>International Society for Computational Biology (ISCB)</i>

### CLASSES & TEACHING

July 2021	VISUAL COMMUNICATION THROUGH SCHEMATIC GRAPHICS <i>Freie Universität Berlin</i> TOPICS — How to create impactful figures for impactful publications
Spring 2014 Spring 2013	NUMERICAL ANALYSIS · MATH-251 <i>Life Sciences School · 4<sup>th</sup> Bachelor semester</i> <i>École Polytechnique Fédéral de Lausanne (EPFL)</i> 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 — <i>Simone Deparis</i>
July 2010	HIGH PERFORMANCE COMPUTING <i>National Institute of Laser Advanced Sciences (NILES)</i> 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 <i>National Institute of Laser Advanced Sciences (NILES)</i> TOPICS — OpenGL Pipeline · Surface rendering · Graphics Modeling using 3D Studio Max

### REVIEWER

December 2021	FRONTIERS IN SURGERY
August 2021	NEUROINFORMATICS (SPRINGER)
May 2021	STAR PROTOCOLS (CELL PRESS)
February 2021	IEEE TRANSACTIONS ON VISUALIZATION AND COMPUTER GRAPHICS
February 2020	FRONTIERS IN NEUROSCIENCE
July 2019	JOURNAL OF ELECTRONIC IMAGING (SPIE)
February 2019	IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING

<i>December 2018</i>	IEEE TRANSACTIONS ON COMPUTATIONAL IMAGING
<i>April 2018</i>	JOURNAL OF ELECTRONIC IMAGING (SPIE)
<i>February 2018</i>	BMC BIOINFORMATICS
<i>January 2018</i>	JOURNAL OF ELECTRONIC IMAGING (SPIE)
<i>February 2017</i>	JOURNAL OF MEDICAL IMAGING (SPIE)
<i>May 2016</i>	JOURNAL OF ELECTRONIC IMAGING (SPIE)
<i>March 2016</i>	EUROGRAPHICS SYMPOSIUM ON PARALLEL GRAPHICS & VISUALIZATION (EGPGV) 2016
<i>January 2016</i>	SOFTWAREX (ELSEVIER)
<i>August 2015</i>	DESIGN AUTOMATION FOR EMBEDDED SYSTEMS
<i>July 2015</i>	COMPUTER GRAPHICS FORUM
<i>March 2015</i>	EUROGRAPHICS SYMPOSIUM ON PARALLEL GRAPHICS & VISUALIZATION (EGPGV) 2015
<i>January 2014</i>	JOURNAL OF MEDICAL IMAGING & HEALTH INFORMATICS
<i>August 2012</i>	IEEE, CAIRO INTERNATIONAL BIOMEDICAL ENGINEERING CONFERENCE (CIBEC) 2012

#### ATTENDED EVENTS, CONFERENCES & WORKSHOPS

<i>July 2021</i>	BIOLOGICAL DATA VISUALIZATION (BioVis 2021) AT ISMB ECCB 2021 <i>Virtual Conference</i>
<i>July 2020</i>	BIOLOGICAL DATA VISUALIZATION (BioVis 2020) AT ISMB 2020 <i>Virtual Conference</i>
<i>October 2019</i>	BLENDER CONFERENCE (BCON) 2019 (SCIENTIFIC VISUALIZATION PANEL) <i>Amsterdam · Netherlands</i>
<i>September 2019</i>	EUROGRAPHICS COMPUTER GRAPHICS & VISUAL COMPUTING (CGVC) 2019 (SESSION CHAIR) <i>Bangor · Wales · UK</i>
<i>July 2019</i>	BIOLOGICAL DATA VISUALIZATION (BioVis 2019) AT ISMB ECCB 2019 <i>Basel · Switzerland</i>
<i>July 2018</i>	8 <sup>th</sup> WORKSHOP ON BIOLOGICAL DATA VISUALIZATION (BioVis 2018) AT ISMB 2018 <i>Chicago IL · USA</i>
<i>March 2018</i>	THE 9 <sup>th</sup> INTERNATIONAL MEETING ON VISUALIZING BIOLOGICAL DATA (VIZBI 2018) <i>Boston · Cambridge MA · USA</i>
<i>October 2017</i>	THE HUMAN BRAIN PROJECT SUMMIT <i>Glasgow · Scotland · UK</i>
<i>September 2017</i>	NEUROBRIDGES · A MEDITERRANEAN, MIDDLE EASTERN SUMMER SCHOOL IN COMPUTATIONAL NEUROSCIENCE <i>France</i>
<i>July 2017</i>	7 <sup>th</sup> WORKSHOP ON BIOLOGICAL DATA VISUALIZATION (BioVis 2017) AT ISMB 2017 <i>Prague · Czechia</i>
<i>October 2016</i>	6 <sup>th</sup> WORKSHOP ON BIOLOGICAL DATA VISUALIZATION (BioVis 2016) AT IEEE VIS 2016 <i>Baltimore · MD · USA</i>
<i>May 2016</i>	THE BRAIN FORUM <i>Lausanne · Switzerland</i>
<i>May 2016</i>	EUROGRAPHICS 2016 <i>Lisbon · Portugal</i>
<i>April 2016</i>	37 <sup>th</sup> INTERNATIONAL SYMPOSIUM ON BIOMEDICAL IMAGING: FROM NANO TO MACRO (ISBI 2016) <i>Prague · Czech Republic</i>
<i>October 2015</i>	THE SECOND BIOMEDICAL ENGINEERING WORKSHOP (ORGANIZER) <i>Systems &amp; Biomedical Engineering Department · School of Engineering · Cairo University · Cairo · Egypt</i>
<i>October 2015</i>	THE 2 <sup>nd</sup> IEEE EMBS INTERNATIONAL STUDENTS CONFERENCE (KEYNOTE) <i>Cairo · Egypt</i>

