

GONZALO ANDRÉS VIDAL PEÑA

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FORMAL EDUCATION

University of Colorado Boulder, Boulder CO	<i>2024 - present</i>
Postdoctorate Researcher	
Genetic Logic Lab Newcastle University, Newcastle Upon Tyne	<i>2021 - 2024</i>
Computer Science PhD	
Interdisciplinary Computing and Complex BioSystems (ICOS) research group	
Pontifical Catholic University of Chile, Santiago	<i>2019 - 2021</i>
Biological and Medical Engineering PhD	<i>Student representative</i>
Institute for Biological and Medical Engineering	
Pontifical Catholic University of Chile, Santiago	<i>2017 - 2019</i>
Biochemistry.	<i>Honours</i>
University of Chile, Santiago	<i>2012 - 2016</i>
Biochemistry.	
University of Chile, Santiago	<i>2010 - 2012</i>
Bachelor of Natural and Exact Sciences.	<i>Honours</i>

PROJECTS

SynBio DBTL

Development of open-source software, hardware, standards and biological parts necessary to close and automate the DBTL cycle for Synthetic Biology using tools from robotics, IoT and AI.

Software tools: [LOICA](#), [PUDU](#), [XDC](#), [Flapjack](#).

Biocomputing

Design and analysis of genetic networks that encode logic gates, motifs, oscillators, toggle-switches and novel devices implementing computation in the frequency domain and TTL coupling using metamorphic proteins. Modeling with ODE, PDE, IBM and stochastic simulations to research the relevance of noise on systems over time and space.

Non-equilibrium Polysome Dynamics

Research of gene expression in prokaryotes with a complex systems approach, using frameworks like statistical mechanics.

Mitochondrial dynamics regulation

Research cell signal transduction under a biochemical approach with focus on mitochondrial dynamics in cell lines, and the development of automated analysis pipelines.

Software tools: [MiNuD](#)

TECHNICAL STRENGTHS

DRYLAB

Modeling and Analysis	ODE, Stochastic, Complex Systems, Individual Based Modeling.
Programming Languages	Python, JavaScript, R, Matlab, GO, Julia.
Main Packages	ScyPy, NumPy, Pandas, Scikit-Image.
AI Packages	TensorFlow, Keras, PyTorch, Scikit-learn.
Visualization Packages	Matplotlib, Seaborn, Plotly.
Other Software & Tools	ImageJ, GraphPad, Latex, MS Office, Affinity Designer.

WETLAB

Test Equipment	Plate reader, Flow cytometry, Microscopy
Hosts/Chassis	<i>E.coli</i> (DH5 α , MG1655, DHL705), Human Cell lines (A7r5).
Automation Equipment	OT-2, Echo, Felix, PIXL.

PUBLICATIONS

Phase-based genetic logic circuits. **BIORXIV. 2023**
doi.org/10.1101/2022.12.13.5202896

Functional Synthetic Biology. **OUP SYNTHETIC BIOLOGY. 2023**
doi.org/10.1093/synbio/ysad006

Experimental Data Connector (XDC): Integrating the Capture of Experimental Data and Metadata Using Standard Formats and Digital Repositories. **ACS SYNTHETIC BIOLOGY. 2023**
doi.org/10.1021/acssynbio.2c00669

Synthetic biology open language (SBOL) version 3.1.0. **JOURNAL OF INTEGRATIVE BIOINFORMATICS. 2023**
[oi.org/10.1515/jib-2022-0058](https://doi.org/10.1515/jib-2022-0058)

Accurate characterization of dynamic microbial gene expression and growth rate profiles. **OUP SYNTHETIC BIOLOGY. 2022**
doi.org/10.1093/synbio/ysad006

LOICA: Integrating Models with Data for Genetic Network Design Automation. **ACS SYNTHETIC BIOLOGY. 2022**
doi.org/10.1021/acssynbio.1c00603

Flapjack: Data Management and Analysis for Genetic Circuit Characterization. **ACS SYNTHETIC BIOLOGY. 2020**
doi.org/10.1021/acssynbio.0c00554

Novel Tunable Spatio-Temporal Patterns From a Simple Genetic Oscillator Circuit. **FRONTIERS IN BIOENGINEERING AND BIOTECHNOLOGY. 2020**
doi.org/10.3389/fbioe.2020.00893

Glucagon-like peptide-1 inhibits vascular smooth muscle cell dedifferentiation through mitochondrial dynamics regulation. *BIOCHEMICAL PHARMACOLOGY*. 2016
doi.org/10.1016/j.bcp.2016.01.013

BOOK CHAPTERS

Vidal, G., Vitalis, C., Guillien, J. (2024). Standardized Golden Gate assembly metadata representation using SBOL. In: Braman, J.C. (eds) *Methods in Molecular Biology*.

Vidal, G., Vitalis, C., Matúte, T., Núñez, I., Federici, F., Rudge, T.J. (2024). Genetic Network Design Automation with LOICA. In: Braman, J.C. (eds) *Synthetic Biology. Methods in Molecular Biology*, vol 2760. Humana, New York, NY. https://doi.org/10.1007/978-1-0716-3658-9_22

Vitalis, C. et al. (2024). Flapjack: Data Management and Analysis for Genetic Circuit Characterization. In: Braman, J.C. (eds) *Synthetic Biology. Methods in Molecular Biology*, vol 2760. Humana, New York, NY. https://doi.org/10.1007/978-1-0716-3658-9_23

WORK EXPERIENCE

University of Colorado Boulder 2023 - Present
Postdoc

- Development of a complete data management workflow for synthetic biology experimental data.

