Centre Universitaire d'Informatique

2019

Activity Report

TecDay, Collège de Candolle, Geneva, 2019 April 4th

UNIVERSITÉ DE GENÈVE

Centre Universitaire d'Informatique
Battelle - Bâtiment A
7, route de Drize
CH-1227 Carouge

UNIVERSITÉ DE GENÈVE

Foreword

The Centre Universitaire d'Informatique, funded in 1975, federates research and teaching activities at the University of Geneva. With more than 200 members of staff, we develop key research competences in several areas, particularly on: Artificial Intelligence, Virtual and Augmented Reality, Services for Smart Cities, Modelling and Simulation, Information Security, E-Health and Quality of Life, Natural Language Processing. This research is supported by more than 4.45 MCHF of externally funded money (38% of our total budget).

In addition to research, we developed reach out activities. Started in 2018, the Infoscope offers now 6 workshops for Geneva's school primary and secondary classes. It also regularly goes outside our walls, meeting its public on various places or events, such as La Nuit de la Science, Tecdays, Ramène ta science, Futur en tous genres, Enhance your horizon, ...

In 2019, CUI established the Digital Innovation Hub of the University of Geneva. Part of the University's digital strategy the Digital innovation hub has 3 main missions: (1) developing innovative services for the University community, (2) reaching out to the public, private, international sector with innovation activities or proof-of-concepts, (3) supporting students and researchers with digital projects that lead to commercial exploitation or social impact.

Besides 62 PhD students enrolled in our various doctoral programs, we have seen an increase of 25% of the number of BSc and MSc students, totalling over 300 students. This is also the result of two new programs started in 2019: the MSc in digital systems and services, a research-oriented program with various specialisations (e.g. Digital transformation, Knowledge engineering, Smart cities, User experience, Information security), and a new version of the MSc in Mathematics and computer science led jointly with our colleagues of Mathematics. Continuous education is also very present at CUI with programs covering various domains from data protection, information security, blockchain or information systems management.

Two awards recognised the research led in the field of Natural Language Processing. Ms Kristina Gulordava is the recipient of the Latsis prize 2019, for her PhD thesis entitled: Word order variation and dependency length minimisation : a cross-linguistic computational approach. Ms Gulordava Phd was supervised by Paola Merlo. Prof Merlo herself has been nominated Fellow of the Association for Computational Linguistics.

I seize this opportunity to thank all CUI members of staff, students and researchers for their hard work, commitment, innovation, reach out and research activities, all participating to our national and international visibility and excellence.

The coming years will see the development of interdisciplinary partnerships with other disciplines of the University of Geneva, the establishment of links with the local industry and administration, and a series of digital innovations for the University community.

Prof. Giovanna Di Marzo Serugendo
Director of the CUI
University of Geneva

Organisation

Centre Universitaire d'Informatique

Director:
- **Giovanna Di Marzo Serugendo**

Academic Advisor:
- Marc Pochon

Direction assistant:
- Elie Zagury

Secretaries:
- Marie-France Culebras
- Elisabeth Giudicelli
- Maëlle Saintilan

Student secretary:
- Séverine Walter

System Engineer:
- Nicolas Mayencourt

Department of Computer Science

Director:
- **Bastien Chopard**

Academic Advisor:
- Stéphane Marchand-Maillet

Secretary:
- Anne-Isabelle Guintini

System Engineer:
- Daniel Agulleiro

Humanities Computing Unit

Director:
- **Paola Merlo**

Academic Advisor:
- Sandra Rubal

Secretary:
- Eva Capitao

Information Service Science

Director:
- **Giovanna Di Marzo Serugendo**

Secretaries:
- Marie-France Culebras
- Elisabeth Giudicelli

Information Science Institute

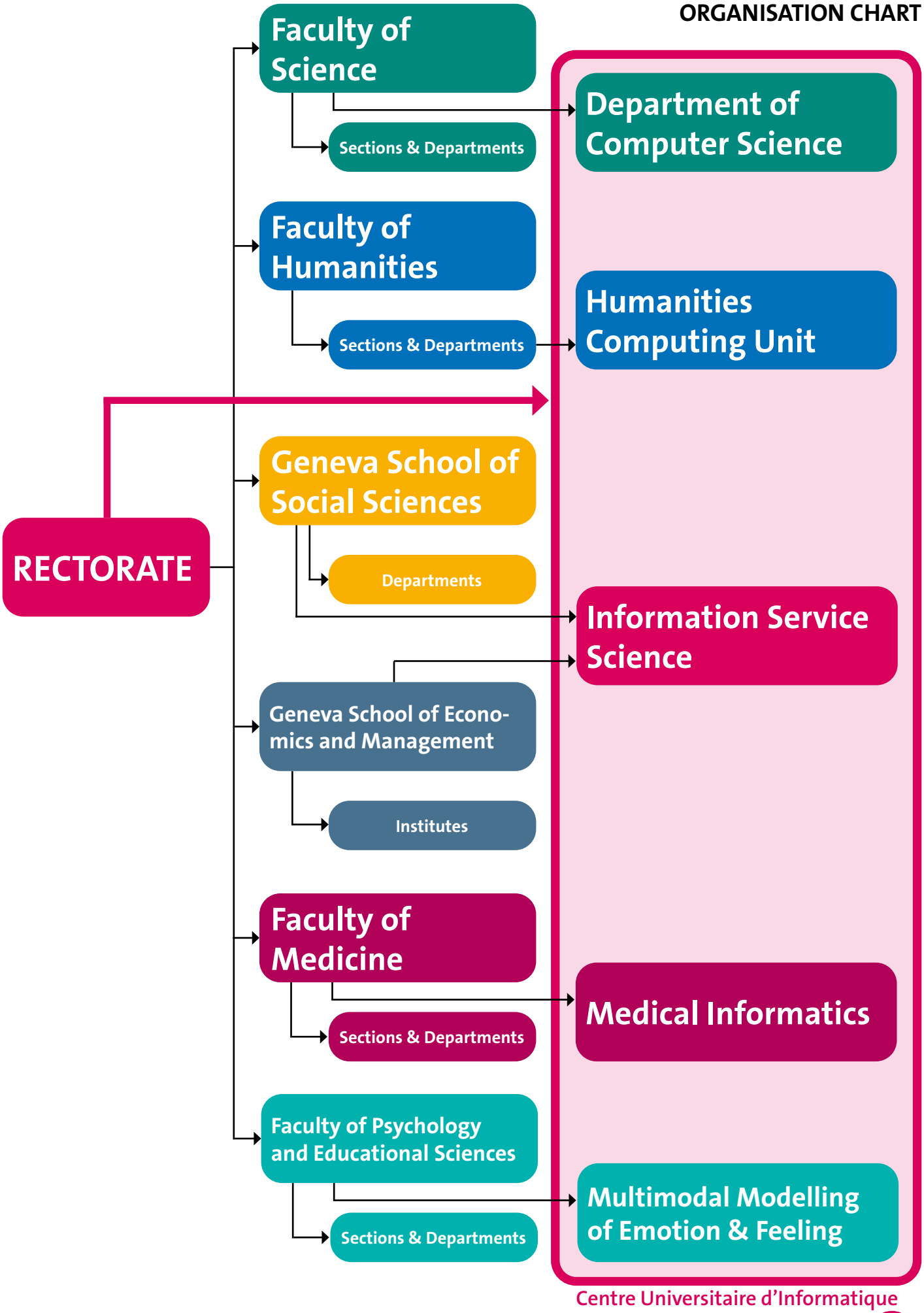
Director:
- **Dimitri Konstantas**

Medical Informatics

Director:
- **Antoine Geissbuhler**

Multimodal Modelling of Emotion & Feeling

Director:
- **David Rudrauf**


Faculty of Science
Sections & Departments
Department of Computer Science
Faculty of Humanities
Sections & Departments
Humanities Computing Unit
RECTORATE
Geneva School of Social Sciences
Departments
Information Service Science
Geneva School of Economics and Management
Institutes
Faculty of Medicine
Sections & Departments
Medical Informatics
Faculty of Psychology and Educational Sciences
Sections & Departments
Multimodal Modelling of Emotion & Feeling
Centre Universitaire d'Informatique

www.citizencyberlab.org

CCL

Citizen Cyberlab

Infoscope, Geneva, 2018 May 14th

Citizen Cyberlab

Domain Activities

At Citizen Cyberlab, we are developing methods and studying motivations for new forms of public participation in research. We are researchers from a diversity of backgrounds – history, informatics, learning, linguistics, medicine, physics, psychology and more. Jointly, we initiate projects and organise events that encourage citizens and scientists to collaborate in new ways to solve big challenges. From online crowdsourcing to in-person hackathons, we are exploring and expanding the limits of citizen science and human computation.

Citizen Cyberlab is based on a partnership between the **European Particle Physics Laboratory, CERN**, the **UN Institute for Training and Research, UNITAR**, and the **University of Geneva**, where several teams in different faculties contribute to the lab's activity. In the following, we report activities, events and publications by or involving CUI members of the Cyberlab team.

Team

Co-Directors

François Grey
Associate professor
H-index: 38

Rosy Mondardini

Prof. Bruno Strasser

Prof. Basile Zimmermann

Senior Lecturer

Dr. Thomas Maillart
Dr. Jose Luis Fernandez-Marquez

PhD. Students

Amudha Ravi Shankar
Mallory Zhan
Ahmed Riad
Fayez Hussein Fayez Alrafeea
Dana Mahr, postdoc, ERC/SNSF Consolidator Grant
Elise Tancoigne, postdoc, ERC/SNSF Consolidator Grant
Jérôme Baudry, postdoc, ERC/SNSF Consolidator Grant
Lucas Mueller, ERC/SNSF Consolidator Grant
Steven Piguet, scientific collaborator, ERC/SNSF Consolidator Grant
René Sigrist, scientific collaborator, ERC/SNSF Consolidator Grant
Martina von Arx, PhD Student, SNSF Sinergia

List of publications

Refereed papers in international journals

[1] Rafael Ruiz de Castañeda, Andrew M Durso, Nicolas Ray, José Luis Fernández, David J Williams, Gabriel Alcoba, François Chappuis, Marcel Salathé, Isabelle Bolon.Snakebite and snake identification: empowering neglected communities and health-care providers with AI. The Lancet Digital Health 1 (5), e202-e203

[2] Nicole E Kogan, Isabelle Bolon, Nicolas Ray, Gabriel Alcoba, Jose Luis Fernandez-Marquez, Martin M Müller, Sharada P Mohanty, Rafael Ruiz de Castañeda. Wet markets and food safety: TripAdvisor for JMIR public health and surveillance 5 (2), e11477

[3] R Ruiz de Castañeda, Francois Grey, David J Williams. Citizen surveys could map snakebite risks. Nature 571 (7766), 478-478

[4] Steffen Fritz, Linda See, Tyler Carlson, Mordechai Muki Haklay, Jessie L Oliver, Dilek Fraisl, Rosy Mondardini, Martin Brocklehurst, Lea A Shanley, Sven Schade, Uta Wehn, Tommaso Abrate, Janet Anstee, Stephan Arnold, Matthew Billot, Jillian Campbell, Jessica Espey, Margaret Gold, Gerid Hager, Shan He, Libby Hepburn, Angel Hsu, Deborah Long, Joan Masó, Ian McCallum, Maina Muniafu, Inian Moorthy, Michael Obersteiner, Alison J Parker, Maike Weisspflug, Sarah West. Citizen science and the United Nations sustainable development goals. Nature Sustainability 2 (10), 922-930

[5] Bruno J. Strasser, Jérôme Baudry, Dana Mahr, Gabriela Sanchez, Elise Tancoigne. (2019) « Citizen Science»? Rethinking Science and Public Participation. Science & Technology Studies 32, 52-76

[6] Bruno J. Strasser and Thomas Schlich. (2020) "A history of the medical mask and the rise of throwaway culture," The Lancet , 396(10243), P19-20

[7] Elise Tancoigne (2019), "Invisible brokers: 'Citizen Science' on Twitter", JCOM , 18, 6 : A05.

[8] Elise Tancoigne and Jérôme Baudry (2019), "La tête dans les étoiles ? Faire sens de l'engagement dans le projet de science participative SETI@home", Réseaux , n° 214-215, 2 : 109-140 (English version: "Stars in their eyes? Making sense of public involvement in the citizen science project SETI@home").

[9] Hadrien Macq, Elise Tancoigne, and Bruno J. Strasser (2020) "From Deliberation to Production: Public Participation in Science and Technology Policies of the European Commission (1998–2019)." Minerva , April 22

[10] Gregory Falco, Martin Eling, Danielle Jablanski, Matthias Weber, Virginia Miller, Lawrence A Gordon, Shaun Shuxun Wang, Joan Schmit, Russell Thomas, Mauro Elvedi, Thomas Maillart, Emy Donavan, Simon Dejung, Eric Durand, Franklin Nutter, Uzi Scheffer, Gil Arazi, Gilbert Ohana, Herbert Lin. Cyber risk research impeded by disciplinary barriers. Science 366 (6469), 1066-1069

[11] Katherine E Miller, Linda Bäbler, Thomas Maillart, Afik Faerman, Steven H Woodward. Sleep/wake detection by behavioral response to haptic stimuli. Journal of Clinical Sleep Medicine 15 (11), 1675-1681

[12] Thomas Maillart, Didier Sornette. Aristotle vs. Ringelmann: On superlinear production in open source software. Physica A: Statistical Mechanics and its Applications 523, 964-972

[13] Halabi, A., Zimmermann, B. Waves and forms: constructing the cultural in design. AI & Soc 34, 403–417 (2019). https://doi.org/10.1007/s00146-017-0713-8

Books and book chapters

[14] Bruno J Strasser (2019) Collecting Experiments: Making Big Data Biology . University of Chicago Press

[15] Jose Luis Fernandez-Marquez, Chiara Francalanci, Sharada Mohanty, Rosy Mondardini, Barbara Pernici, Gabriele Scalia. E2mC: Improving Rapid Mapping with Social Network Information. Organizing for the Digital World, Springer, Cham, 63-74.

