Curriculum Vitae

Gabriel Balaban M.Sc. Ph.D.
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Languages: English (Native Speaker), Norwegian (fluent), German (fluent), Czech (fluent)

Description: Medical AI researcher with a background in mathematical modelling, biophysics and machine learning. Extensive experience with cardiological applications. Strong research network, including leading hospitals in Norway and the UK.

Key Metrics

Research Experience:	9 years, 6 in Norway, 3 in the UK.
Publications:	16 scientific articles, 10 as first author or shared first author, 11 conference/workshop proceedings, 222 citations, h-index 10.
Supervision:	4 PhD students, 5 MSc students, 3 interns.
Teaching:	Lecturer/teacher in 6 courses (4 Master, 2 Bachelor). Published 1 guide to scientific programming.

Employment History

2023-	**Associate Professor in Computer Science**, AI Lab, School of Economics Innovation and Technology, Kristiania University College. *Research Topics: Cardiac physics informed machine learning, future cancer prediction.*
2021-2023	**Postdoctoral Researcher**, Department of Computational Physiology, Simula Research Laboratory. Funding: PROCardio Centre for Excellent Innovation (Norwegian Research Council). Main Partner: Oslo University Hospital. *Research Topics: Deep learning with medical images, heart valve disease.*
2019-2021	**Postdoctoral Researcher**, Biomedical Informatics Research Group, Department of Informatics, University of Oslo. Funding: Pharmatox Strategic Research Initiative (UiO). *Research Topics: Bioinformatics, machine learning, computational immunology.*
2016-2019	**Research Associate**, School of Biomedical Engineering and Imaging Sciences, St. Thomas Hospital, King's College London, UK. Funding: Young Investigator Grant (UK Medical Research Council). *Research Topics: Cardiac electrophysiology simulation, medical image analysis, cardiac arrhythmias.*
2013-2016	**PhD Student**, Biomedical Computing Group, Simula Research Laboratory, Oslo, Norway. Funding: Centre for Biomedical Computing (Excellent Research Centre scheme, Norwegian Research Council). *Research Topics: Data assimilation and inverse problems, cardiac mechanics, echocardiographic image analysis.*
2012-2013	**IT Trainee**, Statkraft AS, Oslo, Norway
2012	**Scientific Programmer**, Micromagnetics Computational Modelling Group, University of Southampton, UK.
2008-2010	**IT Consultant and Software Developer**, IDS-Scheer AG, Freiburg, Germany.

Education

2017	**PhD in Computer Science**, University of Oslo, Norway Thesis: *Adjoint Data Assimilation Methods for Cardiac Mechanics* Advisors: Marie Rognes, Joakim Sundnes.
2012	**MSc in Mathematics**, University of Oslo, Norway Thesis: *A Newton's Method Finite Element Algorithm for Fluid-Structure Interaction* Advisors: Anders Logg, Marie Rognes.
2008	**Honours BSc in Mathematics with Minor in German Studies**, Trent University, Canada, Grade: A. Exchange year in Freiburg, Germany.

Research Leadership

2024-2026	**Principle Investigator**, *PINNHeart: New Physics Informed Neural Network Techniques for Cardiac Arrest Prediction*, 1 PhD Student, 2.2M NOK, financed by Kristiania University College.
2024	**Principle Investigator**, *HiDHeart: Discovering hidden heart disease with new ML tools for detection and assessment of mitral annular disjunction*, 2 Research Assistants, 385K NOK, financed by Kristiania University College.

Supervision

2023-	**PhD: Giulia Monopoli**, *Artificial Intelligence and Computational Modeling for Heart Valve Disease*, Simula Research Laboratory, Co-supervisor
2023-	**MSc: Emil Jettli**, *Cancer Prediction with Longitudinal Serum RNA measurements and Machine Learning*, Simula Research Laboratory, Co-supervisor
2023-	**MSc: Adam Jacobsen**, *Pathological Electrical Wave Simulation in the Heart Using Physics Informed Neural Networks*, Simula Research Laboratory, Main Supervisor
2022-2023	**Interns: Bendik Dalen, Natascha Augustin**, *Deep learning based motion tracking in Cardiac MRI*, Simula Research Laboratory. Main Supervisor.
2022-2023	**Summer School Project Group, 3 PhD Students, 1 MSc student**, *Automated Cardiac Mechanics Modelling with Evolutionary Polynomial Regression*, Main supervisor.
2017-2018	**MEng: Charlotta Malvuccio**, *Quantification of Scar Heterogeneity in Non-Ischemic Dilated Cardiomyopathy*, MEng thesis in biomedical engineering at King's College London, UK. Co-supervisor together with Martin Bishop.
2013	**Intern: Karl Erik Holter**, *Inverse Cardiac Mechanics with Kalman Filtering*, Summer internship at Simula Research Laboratory, Oslo, Norway. Main supervisor, together with Marie Rognes.