SBOL Industrial Internship, BioDesign Automation Consortium (BDAC) 2022
SBOL-based automation of DNA construction.

- Development of a workflow to go from plasmid design in SBOL to assembly instructions in the OT-2 liquid handling robot.

Institute for Biological and Medical Engineering 2019
Automation and Robotics Engineer.

- DNA assembly automation. Liquid handling robot setup to perform BASIC and Golden Gate assembly. Development of automated pipelines for genetic network characterization.

Monsanto 2017 - 2018
Advice, research, project realization.

- Water management. Satellital and drone image processing. Determination of Kc in *Brassica*. Part of the program Sin Limites from Pontificia Universidad Católica de Chile.

Milandu 2016 - 2019
R&D and Co-founder

- Startup in Maule valley, Chile. Water management and remote sensing on amaranth crops.

AWARDS

IWBDA Best Poster Award	2022
Newcastle University, School of Computing scholarship	2021
Institute for Biological and Medical Engineering scholarship	2019
Pontifical Catholic University of Chile academic excellence	2018

University of Chile scholarship	2011
Ministry of Education, Bicentenary scholarship	2011

TEACHER ASSISTANT/ DEMONSTRATOR

Software Engineering	2023
Contemporary Topics in Computing	2023
Computer Systems Design and Architectures	2023
Advanced Synthetic Biology	2022
Introduction to Synthetic Biology	2022
Biomedical Data Analytics and AI	2022
Synthetic Biology and Artificial Biological Function Prototyping	2018, 2019
Complex Systems	2017, 2018, 2019

LEADERSHIP

SynBioNet NEUK Co-Chair 2022-2023
Synthetic Biology Networking at the North East of UK, led by Newcastle University and Northumbria University.

iGEM Engineering Committee 2020-present
Active member on the general, software and interlab committees. Automation interlab leader, developing, planning and conducting inter laboratory studies using automation.

SBOL Editor 2020-present
Editor of the Synthetic Biology Open Language specification. Lead, develop, maintain and coordinate community software, activities and events.

Biological and Medical Engineering postgraduate student representative 2019-2021
Creation, funding acquisition and realization of interdisciplinary projects. Representation of BME postgraduate students on the school.

CONFERENCES

Workshop: Software tools for synthetic biology. **SYNTHETIC BIOLOGY: ENGINEERING, EVOLUTION & DESIGN (SEED)**. 2023

PUDU: Build and Test Automation for SynBio. **HACKATHON OF THE COMPUTATIONAL MODELLING IN BIOLOGY NETWORK (HARMONY)**. 2023

A proposal for connecting and automating the Synthetic Biology Design Build Test Learn cycle. **SYNTHETIC BIOLOGY UK (SBUK) — SAGE PGR CONFERENCE**. 2022

Talk: Software tools for the Synthetic Biology DBTL cycle. **INTERNATIONAL GENETICALLY ENGINEERED MACHINE**. 2022

Program Committee — Standardizing the Representation of Parts and Devices for Build Planning (Best poster award) — Steps Towards Functional Synthetic Biology — Experimental Data Converter. **INTERNATIONAL WORKSHOP ON BIO-DESIGN AUTOMATION (IWBDA)**. 2022.

LOICA 1.2: Genetic Network Design Automation for Spatio-Temporal Patterns — Workshop: Software tools for synthetic biology. **SYNTHETIC BIOLOGY: ENGINEERING, EVOLUTION & DESIGN (SEED) - HACKATHON OF THE COMPUTATIONAL MODELLING IN BIOLOGY NETWORK (HARMONY) — SNES FEST**. 2022

Workshop: Flapjack, Data Management and Analysis for Genetic Circuit Characterization — LOICA: Logical Operators for Integrated Cell Algorithms. **INTERNATIONAL WORKSHOP ON BIO-DESIGN AUTOMATION (IWBDA)**. 2021.

LOICA: Logical Operators for Integrated Cell Algorithms. **THE 1ST INTERNATIONAL BIODESIGN RESEARCH CONFERENCE (IBDRC) — COMPUTATIONAL MODELLING IN BIOLOGY NETWORK (COMBINE)**. 2020.

Self-organized Patterns from a Synthetic Genetic Oscillator in Bacterial Colonies. **INTERNATIONAL SOCIETY FOR MICROBIAL ECOLOGY LATIN AMERICA (ISME-LA)**. 2019.

Open-Source Paper-Fluidic Device for Bacterial Culture, Communication and Biocomputation. **INTERNATIONAL SOCIETY FOR MICROBIAL ECOLOGY LATIN AMERICA (ISME-LA) — SYNTHETIC BIOLOGY: ENGINEERING, EVOLUTION & DESIGN (SEED)**. 2019

Modelling non-equilibrium polysome dynamics with totally asymmetric simple exclusion process (TASEP). **ISCB-LA SOIBIO EMBNET**. 2018