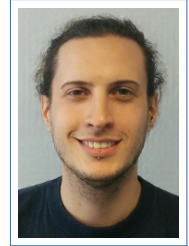# Julien Vaubourg

PhD in Computer Science

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Research Topics

My PhD thesis is about integration of IP network models to DEVS multi-models, for cyber-physical system (CPS) co-simulations.

Modeling and simulating (M&S) a CPS can require to represent elements from three areas of expertise at the same time: physical systems, information systems and communication networks (IP). Because the universal simulator with all of the required skills does not exist, we have **to interconnect existing models provided by different communities**, with a multi-model. Challenges are therefore 1) integrating all of the heterogeneity of the multi-model (formalisms, representations, implementations), 2) integrating IP models in a way enabling them **to represent the network transportation of application data** produced by external models, and 3) integrating them in a way enabling them **to complete each other, to be able to represent together heterogeneous IP networks** used by CPS.

In order to meet these challenges, I contributed to M&S works around MECSYCO, a co-simulation platform based on the DEVS formalism and the concept of wrapping, to integrate different forms of heterogeneity. Thereby, I proposed the definition of a general framework enabling to **wrap IP simulators in DEVS**, with 1) adding of the port concept directly in IP models, to allow data exchanges with external models and 2) controlling IP simulator dynamics, to enable their synchronization with the other parts of the co-simulation. Proposed solutions do not require **to change the simulators code** (i.e. no specific versions to maintain). I was able to evaluate my approach thanks to the **integration of two popular IP simulators** (NS-3 and OMNeT++/INET), and the implementation of **industrial use cases** (smart grids related), in partnership with EDF R&D, the main French electric utility company.

Alongside my research work, I am interesting in issues related to privacy: I **co-founded a non-profit internet service provider** (Lorraine Data Network), I am very **involved in self-hosting popularization** (Internet Cube), and I regularly do public talks about these topics. I also did teaching as PhD candidate for two years, and I was **in charge of a popular science workshop** with kids during one year. I am currently a temporary teaching and research assistant (as a postdoc, corresponding to the French ATER position), finishing my thesis.

Education and Professional Career

2017 – 2019
Freelance Design and Integration, *Network Engineer*.
Innovative solutions for the digital opening-up of countryside castles

2013 – 2017
Inria Grand Est, *PhD Candidate & Postdoc*.
PhD with Inria in collaboration with EDF R&D – Université de Lorraine

2010 – 2013
Master of Science in Engineering, *TELECOM Nancy*.
Telecoms, Networks and Services – Université de Lorraine

2010 – 2015
Lorraine Data Network, *President*.
French Non-Profit Internet Service Provider

2009 – 2010
BSc in IT Networking & Systems Administration, *With high honors*.
Professional degree ASRALL – Université de Lorraine

2007 – 2009
BTEC Higher National Diploma in IT, *French DUT*.
Université Lille 1, Université de Reims Champagne-Ardenne

Teaching

Programming and Algorithms (Python/C), *L1*.
2016–2017
Lectures/Tutorials/Practicals at Faculty of Sciences Nancy, 86h

Databases, *L1*.
2016–2017
Practicals at Faculty of Sciences Nancy, 15h

Project Management, *L1*.
2016–2017
Lectures/Tutorials at Faculty of Sciences Nancy, 21h

IT Certification, *L1*.
2016–2017
Lectures/Practicals at Faculty of Sciences Nancy, 24h

Systems and Networks, *L3, M1, M2*.
2015–2017
Lectures/Tutorials/Practicals at TELECOM Nancy and Faculty of Sciences Nancy, 82h

C Programming, *L3*.
2014–2015
Tutorials/Practicals at TELECOM Nancy, 32h

Creative Computing, *8-13 years (Popular Science)*.
2014–2015
Inria and MJC Centre Social Nomade, 134h

Popular Science (talks about Privacy/IPv6)
M2 TELECOM Nancy 2016, MathC2+ 2014 & 2015 (High School Students), ISN-EPI 2014 (High School Teachers), M1 MIAGE 2014, LP CISIIE 2013

Supervision of Students

Interdisciplinary Project, *M1 TELECOM Nancy*.
2015–2016
Plug-n-Play MECSYCO Demonstrations using a LiveUSB
Co-supervisor: V. Chevrier

Research Project, *M1 TELECOM Nancy*.
2014–2015
Exploitation of OMNeT++
Co-supervisor: V. Chevrier

Internship, *L3 TELECOM Nancy*.
2013–2014
Implementation of a C++ library for a convenient usage of the JSON format
Co-supervisor: V. Chevrier

Tutored Project, *M1 Cognitive Sciences*.
2013–2014
Coupling of a behavior model with a perception model
Co-supervisors: B. Camus, C. Bourjot et V. Chevrier

Tutored Project, *Professional L3*.
2013–2014
Monitoring and capping of the bandwidth used by internet subscribers
Co-supervisor: S. Jean

Research Publications

International Journals with Reading Committee

2018
B. Camus, T. Paris, **J. Vaubourg**, Y. Presse, C. Bourjot, L. Ciarletta, V. Chevrier.
Co-simulation of Cyber-Physical Systems using a DEVS Wrapping Strategy in the MECSYCO Middleware
In SIMULATION: Transactions of the Society for Modeling and Simulation International, janvier 2018.