Research and technical reports

[16] Amudha Ravi Shankar, Jose Luis Fernandez-Marquez, Barbara Pernici, Gabriele Scalia, Maria Rosa Mondardini, Giovanna Di Marzo Serugendo. Crowd4Ems: A crowdsourcing platform for gathering and geolocating social media content in disaster response. International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences. Copernicus (42). 331-340

[17] Sara Barozzi, Jose Luis Fernandez Marquez, Amudha Ravi Shankar, Barbara Pernici. Filtering images extracted from social media in the response phase of emergency events. 16th Conference on Information Systems for Crisis Response and Management, 1-12

[18] Strasser, BJ & M. Haklay (2018), Citizen Science: Expertise, Democracy, and Public Participation , Berne: CSSI

Others

Press and media

- Snakebite resolution set for Health Assembly approval, SciDevNet, 11.05.2018
- AI has 'enormous' potential to transform health sector, SwissInfo, 16.05.2018
- Les morsures de serpents cartographiées, RTS, 13.07.2018
- UNIGE: une carte planétaire des morsures de serpent, SwissInfo.ch, 13.07.2018
- La lutte contre les serpents dangereux s'intensifie, Tribune de Genève, 13.07.2018
- Serpents, poison des zones rurales, Le Temps, 10.04.2018

Funded research projects

Participation to European projects

Geneva Tsinghua Initiative
The Geneva Tsinghua Initiative is the world's first comprehensive education programme for the SDGs
Director: François Grey
Period: 2016 - 2023
Website: https://gt-initiative.org/

E2mC: Evolution of Emergency Copernicus services project
The E2mC Project is co-funded by the European commission / H2020 Programme
Grant Agreement No. 730082
Principal investigator: François Grey
Period: 2016 - 2019

DITOs: Doing It Together science
The DITOS Project is co-funded by the European commission / H2020 Programme
Grant Agreement No. 709443
Principal investigator: Bruno Strasser
Period: 2016 - 2019

Participation to National projects

The Rise of Citizen Science? Rethinking Science and Public Participation
The Project is an ERC/SNF Consolidator Grant funded by the SNF. BSCGIO_158887
Principal investigator: Bruno Strasser
Period: 2015 - 2020

Development of Personalized Health in Switzerland: Social Sciences Perspectives
SNSF Sinergia grant
Co-Principal investigator: Bruno Strasser
Period: 2019 - 2022

SDG Solution Kit: enhancing bottom-up citizen science initiatives
The SDG Solution kit is co-funded by the Boninchi Foundation
Principal investigator: François Grey
Period: 2017 - 2019

Interactional expertise, forms and the Imitation Game : the integration of migrants in Beijing municipality
Funded by China Study Plan
Principal investigator: Basile Zimmermann
Period: 2015 - 2019

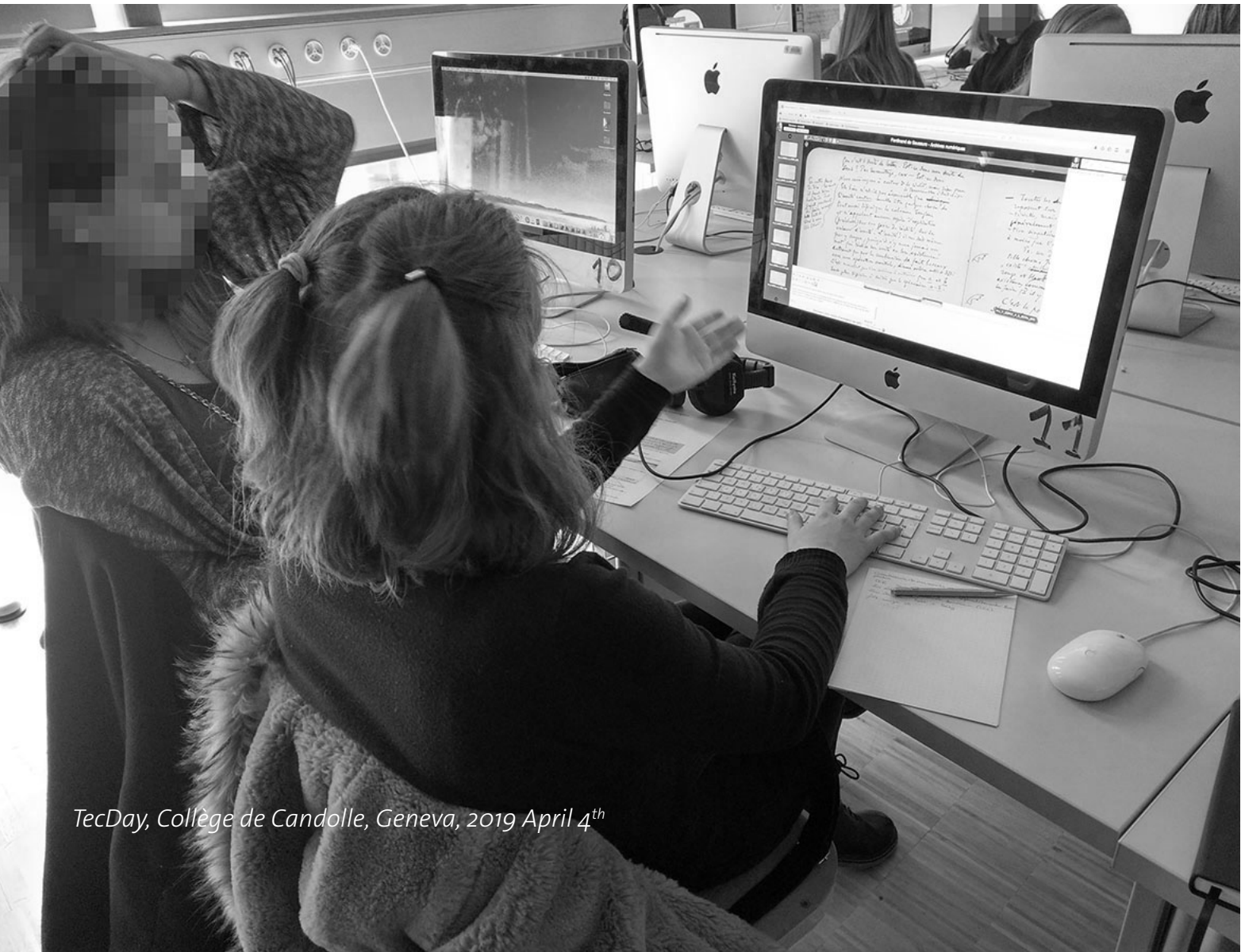
Teaching

- **Citizen Science on the Web** (Master), spring semester, (principal teacher: Francois Grey, participating teachers: , Jose Luis Fernandez Marquez, Rosy Mondardini, Thomas Maillart) 6 students in 2019.
- **Open Science** (Bachelor), autumn semester, (principal teacher: Francois Grey, participating teachers: , Jose Luis Fernandez Marquez, Rosy Mondardini, Thomas Maillart) 39 students in 2019.
- **Sustainable Development and Political Agendas** (Master) autumn semester, (principal teacher: Jörg Balsiger, participating: Francois Grey, Jose Luis Fernandez Marquez, Rosy Mondardini, Thomas Maillart), 30 students in 2019.
- **Science Expertise and Sustainable Development** (Master) spring semester (principal teacher: Bruno Strasser, participating: Thomas Maillart and Francois Grey), 25 students in 2019.

clcl.unige.ch

CLCL

Computational Learning and Computational Linguistics



TecDay, Collège de Candolle, Geneva, 2019 April 4th

Computational Learning and Computational Linguistics

Domain activities

All speakers can understand a sentence never heard before, or derive the meaning of a word or a sentence from its parts. And yet, these basic linguistic skills have proven very hard to reach by computational models. The current reported success of machine learning architectures is based on computationally expensive algorithms and prohibitively large amounts of data that are available for only a few, non-representative languages.

The Computational Linguistics and Computational Learning (CLCL) Research Group (http://clcl.unige.ch/) is concerned with interdisciplinary research combining linguistic modelling with machine learning techniques. We study the notion of similarity and association in the human mono-linguland bilingual lexicon and compare it to current vectorial representations; we study the properties of argument structures and clauses as an expression of their local and non-local compositionality; we address the problem of language universals — rules and principles that are the same for all languages in the world despite their great apparent diversity.

Team

Directors
Paola Merlo
Associate professor
H-index: 22

Assistants (PhD students)
Francesco Ackermann
Maria Andueza Rodriguez
Haozhou Wang

Administration
Eva Capitao

List of publications

Refereed papers in international journals

[1] Paola Merlo and Maria A. Rodriguez (2019), Cross-lingual word embeddings and the structure of the human bilingual lexicon, Proceedings of the Conference on Natural Language Learning (CONLL'19), Brussels.

[2] Haozhou Wang, James Henderson and Paola Merlo (2019), Weakly-Supervised Concept-based Adversarial Learning for Cross-lingual Word Embeddings, Proceedings of the conference on Empirical Methods in Natural Language Processing and 9th International Joint Conference on Natural Language Processing, November,Hong Kong.

[3] Paola Merlo (2019), Probing word and sentence embeddings for long-distance dependencies effects in French and English, Proceedings of the 2019 ACL Workshop BlackboxNLP: Analyzing and Interpreting Neural Networks for NLP.

[4] Giuseppe Samo and Paola Merlo (2019), Intervention effects in object relatives in English and Italian: a study in quantitative computational syntax», Proceedings of SyntaxFest, August, Paris, France.

International and national advisory committees

- Paola Merlo, Member of the Executive Board for the Association for Computational Linguistics.

International and national Research Programs Committees

- Expert for ERC Consolidator and Starting Grants.

PhD Thesis Committees

- Myriam De L'Honeux, Linguistics, Uppsala, November 2019, external examiner.

Member of conference/workshop program committees

- Conference on Empirical Methods in NLP, EMNLP 2019, Hong Kong.
- Annual Meeting of the Association for Computational Linguistics, ACL 2019, Florence.
- American Association for Artificial Intelligence, (AAAI) 2019.

Funded research projects

Participation to National projects

LAOS (Learning Representations of Abstraction in Text)
SNF
Principal Investigator: James Henderson
Idiap Research Institute
Period: Oct. 2018 - Sept. 2022

INTREPID (Automated interpretation of political and economic policy documents: Machine learning using semantic and syntactic information)
SNF Sinergia
Idiap Research Institute, Graduate Institute of International and Development Studies
Principal Investigator: James Henderson
Idiap Research Institute
Period: Jan. 2019 - Dec. 2022

Others

Refeereeing

- Language

Press Release

- SNF page on NCCR: http://www.snf.ch/en/researchinFocus/newsroom/Pages/news-191216-new-national-centres-of-competence-in-research.aspx).

Invited talks

- Syntaxfest, Computational Quantitative Syntax: long-distance dependencies, Paris, August 2019.

Others

- Member of the External Advisory Board of the Centre of Doctoral Training on NLP, University of Edinburgh, starting Fall 2019.
- Kristina Gulordava, Latsis Prize for her doctoral dissertation, University of Geneva. https://www.unige.ch/cite/evenements/prix-latsis-universitaires/precedentes-edition/prix-latsis-2019/
- Paola Merlo Fellow of the Association for Computational Linguistics
- For pioneering research on the fundamental problem of verb predicate-argument structure and the automatic acquisition of the lexical, syntactic and lexical semantic properties of verbs, as well as for valuable service to ACL as editor of the CL journal: https://www.aclweb.org/portal/content/acl-fellows-2019

Teaching

- **Développement Web**, Bachelor, 6 ECTS, 39 hours, 25 students
- **Algorithmique et programmation**, Bachelor, 6 ECTS, 65 hours, 15 students
- **Bases de données**, Bachelor, 6 ECTS, 22 hours (TP), 12 students
- **Structure de données et programmation orientée objets**, Bachelor, 6 ECTS, 56 hours, 7 students
- **Artificial Intelligence: Principles and methods**, Bachelor, 4 ECTS, 56 hours, 18 students
- **Traitement automatique du langage: approches linguistiques et approches statistiques**, Master, 6 ECTS, 56 hours, 21 students
- **Traitement automatique du langage: projet**, Master, 6 ECTS, 2 students
- **Empirical Methods in Natural Language Processing**, Master, 6 ECTS, 56 hours, 12 students
- **Nouvelles Technologies de l'Information et de la Communication**, Bachelor, 6 ECTS, 56 hours, 20 students

Figure 1: Kristina Gulordava, Latsis Prize

cvml.unige.ch

CVML

Computer Vision and Multimedia Laboratory

(R)amène ta science, C.O. Vuillonnex, Geneva, 2019 April 12th

Computer Vision and Multimedia Laboratory

Domain activities

The **Computer Vision and Multimedia Laboratory** (CVML, http://cvml.unige.ch), divided into three groups, carries out research in multimedia data processing, multimedia data management and security, as well as in multimodal human-machine interaction. Research applies to media such as text, audio tracks, sounds, images and videos, and to physiological signals.

Information Retrieval and Machine Learning group (Viper, Prof. S. Marchand-Maillet, Prof. A. Kalousis, http://viper.unige.ch): develops strategies for the efficient modeling, indexing, retrieval and exploration of large-scale datasets. The group studies fundamental machine learning strategies to provide efficient and accurate understanding and access to large-scale collections of complex data. Research themes include information retrieval, recommendation systems, data analytics and exploration, learning over sequential and temporal data, structured and kernel learning, regularization techniques for neural networks. Applications are considered in the fields of data visualization, forecasting, IoT, chemoinformatics, biomedicine.

Stochastic Information Processing group (SIP, Prof. S. Voloshynovskiy, http://sip.unige.ch): studies various aspects of information theory and statistical (stochastic) information analysis and processing. The applications mostly cover object identification and authentication based on unclonable object features in large nonstructured databases originating from various imaging techniques, mass-spectrometry and bioinformatics. Current research also concerns privacy preserving search, indexing and multiclass classification.

Multimodal Interaction group (MMI, Prof. T. Pun, Dr. G. Chanel, http://cvml.unige.ch/MMI): affective computing and multimodal interaction. Studies various forms of interaction between humans, computers, and environment. Used modalities: haptic, auditory, visual (e.g. facial expressions measured by a camera), eye-movements, and based on physiological signals such as EEGs (electroencephalograms),EMG (electromyograms), blood pressure, galvanic skin resistance (GSR) and skin temperature, breathing rate. Current developments concern: affective state determination and emotion recognition and their use for affective computing, multimodal interaction, brain-computer interfaces, the domain of entertainment, mobility aids for sight handicapped people and for the elderly. Member of the Swiss Center for Affective Sciences. Strong cooperation with faculties of psychology, literature and medicine.

The CVML has various specialized equipment and associated software:

- portable microscope with wireless communications for item identification and authentication;
- Computer cluster of 20 Dual Core 3GHz PCs each with 8 Gb RAM and 500Gb disk, inter-connected with GigaBit Ethernet.
- servers with high storage (overall 5Tb, Raid 5) and processing capabilities (1 Transtec Calleo (2 Xeon Dual Core, 12Gb RAM) and 2 SunFire X4150 (2 QuadCore, 32Gb RAM each), all 64bits architecture).
- Biosemi Active II EEG acquisition system (http://www.biosemi.com/) with 64+16 electrodes, with other sensors to record heart rate, GSR, skin temperature, breathing rate, blood pressure, and EMGs;
- Guger Technology gTec gMobilab+ mobile physiological signals recording system (http://www.gtec.at/);
- Eckel C14 audiometric research chamber (http://www.eckel.ca/) with electromagnetic insulation (Faraday cage), 2.16m x 1.80m x 2.37m;
- Eye-trackers: Tobii Pro TX300, Tobii nano, QuickGlance 2 (EyeTech Digital Systems);
- head-mounted display Emagin z800;
- stereo cameras: Videre Design STH-MDCS2, Bumblebee CCD BB2-03S2C-60;
- 3D time-of-flight camera SR4000 3D;
- combined 3D time-of-flight + luminance camera PMD CamCube 3.0 200x200 pixels;
- combined 3D + color camera Microsoft Kinect, Lytro, etc.;
- light field camera: Raytrix.
- Wearables: E4 wristband, Microsoftband, bitalino, seeeduino, ...

Team

Direction

Thierry Pun
Full professor
H-index: 56
(Honorary professor since August 2018)

Sviatoslav Voloshynovskiy
Associate professor
H-index: 34

Stéphane Marchand-Maillet
Associate professor
H-index: 25

Alexandros Kalousis
Full professor
University of Applied Studies, Geneva School of Business Administration
H-index: 30

Guillaume Chanel
Senior Lecturer and Researcher (also affiliated with the Swiss Center for Affective Science)
H-index: 25

Senior researchers

Dr. Guido Bologna (also affiliated with University of Applied Studies, Geneva)
Dr. Mohammad Soleymani
Dr. Taras Holotyak
Dr. Anna Aljanaki

Assistants (PhD students)

Lionel Blondé
François Bogacz
Etienne Brangbour
Sohrab Ferdowsi
Magda Gregorova
Dimche Kostadinov
Amina Mollaysa
Michal Muszinsky
Xavier Ouvrard
Dimitris Dardanis
Jason Ramapuram
Soheil Rayat-Doost
Pablo Strasser
Chen Wang
Olga Taran
Shideh Rezaeifar
Behrooz Razeghi
Denis Ullmann
Slavi Boney
Brandon Panos

Developers / Designers

Maurits Diephuis

Administration

Maëlle Saintilan

List of publications

Refereed papers in international journals

[1] S. Voloshynovskiy, M. Kondah, S. Rezaeifar, O. Taran, T. Hotolyak, and D. J. Rezende, «Information bottleneck through variational glasses,» in Proc. NeurIPS Workshop on Bayesian Deep Learning, Vancouver, Canada, 2019.