Teaching

2023	**Lecturer**, *User Interfaces and Computer Architecture (MSc)*, School of Economics, Innovation and Technology, Kristiania University College, Oslo, Norway.
2023	**Lecturer**, *Research Methods (BSc)*, School of Economics, Innovation and Technology, Kristiania University College, Oslo, Norway.
2023	**Lecturer**, *Data Science (BSc)*, School of Economics, Innovation and Technology, Kristiania University College, Oslo, Norway. Designed and held 4 lectures on data analysis with Python and linear regression.
2022	**Lecturer**, *Emerging Technologies (MSc)*, School of Economics, Innovation and Technology, Kristiania University College, Oslo, Norway. Designed and held lecture on Medical Digital Twins, lead exercise in pitching startup companies.
2022	**Volunteer Instructor**, *Coding Course for Ukrainian Refugees*, Simula Research Laboratory,

Oslo, Norway. Taught Python and microbit coding to 15-20 children and young adults for 3 hours a week.

2022- **Teacher**, *Reading Course in Statistical Survival Analysis (MSc)*, Institute for Informatics, University of Oslo, Norway. Personalized course for MSc student Frida Westby. Designed curriculum and coding exercises. Provided weekly teaching and guidance.

2021- **Lecturer**, *Machine Learning Fundamentals (MSc-PhD)*, Summer School in Computational Physiology, Simula Research Laboratory, Norway. Designed lecture slides and coding exercises for around 30 students from diverse backgrounds (biomedical engineering, computer science, mathematics and biology). Recorded Youtube lecture.

2021 **Practice Group Teacher**, *Machine Learning for Image Analysis*, Institute for Informatics, University of Oslo, Norway. Lead online practice sessions over zoom for up to 100 students. Marked assignments.

2017 **Practice Group Teacher**, *Introduction to Biomedical Engineering*, Department of Imaging Sciences and Biomedical Engineering, King's College London, UK. Lead a practice session.

2011-2012 **Practice Group Teacher**, *Calculus I and II*, Department of Mathematics, University of Oslo, Norway. Lead practice sessions and marked assignments for BSc students and incoming high school students (preparatory summer course).

Institutional Responsibilities

2016-2017 **Board Member and Employee Representative**, Simula School of Research and Innovation, Oslo, Norway.

2014-2016 **Founder and Leader**, Simula PhD Student Forum, Oslo, Norway.

2013-2015 **Union Representative**, Technical-Scientific Association (Tekna), Oslo, Norway.

Public Engagement and Media

2022 **Public Talk**, *Debate: Do we need explainable AI in medicine?*, Pint of Science Festival Oslo

2021 **Online Blog Entry**, *Changes in heart shape can predict future sudden cardiac arrest*, King's College Online News

2021 **Video Lecture**, *Machine Learning Fundamentals*, Youtube Video.

2019 **Live Interview**, *Meet the Future You*, Big Bang Science Fair, Birmingham, UK.

2018 **Online Event for high school students**, *I am a Scientist: Get me Out of Here!*, London, UK.

2017 **Popular Science Article**, *Har utviklet modell for personlige datahjerter*, Titan online magazine.

2016 **Podcast Interview**, *Working as a bioengineering researcher*, 99 Career Options.

2015 **Interactive Presentation for high school students**, *'How does the heart Pump?*, Simula Research Laboratory, Oslo, Norway.

Scientific Seminar Organization

2022 **Seminar Organiser**, *Simulation in Mitral Valve Prolapse and Dilated Cardiomyopathy*, PROCardio Spring and Fall Workshops, Oslo, Norway.

Select Invited Talks

2023 **Conference: Norwegian Artificial Intelligence Consortium**, *Automated Cardiac Elasticity Modelling with Evolutionary Energy Functions*, Tromsø, NO

2023 **Colloquium: Janus RNA Research Group**, *Event-Time models for the Janus RNA cancer data*, University of Oslo, NO

2023	**Colloquium: Computational Modelling and Imaging Biomarkers group**, *Permutation testing for predicting adverse cardiac events with statistical shape models*, King's College London, UK
2022	**Colloquium: Cardiac Electro-Mechanics Research Group**, *Automated cardiac constitutive modelling with evolutionary energy functions*, King's College London, UK
2022	**Conference: Computing in Cardiology**, *Towards an automated pipeline to create patient specific 3D LV geometry models of patients with mitral annular disjunction*, Tampere, Finland
2021	**Colloquium: Computing in Science and Education**, *10 simple rules for quick and dirty scientific programming*, University of Oslo, Norway
2021	**Colloquium: Cardiac Modelling and Imaging Biomarkers**, *10 simple rules for quick and dirty scientific programming*, King's College London, UK
2018	**Conference: Computing in Cardiology**, *The effects of non-ischemic fibrosis texture and density on mechanisms of reentry*, Maastricht, NL
2018	**Conference: Heart Rhythm Scientific Sessions (competitive with 30% acceptance rate)**, *Scar density predicts transmural reentry in non-ischemic dilated cardiomyopathy*, Boston, USA
2017	**Conference: Computational Biomedical Engineering**, *Computational model to understand the mechanistic link between midwall fibrosis and arrhythmic risk in non-ischemic dilated cardiomyopathy*, Pittsburgh, USA

Awards

2006	**Baden-Württemberg Stipendium (€6000)**, for a year of academic exchange in Freiburg, Germany.
2005	**Trent University Scholarship ($1000)**, for academic excellence during my BSc studies, Peterborough, Canada.

Review Services

Regular reviewer for the following journals: *European Heart Journal, Frontiers in Cardiovascular Medicine, Computers in Biology and Medicine, Cardiovascular Engineering and Technology, International Journal for Numerical Methods in Biomedical Engineering.*