International Conferences with Proceedings

2016
J. Vaubourg, V. Chevrier, L. Ciarletta, B. Camus.
Co-Simulation of IP Network Models in the Cyber-Physical Systems Context, using a DEVS-based Platform
In proceedings of Communications and Networking Symposium (CNS'16).

2016

B. Camus, V. Galtier, M. Caujolle, V. Chevrier, **J. Vaubourg**, L. Ciarletta, C. Bourjot.
Hybrid Co-simulation of FMUs using DEV&DESS in MECSYCO
In proceedings of Symposium on Theory of Modeling and Simulation (TMS/DEVS'16).

2015

J. Vaubourg, Y. Presse, B. Camus, C. Bourjot, L. Ciarletta, V. Chevrier, J.-P. Tavella,
H. Morais, B. Deneuville, O. Chilard.
Multi-agent Multi-Model Simulation of Smart Grids in the MS4SG Project
In proceedings of Practical Applications of Agents and Multi-Agent Systems (PAAMS'15).

2015

M. Duflot, M. Quinson, F. Masseglia, D. Roy, **J. Vaubourg**, T. Viéville.
When sharing computer science with everyone also helps avoiding digital prejudices
In proceedings of International Scratch Conference (Scratch2015AMS).

National Journals with Reading Committee

2018

B. Camus, **J. Vaubourg**, T. Paris, Y. Presse, C. Bourjot, L. Ciarletta, V. Chevrier.
Wrapping DEVS de modèles IP dans MECSYCO pour la co-simulation de systèmes cyber-physiques
In Technique et Science Informatiques (TSI), HS DEVS, 2018.

2015

F. Masseglia, M. Quinson, **J. Vaubourg**, V. Poirel, E. Taillant, S. Arias, L. Viennot.
Incitation à la découverte de la programmation
In Bulletin de la société informatique de France, HS1, février 2015.

Demonstrations

2015

J. Vaubourg, Y. Presse, B. Camus, C. Bourjot, L. Ciarletta, V. Chevrier, J-.P. Tavella,
H. Morais, B. Deneuville, O. Chilard.
Smart Grids Simulation with MECSYCO
In proceedings of Practical Applications of Agents and Multi-Agent Systems (PAAMS'15).

2015

J. Vaubourg, Y. Presse, B. Camus, L. Ciarletta, V. Chevrier, J-.P. Tavella, B. Deneuville,
O. Chilard.
Simulation de smart grids avec MECSYCO
In proceedings of Journées Francophones sur les Systèmes Multi-Agents (JFSMA'15).

Research Lectures

2016

Paper Lecture, *United State, CA, Pasadena.*
Co-Simulation of IP Network Models in the Cyber-Physical Systems Context, using a DEVS-based Platform
Communications and Networking Symposium (CNS'16)

2016

Paper Lecture, *United State, CA, Pasadena.*
Hybrid Co-simulation of FMUs using DEV&DESS in MECSYCO
Symposium on Theory of Modeling and Simulation (TMS/DEVS'16)

2015

Paper Lecture, *Spain, Salamanca.*
Multi-Agent Multi-model Simulation of Smart Grids in the MS4SG Project
Practical Applications of Agents and Multi-Agent Systems (PAAMS'15)

2015

Demonstrations, *Spain, Salamanca.*
Smart Grids Simulation with MECSYCO
Practical Applications of Agents and Multi-Agent Systems (PAAMS'15)

2015

Demonstrations, *France, Rennes.*
Simulation de smart grids avec MECSYCO
Journées Francophones sur les Systèmes Multi-Agents (JFSMA'15)

2014

Demonstrations, *France, Chatou.*
Co-simulation distribuée
Journée Logiciels de Modélisation et de Calcul Scientifique (LMCS'14)

Research Software

Plateform	Complete rewriting of the **MECSYCO co-simulation platform in C++**.
Simulators	Implementation of C++ libraries for the **integration of NS-3 and OMNeT++/INET** to MECSYCO.

Personal Experience

Community	Founder and President for 5 years of a **Non-Profit Internet Service Provider** in France (community management, technical contributions, negotiation with providers, communication, public talks).
Admin. sys./net.	Daily administration of personal and community **GNU/Linux servers**: emails, web, DNS, VPN, Git, Zimbra, Puppet, LDAP, KVM/Ganeti virtualization, LXC/Docker containers, etc. Writing of the **IPv6 Lothaire Yarding** Documentation.
Open Source	Founder of the **Internet Cube** project `<internetcu.be>`, and of **free software** available online on `<ju.vg>` and through the GitHub account *@jvaubourg*.