[2] B. Razeghi, T. Stanko, B. Škoric´, and S. Voloshynovskiy, «Single-Component Privacy Guarantees in Helper Data Systems and Sparse Coding with Ambiguation,» in Proc. IEEE International Workshop on Information Forensics and Security (WIFS), Delft, Netherlands, 2019.

[3] O. Taran, S. Rezaeifar, T. Holotyak, and S. Voloshynovskiy, «Robustification of deep net classifiers by key based diversified aggregation with pre-filtering,» in Proc. IEEE International Conference on Image Processing (ICIP), Taipei, Taiwan, 2019.

[4] S. Rezaeifar, B. Razeghi, O. Taran, T. Holotyak, and S. Voloshynovskiy, «Reconstruction of privacy-sensitive data from protected templates,» in Proc. IEEE International Conference on Image Processing (ICIP), Taipei, Taiwan, 2019. [pdf|bib]

[5] O. Taran, S. Rezaeifar, T. Holotyak, and S. Voloshynovskiy, «Defending against adversarial attacks by randomized diversification,» in Proc. IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Long Beach, USA, 2019.

[6] M. Gheisari, T. Furon, L. Amsaleg, B. Razeghi, and S. Voloshynovskiy, «Aggregation and Embedding for Group Membership Verification,» in Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Brighton, United Kingdom, 2019.

[7] O. Taran, S. Bonev, and S. Voloshynovskiy, «Clonability of anti-counterfeiting printable graphical codes: a machine learning approach,» in Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Brighton, United Kingdom, 2019.

[8] D. Kostadinov, B. Razeghi, S. Rezaeifar, and S. Voloshynovskiy, «Supervised Joint Nonlinear Transform Learning with Discriminative-Ambiguous Prior for Generic Privacy-Preserved Features,» in Proc. 53rd Annual Conference on Information Systems & Sciencese (CISS), Maryland, USA, 2019.

Funded research projects

Participation to European projects

IMPRESSIONS

Seconds that matter: Managing first impressions for a more engaging virtual agent

Nr. 200021E-164326 / 1, Lead Agency Framework

Joint French - Swiss project

French principal investigator: Prof. C. Pélachaud, Télécom-ParisTec.

Swiss principal investigator: Prof. T. Pun, Dr. G. Chanel

Period: July 2016 - June 2019

Participation to National projects

FNRS-SNSF, Swiss National Science Foundation:

Impressions (Seconds that matter: Managing first impressions for a more engaging virtual agent)

SNF Nr. 200021E-164326 / 1, Lead Agency Framework, joint French-Swiss project.

French principal investigator: Prof. C. Pélachaud, Télécom-ParisTec. Swiss co-PI: Prof. T. Pun, Dr. G. Chanel.

Period: June 2016 - June 2020

Machine Learning based Analytics for Big Data in Astronomy

SNF NRP75 project (407540_167158)

Joint project between the University of Geneva and Fachhochschule Nordwestschweiz.

Principal investigator for the entire project: Prof. S. Voloshynovskiy, Computer Science Dpt., Univ. of Geneva

Period: May 2017 - April 2020

Identification for the Internet of Things

SNF project (20CH21_167543)

CHIST-ERA project with the Technical University of Eindhoven (PI of this project), the Netherlands, INRIA/IRISA-Rennes, France and the University of Geneva.

Principal investigator at the University of Geneva: Prof. S. Voloshynovskiy, Computer Science Dpt., Univ. of Geneva

Period: February 2017 - January 2020

Others

PubliMAPE: (PUBLic Information MAPped to Environmental events)

Joint project between University of Geneva and Luxembourg Institute of Science and Technology (LIST).

Principal investigator: Dr. Pierrick Bruneau (LIST).

Prof. Stéphane Marchand-Maillet

Period: September 2017 - August 2020

CollSpotting: Visualisation of Large-Scale Collaboration Networks

Joint project between University of Geneva and CERN

Principal investigator: Dr. J-M Le Goff (CERN).

Prof. Stéphane Marchand-Maillet

Period: September 2016 - August 2019

Technology transfer

- **Spin-off: Anteleon Imaging S.A.R.L.** (founded August 2003, http://www.anteleon.com/), specialized in multimedia documents protection and management, watermarking, authentication and tamper proofing as well as brands protection.
- **U-nica Sytems**, AG (Malans) (http://www.u-nica.com) according to Collaborative and Research Agreement between the University of Geneva and U-nica Systems in the domain of physical object protections against counterfeiting based on the University of Geneva patented technology.
- **GEDECE, S.A.R.L.** Geneva (http://www.gedece.org) technology licencing and collaboration in the domain of physical objects security and image processing.
- **Guillaume Chanel was mandated by Airbus**, Toulouse, France from June 2017 to December 2018 to work on ambulatory health monitoring.
- **Patent application**: S. Voloshynovskiy, M. Ferrari, O. Taran, T. Holotyak, K. Eigazarian, Signal sampling with joint training of learnable priors for sampling operator and decoder, August 28, 2018 (submitted).

Open software and databases

CSEM 25
Title of the service/product/process: CSEM-25
Type: dataset of object classes
External partners involved in the development (if any): CSEM
Client or End user(s) : Computer vision community
Brief description: Captured with a Raytrix R5 camera, CSEM-25 is a multipurpose dataset of 5 object classes to address several aspects of computer vision applications using light field with a lens-grid-based representation.
Website: http://csem.ch/csem-25-db

GIF interestingness database
- Title of the service/product/process: GIF interestingness database
- Type (software, educational program, database, etc.): dataset of GIFs
- External partners involved in the development (if any): ETH Zurich
- Client or End user(s) : Multimedia community
- brief description (1 line): It is a collection of GIFs with labels on emotions, aesthetics and interest.

Image interestingness database
Title of the service/product/process: Image interestingness database
Type: dataset of 1005 images
External partners involved in the development (if any): none
Client or End user(s) : Computer vision and multimedia community
Brief description: It is a collection of photos with labels on emotion, aesthetics and interest.

Emotion in Music database
Title of the service/product/process: Emotion in Music database
Type: dataset of more than 2700 songs
External partners involved in the development (if any): Academia Sinica, Taiwan, Utrecht University, the Netherlands
Client or End user(s) : Music information retrieval community, psychologists
Brief description: It is a collection of songs with creative commons license with dynamic and static emotional annotations.

MAHNOB-HCI database
Title of the service/product/process: MAHNOB-HCI database
Type: database of emotional responses
External partners involved in the development (if any): Imperial College London, UK
Client or End user(s) : Researchers from affective computing, computer vision and psychology
Brief description: A database of emotional reactions to videos including, facial expressions, physiological signals and eye gaze.

DEAP
Title of the service/product/process: DEAP
Type: database of emotional responses
External partners involved in the development (if any): Queen Mary University of London, UK, University of Twente, Netherlands, EPFL
Client or End user(s) : Researchers fro maffective computing, computer vision and psychology
Brief description: A database of emotional reactions to music videos including, facial expressions and physiological signals

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TEAP
Title of the service/product/process: TEAP
Type: Toolbox (open source)
External partners involved in the development (if any): none
Client or End user(s) : Researchers from affective computing and physiological signal analysis
Brief description: A toolbox for extracting emotionally relevant features from physiological signals

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EATMINT
Title of the service/product/process: EATMINT database
Type: Database
External partners involved in the development (if any): none
Client or End user(s) : Researchers from affective computing and social signal processing
Brief description: A database for the analysis of collaboration from behaviors and physiological reactions

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PharmaPack
- Title of the service/product/process: PharmaPack database of pharmaceutical packages acquired by mobile phones
- Type (software, educational program, database, etc.): Database of 1000 packages enrolled from 54 positions in automatic mode and 16 hand-held recognition images.
- External partners involved in the development (if any): none

Teaching

- **Human-computer interaction** (Affective computing and multimodal interaction part), Master, with Profs. G. Falquet et L. Moccozet. 56h practical work, approx. 10 students. 8 ECTS.
- **Digital image processing and synthesis**, Computer Science, 3rd year Bachelor, T. Pun, optional for Master and postgraduate students, 56h. course and 56h. practical work, approx. 15-20 students. 8 ECTS.
- **Introduction to algorithms**, Computer Science, 1st year Bachelor, 56h. course, 28h exercises and 56h. lab work, approx. 40-50 students, T. Pun
- **Avanced image processing**, Computer Science, Master, postgrades, 28h. course and 28h. practical work, approx. 8 students.
- **Elements of information theory**, Computer Science, 2nd year Bachelor, Master, postgrades, 28h. course and 28h. practical work, approx. 25 students.
- **Data mining**, Computer Science, 3rd year, Master in statistics, 1st year, 28h. course and 28h. practical work, aprox. 20 students.
- **Artificial Intelligence**, Computer Science, 3rd year, 28h. course and 28h. practical work, aprox. 30 students. 4 ECTS.
- **Multimedia security and privacy**, Computer Science, Master, postgrades, 28h. course and 28h. practical work, approx. 8 students.
- **Information Retrieval**, Computer Science, Master, postgrades, 28h. course and 28h. practical work, approx. 15 students. 4 ECTS
- **Information Analysis and Processing**, Computer Science, Master, postgrades, 28h. course and 28h. practical work, approx. 25 students. 4 ECTS
- **Data Structures**, Computer Science, 1st year Bachelor, 56h. course and 56h. lab work, approx. 30 students. 7 ECTS
- **Hands-on Programming** (practical complement to Data Structures), 1st year Bachelor. 56h Practical work, 20 students.
- **Operating systems** (Systèmes informatiques), 2nd year Bachelor, 28h course, 28h exercices, 56h lab work, 15 students, Dr. J.-L. Falcone
- **Computer Science Project**, Computer science, 3rd year Bachelor, 28 hours course and 56 hours lab. Approximately 10 students.
- **Computer Science Applications**, 2nd year Bachelor, 40 hours of applied computer science with a real client, approx. 15 students
- **Industrial Internships**, Summer Semester (3 months supervision), 5 students.
- **Weekly Computer Vision and Multimedia seminars**, graduate students and senior researchers, 1h. per week, about 15 PhD students, post-docs, seniors, visitors.

iss.unige.ch

ISS

Institute of Information Service Science

Infoscope, Geneva, 2018

Institute of Information Service Science

Team

Senior Researchers
Dr. Grigorios Anagnostopoulos
Maher Ben Moussa
Dr. Giuseppe Cosenza
Dr. Vincenzo Daponte
Dr. Michel Deriaz
Dr. Marios Fanourakis
Dr. Akram Abdulghani Hezam Mohammed
Dr. Abdelaziz Khadraoui
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Mariem Jaouadi
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Giovanna Di Marzo Serugendo
Full professor
H-index: 29

Gilles Falquet
Associate professor
H-index: 18

Dimitri Konstantas
Full professor
H-index: 29

Michel Léonard
Honorary professor
H-index: 21

Nadia Magnenat-Thalmann
Honorary professor
H-index: 90

Claudine Métral
MER

Laurent Moccozet
MER
H-index: 17

Jean-Henry Morin
Associate professor

Jolita Ralyté
MER
H-index: 22

Jean-Marc Seigneur
MER
H-index: 20

Katarzyna Wac
Associate professor
H-index: 24

Panagiotis Kostopoulos
Michaël Reolon
Mathieu Tappolet

Fellowships
Sophie Pusterla

Visiting Academic Guests
Dr. Antoine Burret
Anne-Françoise Cutting-Decelle
Zang Fanglue
Jean-Pierre Hurni
Dr. Gerlinde Kristahn

Thang Le Dinh
Tang Min
Yanlong Tang
Ruofeng Tong
Tommaso Venturini
Sharon Wulfovich

Administration
Marie-France Culebras
Elisabeth Giudicelli

Domain activities

Services represent the most growing sector of the economy in industrialized nations. Services science is arising from the rapid development of services across the industrial world and the need to analyze and study the organization, deployment, maintenance and operation of those related IT based and IT supported services. Services Science represents an interdisciplinary approach to the systematic innovation in service systems, integrating management, social, legal and engineering aspects.

ISS is an inter-faculty research laboratory of the Centre Universitaire d'Informatique of the University of Geneva (iss.unige.ch). As a team of 65 staff members, we are active in research, technology watch, creativity and teaching. We are currently participating in 29 research projects (EU/Cost/CTI/SNF/Private funding) representing a funding of 3.3M/year.
By its very mission, ISS targets research-led innovative services exploiting information and digital technology, such as services for mobile users, for seniors, or for specific industry needs. We developed a series of solutions specifically targeting the seven application domains:

- Smart and Sustainable Cities
- Digital Humanities
- Environment
- Health and Quality of Life
- Information Security
- Indoor positioning
- Processing data coming from smartphone or wearable sensors

Our major areas of research cover:

- Autonomous Adaptive Services, Pervasive Services
- Services for mobile users
- Multimedia services
- Digital Rights Management and Policies for Services
- Knowledge Engineering, Semantic Web, Ontology
- M-health, E-Health, Ambient Assisted Living
- Multimedia Services, Virtual Reality, Augmented Reality
- Modeling, Business Process Methods
- Trust and Online Reputation Management
- Augmented Human
- Smart City Digital Management
- Service Law Compliance
- Geographical Information Systems
- E-Learning
- Social Networks Analysis, Predictive analytics
- Indoor positioning
- Processing data coming from smartphone or wearable sensors
- Data visualization in 3D city models
- Quality of data and semantic queries in volunteer geographic information

We are also part of the Hub in Environmental Informatics of the University of Geneva aiming at developing research and teaching in this area.

Our additional strong involvement in interdisciplinary think groups places us at the forefront of the technology watch in Services Science in Switzerland. We regularly contribute to creativity and innovation hands-on experiments targeted at industry. We also participate to a full range of academic programs in Information Systems and Services Science (BSc, Msc, Executive Programs and PhD).

Our international network includes many academic institutions, public administrations, creativity and innovation consultants, think tanks and services providers across Europe, Asia, North America.

Gilles Falquet, Laurent Moccozet and Claudine Métral - Knowledge Engineering @ ISS

Knowledge Engineering @ ISS is a research laboratory of the Institute for Information Service Science (ISS) within the Center for Computing (CUI) at the University of Geneva. KE@ISS is conducting research on knowledge engineering: knowledge representation, knowledge-based information systems, and interfaces to access knowledge, with an emphasis on ontologies, semantic web, information extraction, and space-related applications.

The main results obtained in 2019 relate to

- Information extraction and classification to improve the security of the Internet of things through semantic firewalls;
- The contextualization of knowledge graphs: creation of a language to express contextualized ontologies and knowledge graphs, development of a complete contextual reasoning system for this language;
- The visualization of scientific knowledge: creation of an ontology of scientific knowledge objects and a visualization system to map knowledge entities to visual entities;
- The publication of geospatial data on the Semantic Web: definition of a technique to formally specify how geospatial data from several sources are integrated and mapped to linked-data entities.

Nadia Magnenat-Thalmann - MIRALab

MIRALab was founded in 1989 by Professor Nadia Magnenat-Thalmann and has brought together PhD students and researchers from different fields, from 3D graphics, 3D simulation, social robotics, 3D fashion design, and cognitive science. This truly interdisciplinary group continues to work in the field of medical informatics, virtual worlds, and virtual humans.

Since 1992, MIRALab has participated in more than 50 European Projects and contributes to the organization of two International Conferences, CASA and CGI.

In 2019, MIRALab is working on the European project ViMM (Virtual Multimodal Museum). This project is a major, high-impact Coordination and Support Action (CSA - 2016 - COOP-8) for Virtual Museums, within the overall context of European policy and practice on Digital Cultural Heritage. This project is supported by a set of 50 excellence examples and three regional case studies in culturally rich regions of South Europe recovering from economic recession. The results of this work are visible on the ViMM website www.vi-mm.eu and through its social media.