September 2015	<b>THE HUMAN BRAIN PROJECT SUMMIT</b> <i>Madrid · Spain</i>
August 2015	<b>37<sup>th</sup> INTERNATIONAL CONFERENCE OF THE IEEE EMB SOCIETY (EMBC 2015)</b> <i>Milan · Italy</i>
July 2015	<b>5<sup>th</sup> SYMPOSIUM ON BIOLOGICAL DATA VISUALIZATION (BioVis 2015) AT ISMB/ECCB 2015</b> <i>Dublin · Ireland</i>
May 2015	<b>EUROGRAPHICS 2015</b> <i>Zürich · Switzerland</i>
March 2015	<b>THE BRAIN FORUM</b> <i>Lausanne · Switzerland</i>
December 2014	<b>IEEE, 7<sup>th</sup> CAIRO INTERNATIONAL BIOMEDICAL ENGINEERING CONFERENCE (CIBEC 2014)</b> <i>Cairo · Egypt</i>
December 2013	<b>THE BRAIN FORUM</b> <i>Jeddah · The Kingdom of Saudi Arabia</i>
October 2013	<b>THE HUMAN BRAIN PROJECT SUMMIT</b> <i>École Polytechnique Fédéral de Lausanne (EPFL) · Lausanne · Switzerland</i>
December 2012	<b>THE FIRST BIOMEDICAL ENGINEERING WORKSHOP (ORGANIZER)</b> <i>Biomedical Engineering Department · School of Engineering · Cairo University · Cairo · Egypt</i>
December 2012	<b>IEEE, 6<sup>th</sup> CAIRO INTERNATIONAL BIOMEDICAL ENGINEERING CONFERENCE (CIBEC 2012)</b> <i>Cairo · Egypt</i>
November 2012	<b>BRAIN MIND INSTITUTE (BMI) RETREAT MEETING</b> <i>Bex · VD · Switzerland</i>
April 2011	<b>ADVANCED SCHOOL IN HIGH PERFORMANCE COMPUTING &amp; GRID COMPUTING</b> <i>International Center for Theoretical Physics (ICTP) · Trieste · Italy</i>
November 2009	<b>ADVANCED SCHOOL IN HIGH PERFORMANCE COMPUTING</b> <i>International Center for Theoretical Physics (ICTP) · Trieste · Italy</i>
November 2009	<b>IEEE, INTERNATIONAL CONFERENCE OF IMAGE PROCESSING (ICIP 2009)</b> <i>Cairo · Egypt</i>
March 2009	<b>URSI, 26<sup>th</sup> NATIONAL RADIO SCIENCE CONFERENCE (NRSC)</b> <i>Cairo · Egypt</i>
December 2008	<b>IEEE, 4<sup>th</sup> CAIRO INTERNATIONAL BIOMEDICAL ENGINEERING CONFERENCE (CIBEC 2008)</b> <i>Cairo · Egypt</i>

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## OTHER INFORMATION

### PERSONAL

Residence	PERMIT C · Lausanne · Switzerland
HomePage	<a href="http://www.marwan-abdellah.com">www.marwan-abdellah.com</a>
Emails	<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>
Languages	ENGLISH — <i>Fluent</i> · FRENCH — <i>Very Good</i> (B2 Berlitz) ITALIAN · SPANISH · GERMAN — <i>Learning</i> ARABIC — <i>Mother-tongue</i>