Jean-Marc Seigneur - Computational Trust & Augmented Human

For ages, humans have used the human notion of trust as a means to cope with uncertainty, to engage in an action in spite of the risk of a harmful outcome. More recently, computational models of this human notion of trust have been researched in order to be able to use trust in the digital world as well, between computers and/or digital accounts controlled by remote humans, from direct observations to recommendations and online reputation. Decentralized trust solutions such as blockchains are revolutionizing many business domains from banking to supply chain certification. In the near future, it is even envisioned that humans and computers merge together: Elon Musk has recently created a new venture for implants in the human brain with the aim to help human beings merge with software and keep pace with advancements in artificial intelligence. It seems that there is an increasing trend towards augmenting humans not only to retrieve their abilities after being disabled but also beyond their normal abilities. We have contributed to this trend with the organization since 2010 of the augmented human international conferences focusing on scientific contributions towards augmenting human capabilities through technology. We are researching how these augmented human technologies can improve computational trust assessment not only of machines but also of humans.

Giovanna Di Marzo Serugendo - Collective Adaptive Systems - http://unige.ch/cui/cas/

Collective Adaptive Systems refer to a form of complex systems where a large number of heterogeneous entities interact without specific external or internal central control, adapt their behaviour to environmental settings in pursuit of an individual or collective goal. Actual behaviour arises as an emergent property through swarm or collective intelligence.

Examples include understanding emergence and social behaviour of natural life (e.g. bacteria self-organising to overcome shortage of food), engineering swarm robotics, developing socio-technical systems and more generally developing services for smart and sustainable cities. We lead and develop research in three main areas:

- Studying natural systems (e.g. biological, social, human ones) and identifying essential models, mechanisms and interactions at work at the heart of those systems, mostly through agent-based models, simulations and design patterns.
- Designing and developing artificial collective adaptive systems and different forms of emergent behaviour (e.g. swarm robotics, ecosystems of spatial services for smart cities, higher-order emergence)
- Verifying the reliability and trustworthiness of those systems prior to their deployment in real-life settings.

Jean-Henry Morin - Digital Rights & Policy

As our society and economy continues to move towards interwoven digital services and systems, blending the real and the artificial world, our research activities continue to investigate some of the complex challenges and issues towards a more sustainable and responsible digital society. Information Protection and Control (IPC) in general and the growing need for Data Protection have become recognized area where increased research is needed. We continue our work in those areas with a particular look at distributed ledger technologies (blockchain) as a mechanism to support new services and designs to support increasingly complex requirements. Major examples of these research issues we are currently working on include data marketplace ecosystems, dispute resolution and arbitration, data protection and digital rights and policy management.

From July 2016 to July 2017, Jean-Henry Morin is on sabbatical leave in South Korea where he is Invited Professor at Korea University Business School and Yonsei School of Business. During this time, he is also invited researcher at Fasoo.com where he investigates blockchain technologies in Information Security.

Dimitri Konstantas - Mobile services
Mobile services and applications are today an indispensable part of our daily life. We are using our smartphones to access our mail, chat with friends and colleagues, take and store photographs and videos, obtain guidance and route information, play games, access the internet and even measure our daily activities and our physical performance and obtain highly personalized services and information. In other words, smartphones are today indispensable to all our daily activities. For the past few years we have been working in the development of mobile services and applications in different domains, including services for the elderly, services for civil engineers and security applications.
Since 2009 we have been applying the results of our research in the study and development of services for the aging society and for mobile services of elderly. In this context, in 2016 we have succeeded acquiring 4 European projects in the Ambient Assisted Living (AAL) program, 2 technology transfer projects (CTI), one FNRS project (memory condition of Eldrrly) and one H2020 (Security in IoT). Our work in the domain of ageing society concentrates in the study of lifestyle of senior persons (age 65 and more) and the creation of mobile services for monitoring the activities of the users and providing them proactive information regarding activities to do (realising the basic directive for senior persons : do not stay inactive), putting them in contact with other users with similar interests (socialisation), providing them the means for getting help from formal and informal care givers, and even advising them on diet and exercise. In this projects we collaborate with local (Geneva based) industrial partners that are offering services for seniors. The research results from the AAL and H2020 projects are then transfered, via the CTI technology transfer projects, towards commercial applications and services. Our research is carried out in four specialised Laboratories, the Conscious Analytics System Laboratory (CASlab), the Quality of Life Laboratory (QoL), the Travelling and Mobility Laboratory (TaM) and the Security Laboratory (SecLab).

Jolita Ralyté - Digital Transformation
Digital transformation is not just the adoption of new information technologies and the computerization of human activities. It embraces much broader strategic ambitions and involves fundamental changes in the activities, structure and even culture of the organization, with the primary goal of innovating and creating value. Service Science plays a driving role in digital transformation by providing key concepts, such as information service and service system, that facilitate business innovation through the integration of digital technologies. The approach for information service and system engineering must be necessarily exploratory, agile, and contributory, as the implementation of new services transforms the daily life of many people, and affects the organisation's activity and even its position in the ecosystem. Such transformation has to be understood, assessed and accepted by all parties. To be successful, it must be value-driven and ensure the involvement of all stakeholders by making them responsible co-creators. The transdisciplinary is another dimension to be considered in service co-creation as it allows to cross the borders of the conventional information system engineering and create new capabilities and new values. To make the approach holistic, we need to consider many other service-related aspects, such as ethics, accountability, compliance to the regulatory framework, and risks. The robustness and sustainability of services will depend not only on the quality but also on the situational-fitness of the approach. Indeed, the context and requirements of each organisation facing the digital transformation challenge is different, and therefore requires a situation-specific approach. We apply situational Method Engineering principles and techniques for developing our approach and defining contextual criteria for its configuration and application.

Michel Deriaz - TaM group
Welcome to TaM, the Travelling and Mobility R&D team from the University of Geneva. We are specialized on indoor positioning as well as on processing data coming from smartphone or wearable's sensors. Most of our innovative solutions are developed on Android phones. To understand the users' needs and deploy our solutions in the market, we benefit from strong links with industrial partners.
The TaM group is a member of the Institute of Services Science (ISS) and belongs to the Computer Science Centre (CUI, for Centre Universitaire d'Informatique) from the University of Geneva. Our team is today composed of PhD candidates, scientists and developers. Some of us are used to work in private companies. We have the know-how to cover the complete lifecycle of a R&D project, from its initial idea to a fully operational prototype. By using agile development methods, we combine the advantages of fast prototyping, early involvement of users, and high-quality products.

Katarzyna Wac - Quality of Life Technologies Lab - www.qol.unige.ch
Quality of Life (QoL) technologies lab vision is to be a leading academic laboratory recognized for inter-disciplinary, inspirational and high-impact research and education aimed at improving Quality of Life of individuals throughout their lives. The lab leverages behavioral markers to quantify and improve individuals' QoL in new ways – drawing on new emerging models from computer science incorporating examination, diagnosis and treatment of daily life as an "organ" – much like a cardiologist examines heart - and the resulting Quality of Life as a «vital sign» - routinely reported for patients and non-patients alike.

Niels Alexander Nijdam - Information Security Group (I-SEC) - isec.unige.ch
I-Sec aims to translate the complex nature of Cyber Security into an easily comprehensible way to understand, monitor and control the risks of employing current and future technologies. With a strong commitment to co-designed solutions with the end-users, we research new ways on how to expose and present the raised implications on privacy, risk, security and safety.
Domain activities
Applied research in the domains of:
- Internet of things
- Connected (autonomous) vehicles
- Smart Cities and infrastructure

With a strong focus on Cyber Security:
- Risk assessment
- Threat identification
- Anomaly detection
- Privacy preservation
- Usability in security and privacy
- Mitigation advisory

PhD Thesis

- Vincezo Daponte. Analysis and specification of scientific knowledge visualization techniques
- Georges Bediang. Un modèle sémantique basé sur les ontologies pour le partage et la réutilisabilité des itinéraires cliniques à travers le contexte (ShaRE-CP)
- Athanasios Kyritsis, Enhancing Wellbeing Using Artificial Intelligence Techniques, 2019-12-19
- Akram Abdulghani Hezam Mohammed, A Reference Model For Securing IoT, 18th Sept. 2019

List of publications

Refereed papers in international journals

Giovanna Di Marzo Serugendo and team:

[1] Eleonore Fournier-Tombs, Giovanna Di Marzo Serugendo. DelibAnalysis: Understanding the quality of online political discourse with machine learning. Journal of Information Science, 2019. https://doi.org/10.1177/0165551519871828

Nadia Magnenat-Thalmann and team:

[2] M. Ramanathan, W.-Y. Yau, N. Magnenat Thalmann and E. K. Teoh, mutually reinforcing motion-pose framework for pose invariant action recognition, International Journal of Biometrics, DOI: 10.1504/IJBM.2019.099014, Vol. 11, No. 2, March 21, 2019

[3] M. Ramanathan, J. Kochanowicz and Nadia Magnenat Thalmann, Combining Pose-Invariant Kinematic Features and Object Context Features for RGB-D Action Recognition, International Journal of Machine Learning & Computing, Singapore (online journal)

[4] Y. Tahir, Z. Yang, D. Chakraborty, N. Thalmann, D. Thalmann, Y. Maniam, Nur Amirah binte Abdul Rashid, B.-L. Tan, J. L. C. Keong and J. Dauwels, Non-verbal speech cues as objective measures for negative symptoms in patients with schizophrenia, PLOS ONE, DOI: 10.1371/journal.pone.0214314, April 09, 2019 (IF:2.776)

Niels Nijdam and team:

[5] Abdulghani, H. A., Nijdam, N. A., Collen, A., Konstantas, D. (2019). A Study on Security and Privacy Guidelines, Countermeasures, Threats: IoT Data at Rest Perspective. Symmetry, 11(6), 774.

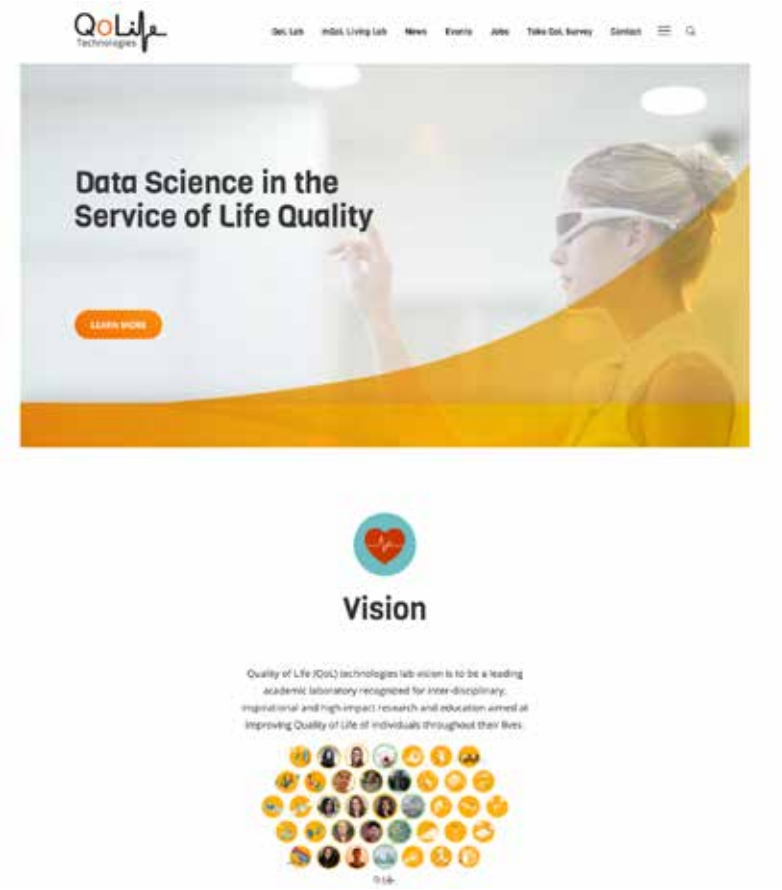
Jolita Ralyté and team:

[6] Wulfovich, S., Fiordelli, F., Rivas, H., Concepcion, W., Wac, K. (2019). «"I Must Try Harder": Design Implications for Mobile Apps and Wearables Contributing to Self-Efficacy of Patients with Chronic Conditions», Frontiers in Psychology, Section: Psychology for Clinical Settings, Special Issue on "Improving Wellbeing in Patients with Chronic Conditions: Theory, Evidence, and Opportunities", Impact Factor: 2.129

[7] Symul, L., Wac, K., Hillard, P., Salathe, M. (2019). «Assessment of Menstrual Health Status and Evolution through Mobile Apps for Fertility Awareness», NATURE Digital Medicine, 2 (1), 64, July 2019.

[8] Ciman, M., Wac, K., (2019). «Smartphones as Sleep Duration Sensors: Validation of the iSenseSleep Algorithm», Journal of Medical Internet Research: mHealth and uHealth (JMU), 7(5):e11930. Impact Factor: 4.301

[9] Grantcharov, P., Ahmed, S., Wac, K., Rivas, H. (2019). «Reprocessing and Reuse of Single-Use Medical Devices: Perceptions and Concerns of Relevant Stakeholders Toward Current Practices», International Journal of Evidence-Based Healthcare, 17 (1), 53-57, Wolters Kluwer Health, 2019. Impact Factor: 1.00



[10] Tsiourti, C., Weiss, A., Wac, K., Vincze. M., (2019) Multimodal Integration of Emotional Signals in HRI from Voice, Body, and Context: Effects of (In)Congruency on Emotion Recognition and Attitudes Towards Robots, International Journal of Social Robotics (SORO), Springer, Impact Factor: 2.009

Laurent Moccozet and team:

[11] Estimation of exposure durations for vitamin D production and sunburn risk in Switzerland, A. Religi, C. Backes, A. Chatelan, J-L. Bulliard, L. Vuilleumier, L. Moccozet, M. Bochud, D. Vernez, Journal of Exposure Science & Environmental Epidemiology, Springer Nature, 2019.

[12] A workflow-based solution to support the assessment of collaborative activities in e-learning: A design founded on IMS-LD meta-model, A. Aouine, L. Mahdaoui, L. Moccozet, Int Jnl of Info and Learning Tech, Emerald Publishing, 36, 124–156, 2019.

[13] A versatile and flexible e-assessment framework towards more authentic summative examinations in Higher-Education, L. Moccozet, O. Benkacem, E. Berisha, R. Trigo Trindade, P-Y. Bürgi, International Journal of Continuing Engineering Education and Life-Long Learning, Inderscience Publishers, 2019.

[14] 3D Modelling for Solar Erythemal UV Protection Provided by Human Hair, A. Religi, L. Moccozet, Applied Sciences 9(22):4724, 2019.

Full refereed papers in Conference Proceedings

Michel Deriaz and team:

[15] A Machine Learning Approach to Waiting Time Prediction in Queueing Scenarios, Athanasios I. Kyritsis, Michel Deriaz, in the Second IEEE International Conference on Artificial Intelligence for Industries (ai4i 2019), Laguna Hills, California, 2019.

[16] Gait Pattern Recognition Using a Smartwatch Assisting Postoperative Physiotherapy, Athanasios I. Kyritsis, Geoffrey Willems, Michel Deriaz, Dimitri Konstantas, International Journal of Semantic Computing, Vol. 13, No. 2, p. 245–257, 2019.

Giovanna Di Marzo Serugendo and team:

[17] Giovanna Di Marzo Serugendo. First and Second-Order Emergence - From Bio-Inspired Design Patterns to Reliable Self-Composing Spatial Services. Keynote Speaker. FSEN'19 Conference. Tehran, 2019.

[18] Amudha Ravi Shankar, Jose Luis Fernandez-Marquez, Barbara Pernici, Gabriele Scalia, Maria Rosa Mondardini, Giovanna Di Marzo Serugendo. Crowd4Ems: A crowdsourcing platform for gathering and geolocating social media content in disaster response. International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Vol. 42 Pages 331-340

[19] Mohammad Parhizkar, Jahn Nitschke, Louis Hellequin, Thierry Soldati and Giovanna Di Marzo Serugendo. Self-organising Agent-Based Model to Study Stream-breaking Phenomenon During Aggregation Phase of Dictyostelium discoideum. The 3rd International Symposium on Swarm Behavior and Bio-Inspired Robotics. SWARM'19. Kyoto, Japan, Nov 2019. Best poster award.

Gilles Falquet and Claudine Métral and team:

[20] Arouna, S., Murphy, J., Rabah, M., Rouis, K., Sidere, N., Tamani, N., Champagnat, R., Coustaty, M., Falquet, G., Ghadfi, S., Ghamri-Doudane, Y., Gomez-Krämer, P., Howells, G., McDonald-Maier, K. D. (2019) Security and PrIvacy foR the Internet of Things: an overview of the project. In Proc. 2019 IEEE International Conference on Systems, Man and Cybernetics (SMC), DOI: 10.1109/SMC.2019.8914221

[21] Métral C., Falquet G. (2019) Une technique de spécification abstraite pour la publication de géodonnées liées (poster). In Proc. Spatial Analysis and Geomatics (SAGEO) Conference, November 13-15 2019, Clermont-Ferrand, 319-324, https://sageo2019.irstea.fr/actes/

Figure 1: European project ViMM platform representation: Webpage with gallery for case studies collection and Motion Capture category-based filter (selected option) © MIRALab

[22] Aljalbout S., Buchs D., Falquet G. (2019) Introducing Contextual Reasoning to the Semantic Web with OWLC. In Proc. Intl Conf. on Conceptual Structures - Graph-Based Representation and Reasoning. ICCS 2019. Lecture Notes in Computer Science, vol 11530. Springer. DOI https://doi.org/10.1007/978-3-030-23182-8_2
[23] Aljalbout S., Buchs D., Falquet G. (2019). OWL^C: A Contextual Two-Dimensional Web Ontology Language. In Proc. 2nd Conference on Language, Data and Knowledge (LDK 2019), OpenAccess Series in Informatics (OASIcs), Vol. 70, Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, Dagstuhl, Germany, doi: 10.4230/OASIcs.LDK.2019.2

Dimitri Konstantas:

- No 2019 data received

Nadia Magnenat-Thalmann and team:

[24] L. Tian, N. Thalmann, D. Thalmann and J. Zheng, Design of a Highly Biomimetic and Fully-Actuated Robotic Finger, The 2019 IEEE Symposium Series on Computational Intelligence (IEEE SSCI 2019), Xiamen, China, December 06 – 09, 2019
[25] Y. Cai, L. Ge, J. Liu, J. Cai, T.-J. Cham, J. Yuan and N. Magnenat Thalmann, Exploiting Spatial-temporal Relationships for 3D Pose Estimation via Graph Convolutional Networks, International Conference on Computer Vision, (ICCV'19), Seoul, South Korea, October 27 – November 02, 2019
[26] H. Ding, X. Jiang, A. Liu, N. Thalmann and G. Wang, Boundary-Aware Feature Propagation for Scene Segmentation, International Conference on Computer Vision, (ICCV'19), Seoul, South Korea, October 27 – November 02, 2019
[27] L. Tian, J. Liu, N. Magnenat Thalmann, D. Thalmann and J. Zheng, Design of a Flexible Articulated Robotic Hand for a Humanoid Robot, 2019 IEEE-RAS International Conference on Humanoid Robots (Humanoids), Toronto, Canada, October 15 – 17, 2019
[28] A. Vishwanath, A. Singh, J. Dauwels, Y. H. V. Chua and N. Magnenat Thalmann, Humanoid co-workers: How is it like to work with a robot? 28th IEEE International Conference on Robot and Human Interactive Communication (Ro-Man 2019), New Delhi, India, October 14 – 18, 2019
[29] N. Mishra, M. Ramanathan, R. Satapathy, E. Cambria and N. Magnenat Thalmann, can a Humanoid Robot be part of Organizational Work Force? A User Study leveraging on Sentiment Analysis, 28th IEEE International Conference on Robot and Human Interactive Communication (Ro-Man 2019), New Delhi, India, October 14 – 18, 2019
[30] S. Xu, Z. Yang, D. Chakraborty, Y. H. V. Chua, J. Dauwels, D. Thalmann, N. Magnenat Thalmann, B.-L. Tan, J. Lee, Automated Verbal and Non-Verbal Speech Analysis of Interviews of Individuals with Schizophrenia and Depression, 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'19), Berlin, Germany, July 23 – 27, 2019
[31] M. Ramanathan, N. Mishra and N. Magnenat Thalmann, Nadine Humanoid Social Robotics Platform, Proceedings of the 36th Computer Graphics International (CGI 2019), Springer, Calgary, Canada, June 17 – 20, 2019 Prof. Nadia Magnenat Thalmann List Publications 26/05/2020 15
[32] E. Baka, A. Vishnawath, N. Mishra, G. Vleioras and N. Magnenat Thalmann, Am I Talking to a Human or a Robot? A Preliminary Study of Human's Perception in Human-Humanoid Interaction and Its Effects in Cognitive and Emotional States, Proceedings of the 36th Computer Graphics International (CGI 2019), Springer, Calgary, Canada, June 17 – 20, 2019
[33] L. Tian, N. Magnenat Thalmann, D. Thalmann, Z. Fang and J. Zheng, Object Grasping of Humanoid Robot Based on YOLO, Proceedings of the 36th Computer Graphics International (CGI 2019), Springer, Calgary, Canada, June 17 – 20, 2019

Jean-Henry Morin:

- No 2019 data received

Niels Nijdam and team:

[34] Pandey, P., Collen, A., Nijdam, N., Anagnostopoulos, M., Katsikas, S., Konstantas, D. (2019). Towards automated threat-based risk assessment for cyber security in smarthomes. In European Conference on Information Warfare and Security, ECCWS (Vol. 2019-July, pp. 839–844).

Jolita Ralyté and team:

[35] Ralyté, J. and Léonard, M. (2019): Exploring the Concept of "Tiers-Lieu" for Information Services: The Value of Conceptual Modeling. In: Joint Proceedings of the ER Forum and Poster & Demos Session, ER 2019, Salvador, Brazil 2019. CEUR-WS vol. 2469, http://ceur-ws.org/Vol-2469/
[36] Ralyté, J. (2019): Une approche situationnelle pour la définition et l'adaptation d'une méthode d'évolution logicielle pilotée par les données. In : Proceedings of INFORSID 2019, pp. 169-170.

Jean-Marc Seigneur and team:

[37] E. Huseynov and J.-M. Seigneur, Hardware TOTP tokens with time synchronization, Proceedings of the 13th International Conference Application of Information and Communication Technologies, IEEE, April, 2019
[38] E. Huseynov and J.-M. Seigneur, Physical presence verification using TOTP and QR codes, Proceedings of the 34th International Conference on ICT Systems Security and Privacy Protection, IFIP, May, 2019

Full refereed papers in Workshop Proceedings

Niels Nijdam and team:

[39] Augusto-Gonzalez J., Collen A., Evangelatos S., Anagnostopoulos M., Spathoulas G., Giannoutakis K.M., Votis K., Tzovaras D., Genge B., Gelenbe E., Nijdam N.A. (2019). From Internet of Threats to Internet of Things: A Cyber Security Architecture for Smart Homes. In 2019 IEEE 24th International Workshop on Computer Aided Modeling and Design of Communication Links and Networks (CAMAD) (pp. 1–6). IEEE.

Figure 2: _ISS_GDM_20190311_094514

Katarzyna Wac and team:

[40] Berrocal, A., De Dominicis, Wac, K., (2019). Feasibility Study Of Smartphone-Enabled, Peer Reported Outcomes Assessment In Healthy Individuals, (poster) Quality of Life Research (ISOQOL), San Diego, CA, October 2019.

[41] Daza, E., Wac, K., Oppezzo, M., (2019). Effects of Sleep Deprivation on Blood Glucose, Food Cravings, and Mood in Non-Diabetics: An N-of-1 Randomized Trial Pilot Study, (poster) Annual Frontiers in Diabetes Symposium 2019, Stanford University, USA, April 2019.

[42] Manea, V., Schnoor Hansen, M., Elbeyi, E., Wac, K., (2019). Towards Personalizing Participation in Health Studies, HealthMedia Workshop in conjunction with ACM Multimedia, Nice, October 2019.

Books and book chapters

Nadia Magnenat-Thalmann and team:

[43] Virtual Reality and Augmented Reality: 16th EuroVR International Conference, EuroVR 2019, Tallinn, Estonia, October 23–25, 2019, Proceedings (Lecture Notes in Computer Science) 1st ed. 2019 Edition. Edited by Patrick Bourdot, Victoria Interrante, Luciana Nedel, Nadia Magnenat-Thalmann , Gabriel Zachmann

[44] Advances in Computer Graphics: 36th Computer Graphics International Conference, CGI 2019, Calgary, AB, Canada, June 17–20, 2019, Proceedings (Lecture Notes in Computer Science) 1st ed. 2019. Edited by Marina Gavrilova, Jian Chang, Nadia Magnenat Thalmann, Eckhard Hitzer, Hiroshi Ishikawa

Jean-Marc Seigneur and team:

[45] K. Wolf, H. Zhang, R. Taiar and J.-M. Seigneur, Proceedings of the 10th Augmented Human International Conference, ACM, March, 2019

Research and technical reports

Nadia Magnenat-Thalmann and team:

[46] Several technical reports for the following projects: ViMM.

International and national advisory committees

Giovanna Di Marzo Serugendo:

- 2019- : SWITCH foundation board, substitute member
- 2018-2020 : Advisory Board ICT Programme, Association Realise, Membre
- Committee Member (2014-2019) – Conseil académique HEPIA
- Swiss Alliance for Data-Intensive Services, InnoSuisse – Board Management member (2016-2019)

Nadia Magnenat-Thalmann:

- Member of the Scientific Advisory Board of the Computer Science Department of Shanghai Tech University, China
- Member of the Advisory Board for the ANA Avatar XPRIZE, USA
- Member of the IAB Committee of the Computer Science Department of the Technical University of Vienna, Austria
- Expert on the Advanced Grant Panel in Computer Science, European Research Council (ERC) Brussels, Belgium
- Expert and reviewer of Horizon 2020 Programme, European Commission, Belgium
- President of the Computer Graphics Association (CGS)

Jean-Marc Seigneur:

- Since 2014: Academic Member, ITU Working Groups on Trust, Digital Currency including Digital Fiat Currency and Distributed Ledger Technology

Figure 3: Overview of the three experiments conducted for the goal of the PhD thesis, Evangelia Baka © MIRALab

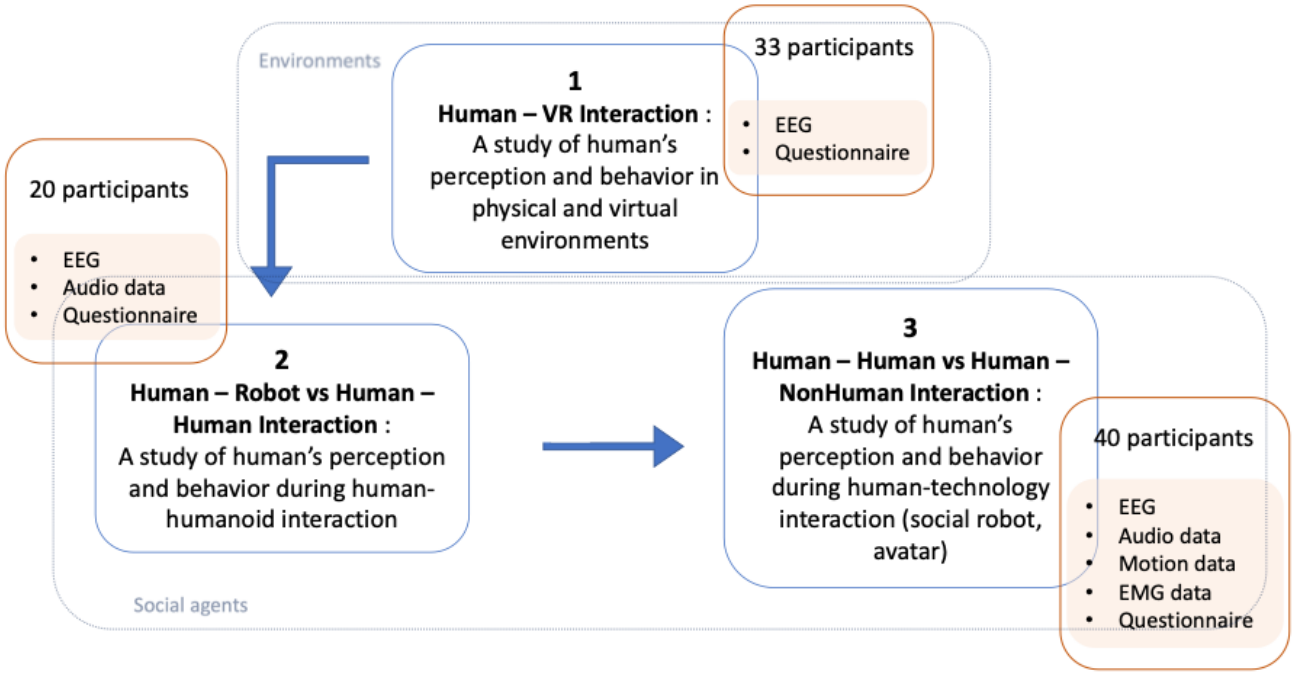


Figure 4: Participants during the three cases of interaction. LEFT: case N where the participant interacted with Nadine social robot. MIDDLE: case VH where the participant had the experience of the virtual human and RIGHT: case H where the participant interacted with another real person © MIRALab

International and national research programs committees

Dimitri Konstantas:

- No 2019 data received

Jolita Ralyté:

- Expert for the Natural Sciences and Engineering Research Council of Canada (NSERC). Review of the research project "Knowledge-based framework for big data-driven marketing" submitted for the Discovery Grants Program, January 2019.

Jean-Marc Seigneur:

- Since 2017: Member of the College of Expert Reviewers, European Science Foundation

Katarzyna Wac:

- K. Wac, Evaluator of research projects submitted to the Foundation for Science and Technology (FCT), Portugal
- K. Wac, Evaluator of research projects submitted to the Research Promotion Foundation, Cyprus

PhD Thesis committees

Giovanna Di Marzo Serugendo:

- Akram Mohammed, A reference model for securing IoT, Jury Member 2019
- Sabrina Nwatchock A Koul, A Framework for Fair and Responsible Data Market EcosystemsJury President, 2019
- Angela Bacchetta von Beckh. Impact des medias sociaux sur les processus d'innovation - Université de Genève, Jury President, 2019

Gilles Falquet:

- David Noël, Université Grenoble Alpes, France, rapporteur
- Athanasios Kyritsis, UNIGE, jury member

Nadia Magnenat-Thalmann:

- Evangelia Baka, Director, University of Geneva, Switzerland
- Simon Sénécal, Director, University of Geneva, Switzerland

Jolita Ralyté:

- External Examiner and Member of PhD Defence Committee: Lobna Azaza, PhD Thesis in Computer Science "Une approche pour estimer l'influence dans les réseaux complexes. Application au réseau social Twitter" (An approach to estimate the influence in complex networks. Application to the social network Twitter), University of Dijon, France, defended May 2019.
- Opponent and Member of PhD Defence Committee: Ana Leon Palacio, PhD Thesis in Computer Science "SILE: A Method for the Efficient Management of Smart Genomic Information", Universitat Politècnica de València, Valencia, Spain, defended October 2019.
- Opponent and Member of PhD Defence Committee: Raphaëlle Bour, PhD Thesis in Computer Science, "DEMOS : une méthode de conception participative pour des systèmes d'information soutenant la démocratie des organisations», University of Toulouse Capitole, France, defended November 2019.