## PUBLICATIONS

### PEER-REVIEWED JOURNAL ARTICLES

- August 2021    **1. DIGITAL RECONSTRUCTION OF THE NEURO-GLIA-VASCULAR ARCHITECTURE**  
*Oxford Cerebral Cortex*  
 AUTHORS — Eleftherios, Zisis, Daniel Keller, Lida Kanari, Alexis Arnaudon, Michael Gevaert, Thomas Delemontex, Benoît Coste, Alessandro Foni, **Marwan Abdellah**, Corrado Cali, Kathryn Hess, Felix Schürmann and Henry Markram
- July 2021    **2. METABALL SKINNING OF SYNTHETIC ASTROGLIAL MORPHOLOGIES INTO REALISTIC MESH MODELS FOR VISUAL ANALYTICS AND IN SILICO SIMULATIONS**  
*Oxford Bioinformatics*  
 AUTHORS — **Marwan Abdellah**, Alessandro Foni, Eleftherios Zisis, Nadir Román Guerrero, Samuel Lapere, Jay S. Coggan, Daniel Keller, Henry Markram, and Felix Schürmann
- July 2021    **3. IN SILICO VOLTAGE-SENSITIVE DYE IMAGING REVEALS THE EMERGENT DYNAMICS OF CORTICAL POPULATIONS**  
*Nature Communications*  
 AUTHORS — Taylor H. Newton, Michael W. Reimann, **Marwan Abdellah**, Grigori Chevtchenko, Eilif B. Muller and Henry Markram
- July 2020    **4. INTERACTIVE VISUALIZATION AND ANALYSIS OF MORPHOLOGICAL SKELETONS OF BRAIN VASCULATURE NETWORKS WITH VESSMORPHOVis**  
*Oxford Bioinformatics*  
 AUTHORS — **Marwan Abdellah**, Nadir Román Guerrero, Samuel Lapere, Jay S. Coggan, Daniel Keller, Benoit Coste, Snigdha Dagaer, Jean-Denis Courcol, Henry Markram, and Felix Schürmann
- January 2019    **5. 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    **6. 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    **7. 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    **8. 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    **9. 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 **10. 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 Delalondre, 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-Céspedes, 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 **11. 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 **12. 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 **13. 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 **14. 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 **15. 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
- October 2017 **16. 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
- August 2016 **17. 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    **18. 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    **19. 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    **20. 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    **21. 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    **22. 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    **23. 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    **24. 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    **25. 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    **26. 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    **27. 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    **28. 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    **29. 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 **30. 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 **31. 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 **32. 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 **33. 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 **34. 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

January 2021 **35. ARCHITECTURE OF THE NEURO-GLIA-VASCULAR SYSTEM**  
bioRxiv  
AUTHORS — Eleftherios, Zisis, Daniel Keller, Lida Kanari, Alexis Arnaudon, Michael Gevaert, Thomas Delemontex, Benoît Coste, Alessandro Foni, **Marwan Abdellah**, Corrado Cali, Kathryn Hess, Felix Schürmann and Henry Markram

January 2020 **36. A CALCIUM-BASED PLASTICITY MODEL PREDICTS LONG-TERM POTENTIATION AND DEPRESSION IN THE NEOCORTEX**  
bioRxiv  
AUTHORS — Giuseppe Chindemi, **Marwan Abdellah**, Oren Amsalem, Ruth Benavides-Piccione, Vincent Delattre, Michael Doron, Andras Ecker, James Gonzalo King, Pramod Kumbhar, Caitlin Claire Monney, Rodrigo Perin, Christian Rössert, Werner Van Geit, Javier DeFelipe, Michael Graupner, Idan Segev, Henry Markram, Eilif Benjamin Müller

October 2019 **37. 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 **38. 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 **39. 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 **40. 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 **41. 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 **42. RECONSTRUCTION AND VISUALIZATION OF LARGE-SCALE VOLUMETRIC MODELS OF NEOCORTICAL CIRCUITS FOR PHYSICALLY-PLAUSIBLE IN SILICO OPTICAL STUDIES**  
*5th Symposium of Biological Data Visualization · Prague, Czech Republic*  
 AUTHORS — **M. Abdellah**, Stefan Eilemann, Juan Hernando, F. Schürmann, H. Markram
- November 2016 **43. 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 **44. 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 **45. COMPUTATIONAL MODELS AND SIMULATORS OF FUNCTIONAL MRI**  
*A literature review report submitted to Prof. Rolf Gruetter · Neuroscience Doctoral School · École Polytechnique Fédéral de Lausanne (EPFL) · Lausanne · Switzerland*  
 AUTHORS — **Marwan Abdellah**
- THESES**
- September 2017 **46. IN SILICO BRAIN IMAGING: PHYSICALLY-PLAUSIBLE METHODS FOR VISUALIZING NEOCORTICAL MICROCIRCUITRY**  
*Ph.D. Thesis · Blue Brain Project · Neuroscience Doctoral School · École Polytechnique Fédéral de Lausanne (EPFL) · Lausanne, Switzerland*  
 AUTHORS — **Marwan Abdellah**
- February 2012 **47. 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 **48. 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

January 10, 2022