Katarzyna Wac:

- 12.2019, Athanasios Kyritsis, University of Geneva, Switzerland, External examiner
- 11.2019, Darius Adam Rohani, Technical University of Denmark, Denmark, External examiner

Conference organization as chair or co-chair

Nadia Magnenat-Thalmann:

- Conference Co-Chair, 36th Annual International Computer Graphics International (CGI 2019), Calgary, Alberta, Canada, June 2019

Jolita Ralyté:

- Tutorials Chair at ER 2019 – 38th International Conference on Conceptual Modeling, Salvador, Bahia, Brazil, November 4-7, 2019.
- Track Co-chair at EMMSAD 2019 - International Conference on Exploring Modeling Methods in Systems Analysis and Design, Roma, Italy, June 3-4, 2019. Track: Foundations of Modeling & Method Engineering.
- Track Co-chair at AMCIS 2019 – 25th Americas Conference on Information Systems, Cancun, México, August 15-17, 2019. Minitrack: Digital Transformation with Smart Services.

Jean-Marc Seigneur:

- Program Co-Chair, 10th Augmented Human International Conference, Reims, France, 2019
- Program Chair, Decentralized Applications Track, ACM SAC, Cyprus, 2019

Katarzyna Wac:

- Co-chair/organizer, International Workshop on "Longitudinal Mobile, Wearable, and Ubiquitous Data Collection from Human Subject Studies" (LDC19) at the ACM Conference on Pervasive and Ubiquitous Computing (ACM UBICOMP 2019), London, UK, October 2019
- Workshop "Wearables in Sleep Research" at the Annual Meeting of the Swiss Society for Sleep Research, Sleep Medicine and Chronobiology (SSSSC) 2019, University of Fribourg, Switzerland. Prof. Wac is a workshop organizer, June 2019

Member of conference/workshop program committees

Michel Deriaz:

- Member program committee for http://wherecamp2019.geoit.org/ 9th GeoIT Wherecamp Conference 2019, November 14th, 2019, Berlin

Gilles Falquet:

- Ingénierie des connaissances (IC 2019)
- Extraction et gestion des connaissances (EGC 2019)

Claudine Métral:

- 3D GeoInfo Conference (3D GeoInfo 2019), Singapore, September 26-27, 2019

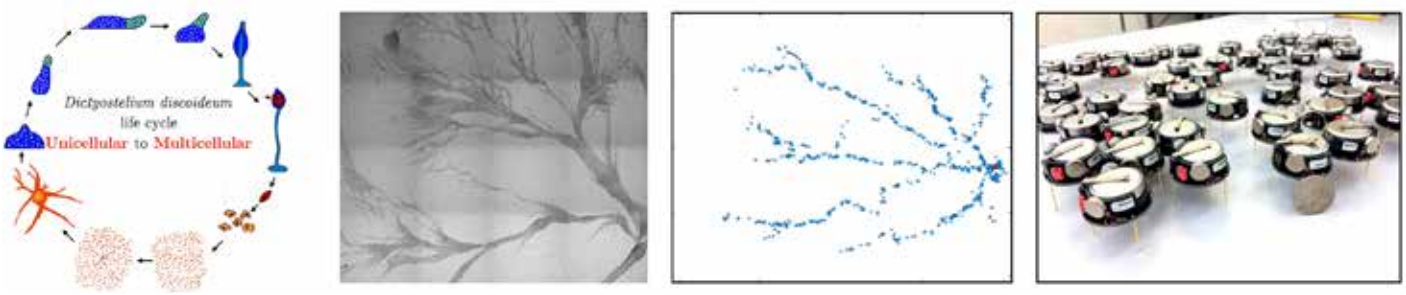
Jolita Ralyté:

- CAiSE 2019 – 31th International Conference on Advanced Information Systems Engineering, Roma, Italy, June 3-7, 2019, Program Board Member (meta-reviewer)
- RCIS 2019 – 13th IEEE International Conference on Research Challenges in Information Science, Brussels, Belgium, May 27-30, 2019, Program Board Member (meta-reviewer)
- ER 2019 – 38th International Conference on Conceptual Modeling, Salvador, BA, Brazil, November 4-7, 2019, Program Committee Member
- REFSQ 2019 – 25th Working Conference on Requirements Engineering: Foundation for Software Quality, Essen, Germany, March 18-21, 2019, Program Committee Member
- EMMSAD 2019 – International Conference on Exploring Modeling Methods in Systems Analysis and Design, Roma, Italy, June 3-4, 2019, Program Committee Member
- PoEM 2019 – 12th IFIP WG8.1 Working Conference on Practice of Enterprise Modelling, Luxembourg, November 27-29, 2019, Program Committee Member
- CBI 2019 – 21st IEEE Conference on Business Informatics, Moscow, Russia, July 15 – 17, 2019, Program Committee Member
- APCCM 2018 – 15th Asia-Pacific Conference on Conceptual Modelling, 15th, Sydney, Australia, January 29-31, 2019, Program Committee Member
- SoEA4EE 2018 – 11th International Workshop on Service-oriented Enterprise Architecture for Enterprise Engineering, in conjunction with EDOC, Paris, France, October 28, 2019, Program Committee Member
- MReBA 2018 – 6th International Workshop on Conceptual Modeling in Requirements and Business Analysis, co-located with ER 2019, Salvador BA, Brazil, November 4-7, 2019, Program Committee Member

Katarzyna Wac:

- ACM CHI (reviewer)
- IEEE EMBC (Associate Editor)
- EAI PervasiveHealth
- ISOQOL
- ACM DigitalHealth
- QoMEX, AugmentedHuman
- FRUCT Conference
- ACII
- ICT Innovations
- IEEE ICHI
- ITU Kaleidoscope
- GoodTechs
- SBM

Figure 5: From D. discoideum life cycle to agent-based models, biological validation and implementation of behaviour into kilobots



Refereeing

Giovanna Di Marzo Serugendo:

- IET Software, IET (August 2019)

Gilles Falquet:

- International Journal of Geographic Information (IJGI)
- International Journal of Digital Earth
- Journal of Data Semantics (JODS)

Nadia Magnenat-Thalmann:

- Jury of Ph.D. thesis for New Zealand, France, Sweden, Switzerland and Germany
- European Union, Horizon 2020, Brussels
- Research Grants Council of Singapore
- Natural Sciences and Engineering Research Council of Canada
- National Science Foundation USA
- Swiss National Research Foundation
- Austrian Research Foundation
- ACM SIGGRAPH, IEEE Transactions on Visualization and Computer Graphics, IEEE Computer Graphics and Applications, IEEE Computer, Communications of ACM, The Visual Computer, Computer Graphics Forum, Computer Vision, Graphics and Image Processing, Presence, International Journal of Human-Computer Studies, Computers and Graphics, Cyberworlds conference, ICAART (International Conference on Agents and Artificial Intelligence), Enactive conference, Multimedia Modelling conference, International Conference on Entertainment Computing (ICEC), International Conference on Signal Processing, Image Processing and Pattern Recognition; GRAPP ("International Conference on Computer Graphics Theory and Applications), Conference on Affective Computing and Intelligent Interaction (ACII 2010), EG Workshop on 3D Object Retrieval, IEEE Virtual Reality Conference 2010, Computer Graphics International, CASA conference, SIGGRAPH/EUROGRAPHICS Symposium on Computer Animation, etc.

Jolita Ralyté:

- JSS – Journal of Systems and Software
- BISE – Business & Information Systems Engineering
- IJISMD – International Journal of Information Systems Modeling and Design
- IJISSS – International Journal of Information Systems in the Service Sector
- REEN – Requirements Engineering Journal
- JAIS – Journal of the Association of Information Systems
- SOSYM – Software and Systems Modeling

Katarzyna Wac:

- NATURE Digital Medicine
- IEEE Transactions on Mobile Computing,
- Personal and Ubiquitous Computing (Springer),
- IEEE Journal of Biomedical and Health Informatics
- Journal of Medical Internet Research (JMIR Publications Inc)

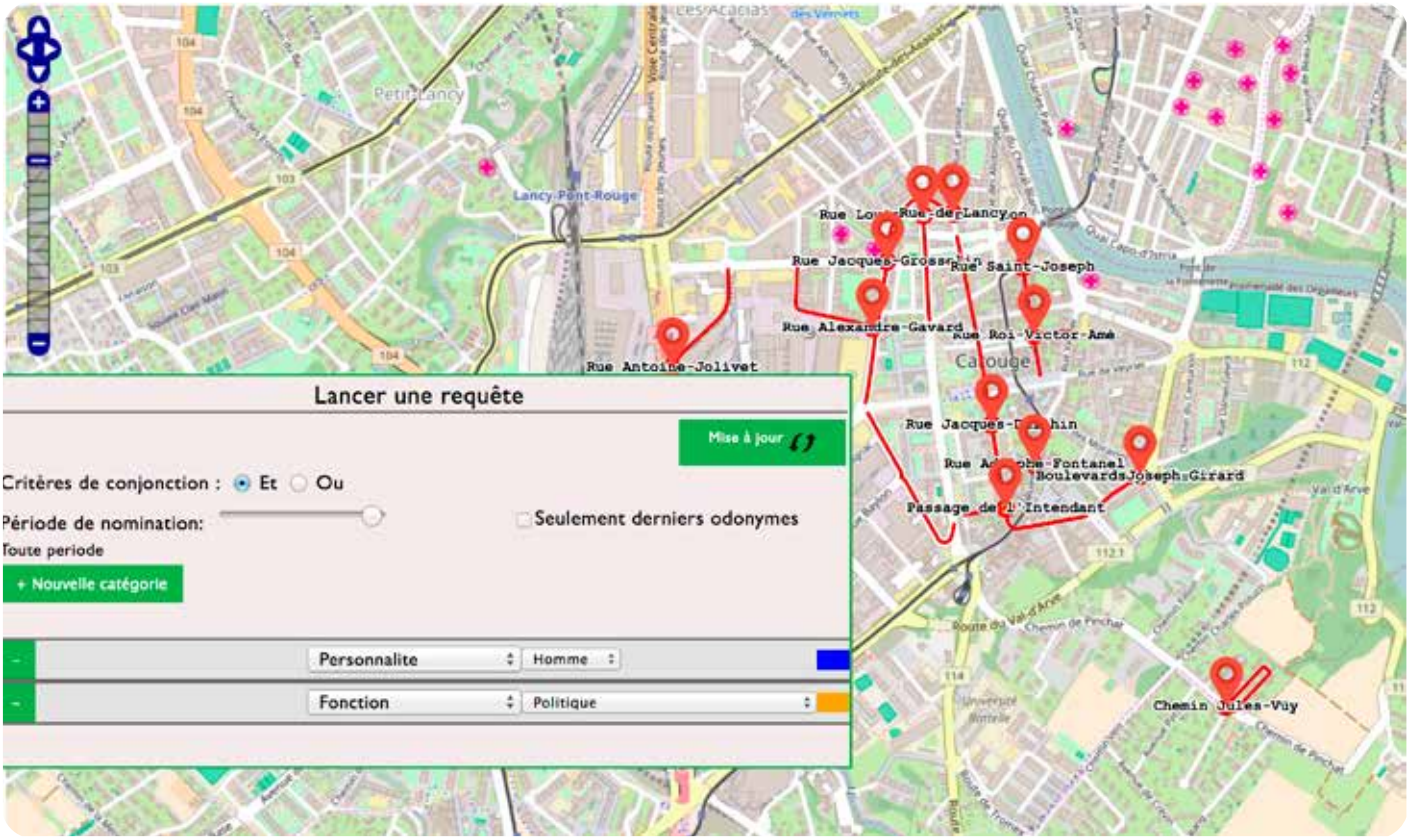


Figure 6: Visualisation of dynamical and toponymical challenges for the Swiss City of Carouge

Figure 7: Virtual reality interactive salsa dance learning system: Improvement of dance skills and performance evaluation © MIRALab

Editorial responsabilities

Nadia Magnenat-Thalmann:

- 2014-Present: Associate Editor, Frontiers in Robotics, Nature Publisher
- 2010-Present: Editorial Adviser of the journal of Graphical Models published by Elsevier.
- 2000-Present: Editor-in-Chief of the Journal the Visual Computer published by Springer Verlag, Germany
- 2000-Present: Editor of the Journal of Computational Geometry published by Elsevier, Holland.
- 1995-Present: Editor, Computational Geometry Journal, North Holland
- 1990-Present: Co-founder and Co-editor-in-chief, Computer Animation and Virtual Worlds, John Wiley, and Sons

Jolita Ralyté:

- Editorial Board Member for IJISMD – International Journal of Information Systems Modeling and Design
- Editorial Board Member for IJISSS – International Journal of Information Systems in the Service Sector

Jean-Marc Seigneur:

- Co-Editor in Chief, Springer Journal "Augmented Human Research", since 2015

Katarzyna Wac:

- IEEE Communications Mag. (COMMAG), Associate Technical Editor, Impact Factor: 10.435, since 2017

Events

Nadia Magnenat-Thalmann:

- Nuit de la Science MIRALab – UNIGE, In the framework of the EU project NOTRE, Parc de la Perle du Lac, Geneva, Switzerland, July 7-8, 2018

Invited talks

Michel Deriaz:

- Innosuisse Tour de Suisse: Presentation of the QueueForMe project, 26 Nov 2019
- Semaine de l'Entreprenariat: Presentation of the QueueForMe project, 18 Nov 2019
- GeoIT Berlin: Chair of the Indoor positioning session, 14 Nov 2019
- CREG (Centre de Rencontre des Entrepreneurs de Genève): «Cyberharcèlement», 15 May 2019

Giovanna Di Marzo Serugendo:

- WSIS 2019 – Open Geneva – Panelist, 2019
- First- and Second-Order Emergence: From Bio-Inspired Design Patterns to Reliable Self-Composing Spatial Services, FSEN'2019 – Keynote Speaker, Tehran, May 2019
- Bancs publics Smart City – Invited Panelist – Geneva, January 2019
- Geofab: Un projet transfrontalier pour soutenir l'innovation de services numériques grâce aux géo-données– Veille Technologique Géomatique, HEIG-VD, Yverdon, Jan 2019

Gilles Falquet & Luka Nerima:

- Philosophy of Language and Digital Humanities, Semantic web technologies and models to represent and reason on the historical and terminological context of Saussure's manuscripts, University of Calabria, Cosenza, 7-9 May 2019

Claudine Métral & Gilles Falquet:

- Extension and Contextualization for Linked Semantic 3D Geodata, Invited talk at the University of Coimbra, seminar of the dpt of Mathematics and Engineering, 11 Sept. 2019

Nadia Magnenat-Thalmann:

- Keynote speaker at the Symposium on Humans and Machines, Prospects for our Digital Future, Year 1919- 2019 Women Study, from Antiquity to Humanoid Social Robots: a Dream of Humanity, Technical University, Vienna, Austria, October 29, 2019 (https://www.dropbox.com/s/4udy2310mlrz7rv/Keynote_Symposium%20on%20Humans%20and%20Machines%2C%20Prospects%20for%20our%20Digital%20Future.pdf?dl=0)
- Invited speaker at the Digital 365 @ Singtel, Smart humanoids: Past, Present, Future, Singtel Comcentre, Singapore, October 21, 2019
- Keynote speech at the Trescon Global's World AI Show, Smart humanoids: Past, Present, Future, Marina Bay Sands, Singapore, July 24, 2019 (https://www.dropbox.com/s/rbsugkrlwolptvo/Keynote_Trescon%20Global%E2%80%99s%20World%20AI %20Show%202019.pdf?dl=0)
- Invited speaker at the Future Smart Workforce Learning Festival, Humanoid Robots: What For, What Next? OCBC Campus, Singapore, July 08, 2019 (https://www.youtube.com/watch?v=_wGaZw69zUQ)
- Keynote speech at the 7th International Symposium of Chinese CHI (Chinese CHI 2019), Humanoid social robots: What can they do? What are their limitations? What is their future? Xiamen University, Xiamen, China, June 27 – 30, 2019 (https://www.dropbox.com/s/14qksx300vs4gn3/Keynote_Chinese%20CHI%202019.pdf?dl=0)
- Keynote speech at the 36th Annual Conference in Computer Graphics International (CGI 2019), Social Humanoid Robots: What for, What next?, University of Calgary, Calgary, Alberta, Canada, June 17 – 20, 2019 (https://www.dropbox.com/s/8xe33qvurls7a04/Keynote_CGI%202019.pdf?dl=0)
- Invited Panelist at the Future of Ageing, Nobel Prize Dialogue meeting, bringing together a unique constellation of Nobel Laureates, world-leading scientists, policy makers and thought leaders to discuss global issues that affect us all. Madrid, 22 May 2019, https://www.nobelprize.org/events/nobel-prize-dialogue/madrid-2019
- Invited speaker at the Disrupt @ The Bay, Education Disrupt 2019 presented by DBS Business Class, AI and social robotics – from dream to reality and its impact on society, DBS Auditorium, L3 Marina Bay Financial Centre Tower 3, Singapore, May 16, 2019 (https://www.dropbox.com/s/605u6up8rqsucrj/Invited%20Speaker_DBS%20Disrupt%20%40%20The%20 Bay.pdf?dl=0)
- Invited talk at Clariden Global's 2nd Applying Artificial Intelligence and Deep Learning for Enterprises Conference, The Intersect of Artificial Intelligence with Robotics: Latest Advances, Pan Pacific Singapore, Singapore, May 15, 2019 (https://www.dropbox.com/s/2q2xvcn8yyiq4zw/Invited%20Speaker_Clariden%20Global%202nd%20Applying%20Artificial%20Intelligence%20and%20Deep%20Learning%20for%20Enterprises%20Conference.pdf ?dl=0)
- Keynote speech at the 7th China (Shanghai) International Technology Fair (CSITF), AI and social Robotics: a global view, Shanghai World Expo Exhibition & Convention Center, Shanghai, China, April 18 – 20, 2019 (https://www.dropbox.com/s/9gusr52g0f39v3t/Keynote_CSITF%202019.pdf?dl=0)
- Invited speaker at the Rendez-vous de Casablanca de l'Assurance 2019, la robotique, l'intelligence artificielle, où allons-nous ? Hyatt Regency Hôtel, Casablanca, Maroc, April 03 – 04, 2019 (https://www.dropbox.com/s/5vnmn9zgjd24fgz/Invited%20Speaker_Rendezvous%20de%20Casablanca%20de%20l%27Assurance%202019.pdf?dl=0)
- Invited talk at the 9th ACADEMIA SUPERIOR PLENUM, Surprise Factors Symposium 2019, Predictive Futures: Measuring the Future, Gmunden, Austria, March 30, 2019 (https://www.dropbox.com/s/7r7uwgxj2t4arz7/Invited%20Speaker_9th%20ACADEMIA%20SUPERIOR%2 0PLENUM.pdf?dl=0) (https://www.instagram.com/p/BunuFlfBEA0/)

Figure 8: Avenue the leading European project on the integration of autonomous vehicles for public transport led by UNIGE

Katarzyna Wac:

- 9.2019 "Quality of Life & Technologies", DIKU Bits, Department of Computer Science, Department of Computer Science (DIKU), Faculty of Science, University of Copenhagen, Denmark
- 6.2019 "Researching Quality of Life of Smartphone-Centric Humans via Human-Centric Methods", Le Sensolier Seminar, Institut Paul Bocuse, Lyon, France
- 6.2019 "Quality of Life Technologies", Faculty of Informatics, Vienna University of Technology, Austria
- 3.2019 "Digital Behaviome: Ubiquitous Computing for Behaviour, Health and Quality of Life Assessment", Digital and Mobile Health Seminar, University of Zurich, Switzerland.
- 3.2019 Panel: "Interdisciplinary, Collaborative Models Of Designing, Implementing, And Evaluating Digital Behavior Change Interventions", Scientific Papers Session at: 40th Annual Meeting and Scientific Sessions of the Society of Behavioral Medicine (SBM 2019), Washington, US.
- 2.2019 "Quality of Life Technologies", Firmenich, Geneva, Switzerland.

Participation in TV and radio programs

Michel Deriaz:

- Le monde Economique, Interview of Michel Deriaz about IFA Berlin, Berlin, 29 Sept 2019, https://tam.unige.ch/files/3215/7062/6087/20190929_LeMondeEconomique.mp4

Nadia Magnenat-Thalmann:

- Nadia Magnenat Thalmann and Anna Aaron se rencontrent pour la premiere fois, Premier Rendez-vous, RTS, 4 mars 2019 (https://www.rts.ch/play/radio/premier-rendez-vous/audio/nadia-magnenat-thalmann-et anna-aaron-se-rencontrent-pour-la-premiere-fois?)

Press release

Nadia Magnenat-Thalmann:

- World AI Leaders from Dell Technologies, Rolls-Royce and Kryon, among others, discuss AI Strategies in Singapore, Retail News Asia, Aug 05, 2019 (https://www.dropbox.com/s/kz8080msaq4lcki/Retail%20News%20Asia_050819_World%20AI%20Leaders%20from%20Dell%20Technologies%2C%20RollsRoyce%20and%20Kryon%2C%20among%20others%2C%20discuss%20AI%20Strategies%20in%20Sing apore.pdf?dl=0)
- OCBC Bank co-designs program to groom 200 data scientists and analysts, Human Resources, Jul 09, 2019 (https://www.dropbox.com/s/yy80uhfglwp3egg/HumanResources_090719_OCBC%20Bank%20codesigns%20programme%20to%20groom%20200%20data%20scientists%20and%20analysts.pdf?dl=0)
- Nadine, el robot que muy pronto estará presente en residencias del mundo entero, 65ymas.com, Jun 09, 2019, Spanish (https://www.dropbox.com/s/1zm9b3h13zmozth/65ymas.com_090619_Nadine%2C%20el%20robot%20que%20muy%20pronto%20estar%C3%A1%20presente%20en%20residencias%20del%20mundo%20ente ro.pdf?dl=0)
- Wir Menschen brauchen Hilfe von Robotern, Salzburger Nachrichten, Apr 10, 2019, German (https://www.dropbox.com/s/lbj4yvykc1zyclv/Salzburger%20Nachrichten_100419_Wir%20Menschen%20brauchen%20Hilfe%20von%20Robotern.pdf?dl=0)
- Commentary: Countries are not responding well to automation, Channel NewsAsia, Jan 28, 2019 (https://www.dropbox.com/s/wbi2hm98qst6lqn/Channel%20NewsAsia_280119_Commentary%20Countries%20are%20not%20responding%20well%20to%20automation.pdf?dl=0)

Figure 9: H2020 nIoVe project on cybersecurity for connected automated vehicles.

- Meet the trailblazing humanoid robots in AIA Singapore's customer service centers, Singapore Business Review, Jan 22, 2019 (https://www.dropbox.com/s/lnvnmk29v3qpw2y/Singapore%20Business%20Review_220119_Meet%20the%20trailblazing%20humanoid%20robots%20in%20AIA%20Singapore%27s%20customer%20servic e%20centres.pdf?dl=0)

Katarzyna Wac:

- "Are Fertility Apps Useful?", eHealthNews.eu covering the Nature Digital Medicine 2019 article. One of the total of 11 online articles covering this journal publication. More details at https://www.nature.com/articles/s41746-019-0139-4/metrics, July 2019

Others

Giovanna Di Marzo Serugendo:

- Projet Geofab – Remise prix quatrième appel à projet – March 2019 – Centre Universitaire d'Informatique, in the presence of Mr Antonio Hodgers, President of Canton Geneva Council
- Best poster award, Swarm'19 conference for paper: Mohammad Parhizkar, Jahn Nitschke, Louis Hellequin, Thierry Soldati and Giovanna Di Marzo Serugendo. Self-organising Agent-Based Model to Study Streambreaking Phenomenon During Aggregation Phase of Dictyostelium discoideum. The 3rd International Symposium on Swarm Behavior and Bio-Inspired Robotics. SWARM'19. Kyoto, Japan, Nov 2019
- Program committee chair: PhD in Information Systems, University of Geneva
- Director: Institute of Information Service Science, University of Geneva
- Director: Centre Universitaire d'Informatique, University of Geneva
- Program committee chair: Master in digital systems and services, University of Geneva

Nadia Magnenat-Thalmann:

- Nadia Magnenat Thalmann at the International Innovation Summit, panel on Smart Dialogue #2: Human Intelligence vs Artificial Intelligence, Resorts World Sentosa, Singapore, December 04 – 05, 2019 (https://www.dropbox.com/s/flanm9mr323wxcs/Panelist_International%20Innovation%20Summit.pdf?dl=0)
- Nadia Magnenat Thalmann at Property Guru Asia Real Estate Summit, panel on Tech Disruptors: solutions that are transforming the way we build, to the way we live, The Athene Hotel, Bangkok, Thailand, November 21 – 22, 2019 (https://www.dropbox.com/s/cbi4jnedfpe63h1/Panelist_PropertyGuru%20Asia%20Real%20Estate%20Su mmit.pdf?dl=0)

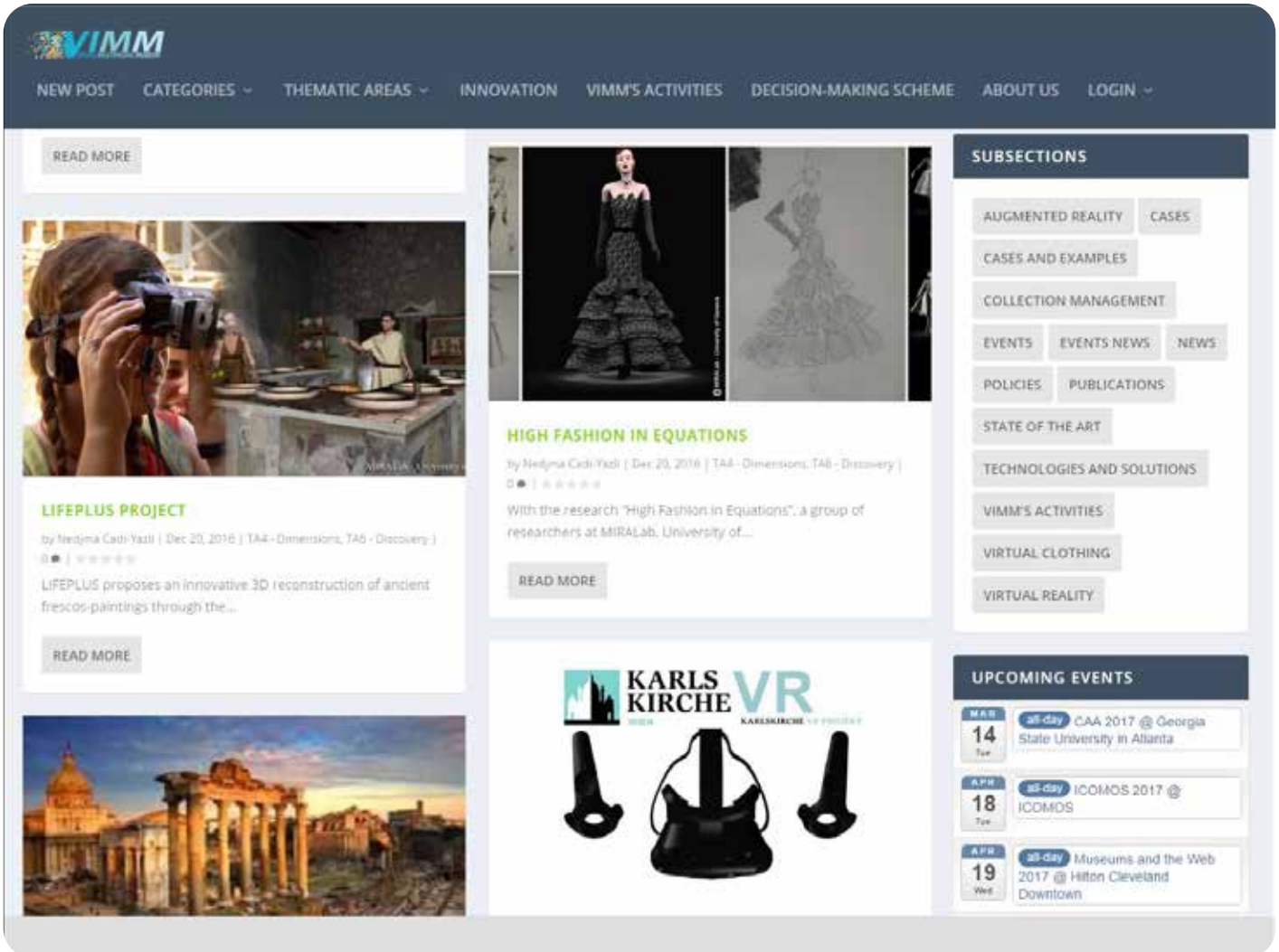


Figure 10: ViMM project – Dissemination and Communication platform © MIRALab

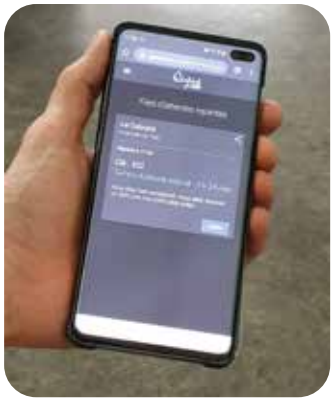


Figure 11, 12, 13: Queue for ME
© ISS TaM

- Nadia Magnenat Thalmann at HR Innovation Week 2019, panel on The Future of Human-AI Collaboration in HR, Amara Sanctuary Resort Sentosa, Singapore, September 17 – 20, 2019 (https://www.dropbox.com/s/ilzuhg33znb5928/Panelist_HR%20Innovation%20Week%202019.pdf?dl=0)
- Nadia Magnenat Thalmann chairing the panel at the 36th Computer Graphics International (CGI 2019), panel on The Future of Computer Graphics in the Age of AI and Social Media, University of Calgary, Calgary, Alberta, Canada, June 17 – 20, 2019 (https://www.dropbox.com/s/jeug98q2xiazt16/Panelist_CGI%202019.pdf?dl=0)
- Nadia Magnenat Thalmann at 4GAMECHANGERS FESTIVAL 2019, panel on Generation AI: Taking the Next Step In Human Evolution. Can Imperfect Humans Create Perfect Intelligence?, MARX HALLE, Austria, April 11, 2019 (https://www.puls4.com/4GAMECHANGERS/Videos/4GAMECHANGERS/Session-Generation-AI-Takingthe-next-step-in-human-evolution.-Can-imperfect-humans-create-perfectintelligence?utm_campaign=4gamechangers&utm_content=20190411_4GC_SESSION_GENERATION_AI&utm_medium=social&utm_source=facebook&utm_term=social_post)

Jolita Ralyté:

- "Digital Transformation: Better Guided than Chaotic." Lecture at NEMO Summer School – Next Generation Enterprise Modelling in the Digital Transformation Age, University of Vienna, Austria, 15-26 July 2019.
- Research seminar on "Contextual Aspects in Situational Method Engineering". University of Paris 1 Pantheon-Sorbonne. Paris, France, February 8, 2019.
- Chair of the IFIP WG 8.1: Design and Evaluation of Information Systems, 2016 - 2021
- Steering Committee Member of CAiSE – International Conference on Advances Information Systems Engineering, since 2012.
- Steering Committee Member of PoEM – IFIP WG8.1 Working Conference on Practice of Enterprise Modelling, since 2015.
- Steering Committee Member of INFORSID – Congrès Francophone d'INFormatique des ORganisation et Systèmes d'Information et de Décision, since 2014.
- Steering Committee Member of RCIS – IEEE International Conference on Research Challenges in Information Science, since 2017.

Katarzyna Wac:

- Since Nov. 2018, Visiting Professor, Stanford University and Stanford University Medical Center, Department of Surgery, group lead by Prof. W. Conception (MD)
- Awards: 2018 – 2020 IEEE Distinguished Visitor and Invited Speaker for the IEEE Region 8
- Standardization Activities: Since 2018 IEEE P1752 "Open Mobile Health" Working Group: "Sleep Schema" subgroup and the IEEE 1847 Working Group - "Recommended Practice for Common Framework of Location Services for Healthcare"
- Consultancy/Advisory to Industry: Consultancy to Lundbeck A/S, Denmark on "Digital Health in Pharma Industry"

Funded research projects
Participation to European projects

Appui dans l'expérimentation des ontologies pour la résolution de problèmes d'interopérabilité
RTE-France Funding (Réseau de transport d'électricité)
Principal Investigator: Giovanna Di Marzo Serugendo
Period: 2019 - 2020

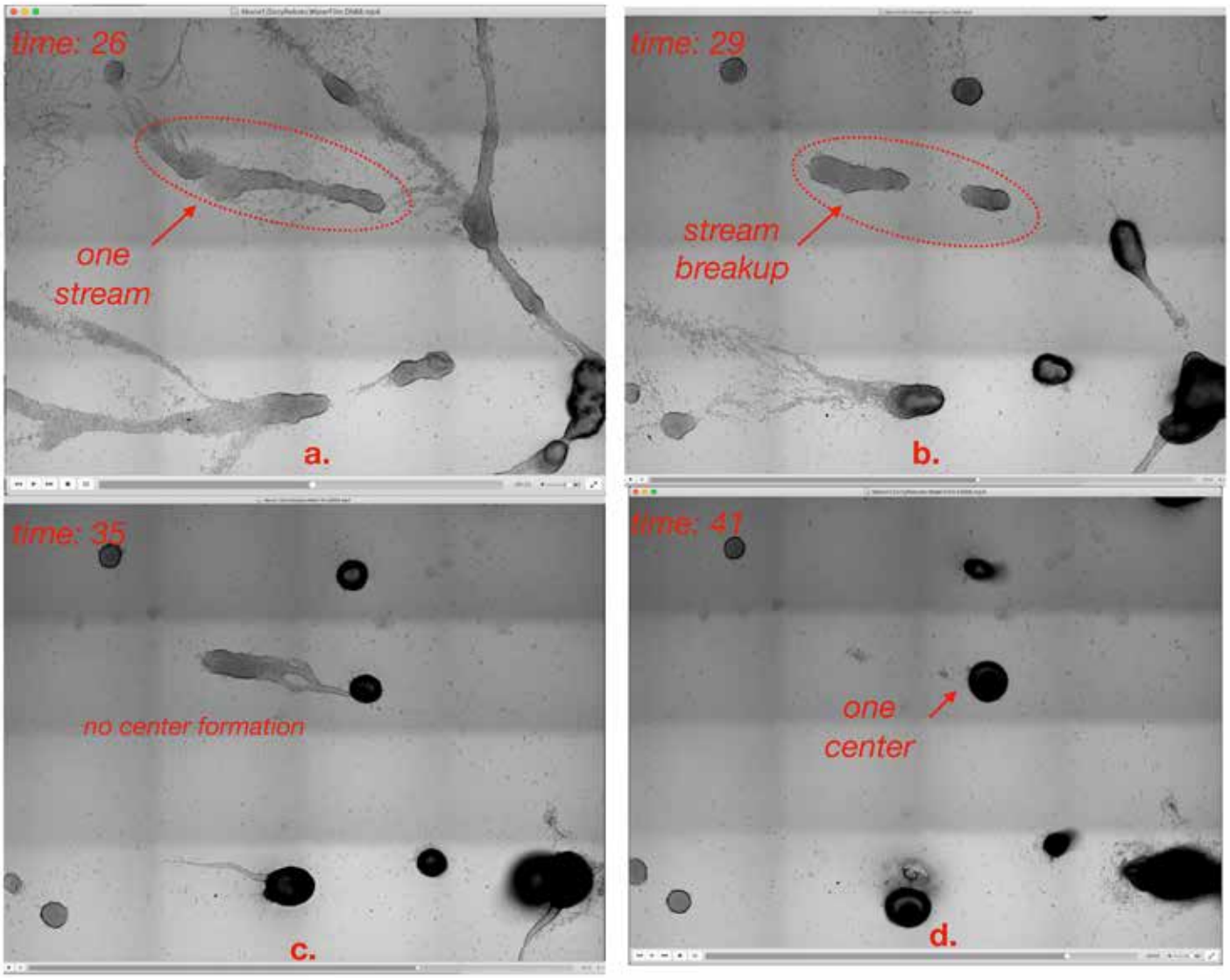
AVENUE - Autonomous Vehicles to Evolve to a New Urban Experience
Grant agreement ID: 769033
Coordinator: University of Geneva
Period: May 2018 - April 2022
Web site: https://cordis.europa.eu/project/id/769033

CardioRNA
Catalysing Transcriptomics Research in Cardiovascular Disease
EU COST Action CA17129
co-PI: Katarzyna Wac
Period: 2018 - 2022
Web site: https://www.cost.eu/actions/CA17129/

CoachMyLife
Living autonomously despite dementia
AAL project, with Michel Deriaz
Partners: Pharmacie Principale (Switzerland), terz Stiftung (Switzerland), TaM (University of Geneva, Switzerland), Jozef Stefan Institute (Slovenia), Eurotronik (Slovenia), «Carol Davila» University of Medicine and Pharmacy (UMFCD) (Romania), Canary Technology Innovations (Romania)
Period: July 2019 - June 2022
Web site: https://www.coachmylife.eu/

ECoWeB
Assessing and Enhancing Emotional Competence for Well-Being in the Young
H2020 project 754657
Danish PI: Katarzyna Wac
Period: 2018 - 2021
Web site: http://www.ecowebproject.eu/

Figure 14: _ISS_GDM_StreamBreakup02



frAAgiLe
Detecting fraility of elderly people and protecting them
AAL project, with Michel Deriaz
Partners: Ideable solutions (Spain), Ana Aslan International Foundation (Romania), terz Stiftung (Switzerland), TaM (University of Geneva, Switzerland), Agecare (Cyprus), Innolabor (Hungary), Bay Zoltaan Nonprofit Lft. For Applied Research (Hungary), SingularLogic Romania Computer Application (Romania), University of Deusto (Spain)
Period: July 2019 - June 2022
Web site: https://fraagile.eu/

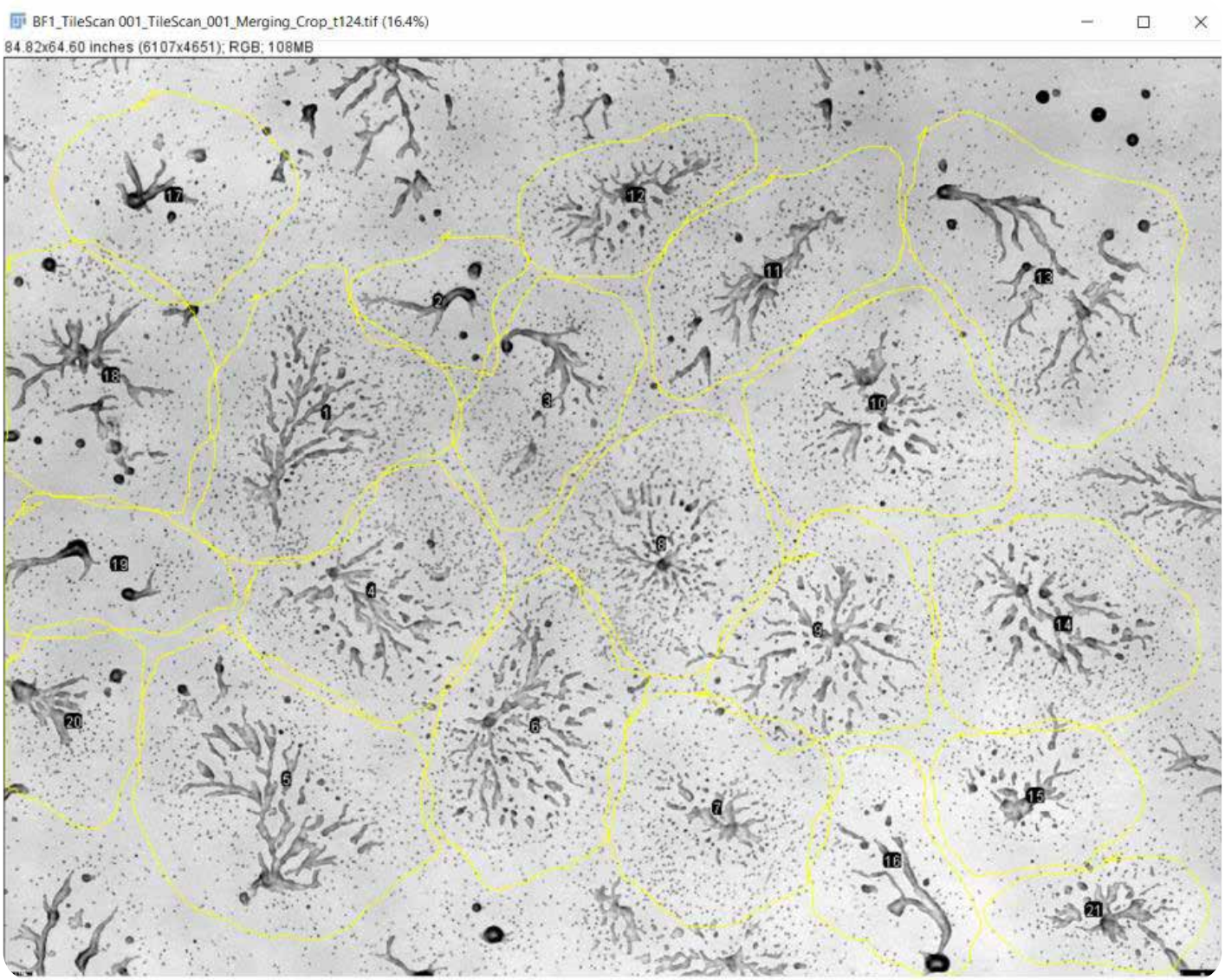
GeoFab du Grand Genève
InterReg project
Principal Investigator: Giovanna Di Marzo Serugendo
Period: July 2016 - December 2019
Web site: https://www.geofab-grandgeneve.org/

GHOST - Safe-Guarding Home IoT Environments with Personalised Real-time Risk Control
Grant agreement ID: 740923
PI from UNIGE: Niels Nijdam
Partners: Televes (Spain), CERTH (Greece), NTNU (Norway), ICL (UK), EXUS (Greece), KIT (Germany), Kalos (Norway/Romania), Red Cross Spain (Spain), Tescos (Spain)
Period: May 2017 - April 2020
Web site: https://www.ghost-iot.eu/

Horse Track
Anticipating injuries on horses
Innosuisse project, with Michel Deriaz
Partners: Alogo Analysis SA, TaM (University of Geneva), Dr Stéphane Montavon
Period: November 2019 - April 2021
Web site: https://alogo.io/products/move/horsetrack

Many-Me
Social Interactive Care System to support the wellbeing of people living with dementia
AAL Project (AAL/Call2016/1/2017), with Michel Deriaz
Partners: Drimpy, CPX, TaM (University of Geneva), EKKOTEK, ASM, terzStiftung, EURAG, MOB, Materia Group
Period: March 2017 - February 2020
Web site: http://many-me.eu/

Figure 15: Aggregation territories (biological validation)



nIoVe - A Novel Adaptive Cybersecurity Framework for the Internet-of-Vehicles
Grant agreement ID: 833742
PI from UNIGE: Niels Nijdam
Partners: CERTH (Greece), Argus (Israel), HOP Ubiquous (Spain), TUM (Germany), Athena (Greece), ICT Legal (Italy), Navya (France), Kenotom (Greece), RISE (Sweden), Seems (Greece), TPG (Switzerland)
Period: May 2019 - April 2022
Web site: https://www.niove.eu/

QueueForMe
Life is too short to wait!
Partners: iabsis SARL, TaM (University of Geneva)
Period: February 2019 - January 2020
Web site: https://qfor.me/

SPIRIT
Security and PrIvacy foR the Internet of Things
CHIST-ERA European project, R
EPSRC Reference EP/P015956/1
Partners: University of Kent - School of Engineering and Digital Arts, University of La Rochelle - L3i Laboratory, University of Essex - School of Computer Science and Electronic Engineering, University of Geneva - Centre for Computer Science (CUI)
Period: January 2017 - December 2019
Web site: http://cui.unige.ch/spirit

Uncertain Archives: Unknowns, Errors, and Vulnerabilities in Big Data
Carlsberg Foundation Grant (CF16-0332), University of Copenhagen
Denmark PI: Prof. K. Veel
Danish co-PI: Katarzyna Wac
Period: 2017 - 2020

ViMM
Virtual Multimodal Museum
EU H2020 project
Partners: Cyprus University of Technology (CUT) – Cyprus, Foundation For Research and Technology Hellas (FORTH-ICS) – Greece, 7Reasons Medien Gmbh - Germany, MIRALab, University of Geneva (UNIGE) – Switzerland, Stifung Preussischer Kulturesizt – Germany, Universidad Pompeu Fabra – Spain, 7scenes – Netherlands
Period: October 2016 - March 2019
Web site: http://vi-mm.eu/

WellCO
Wellbeing and Health Virtual Coach
H2020 project 769765
Danish PI: Katarzyna Wac
Period: 2018 - 2021
Web site: http://wellco-project.eu/

ISS TaM team in 2020

Participation to National projects

3D-Subsurface
Efficient data exploitation in urban subsurface planning
InnoSuisse
Partner: Giovanna Di Marzo Serugendo, Gilles Falquet
Period: 2019 - 2020

Dicty
Social Amoeba Dictyostelium discoideum as an Inspiration for Higher-Order Emergence in Collective Adaptive Systems
SNF
Principal Investigator: Giovanna Di Marzo Serugendo
Period: 2018 - 2020

MIQmodel
Context-aware Mobile Internet Quality Model
SNSF-157003
PI: Katarzyna Wac
Period: 2015 - 2019
Web site: http://p3.snf.ch/Project-157003

Swiss Alliance for Data-Intensive Services
KTI NTN Project
Management Board Member: Giovanna Di Marzo Serugendo
Period: 2017 - 2019
Web site: http://www.data-service-alliance.ch/

Technology transfer

Gilles Falquet:

- Anne-Françoise Cutting-Decelle, Oumaima Ajmi, Creation of an ontology for electricity network management, RTE (Réseau de transport d'électricité), Paris la Défense, France

Open software and databases

Giovanna Di Marzo Serugendo:

- **SAPERE** : Coordination Middleware
- **SAPERE-Android** : Coordination Middleware for Android
- **TheOneSAPERE Model** : Prototyping Platform from TheOne simulator and Sapere middleware
- **LogicFragment Model** : Logic-Based Coordination Middleware
- **Learning-based coordination model** : Learning-based Coordination Middleware
- https://www.unige.ch/cui/cas/publications/projects-output/

Gilles Falquet:

- ***SKOO***
  An ontology of Scientific Knowledge Objects
  Brief description: A high level formal ontology (in OWL) that describes the entities used in scientific research: hypothesis, results, theorems, proofs, observations, methods, formal expressions, equations, etc.

Figure 16 & 17:HorseTrack © ISS TaM

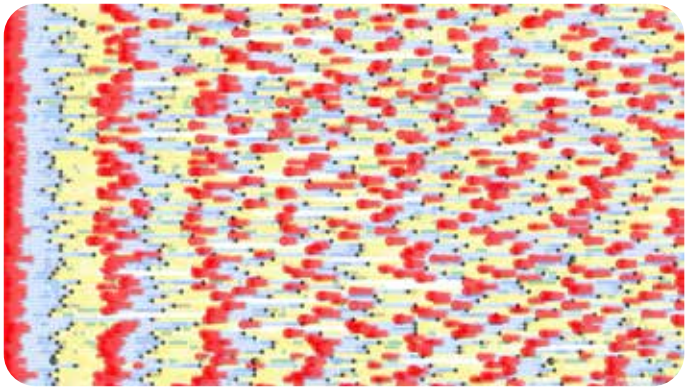


Figure 18: Visualizing the [Menstrual Health Status] data from the modelling part of the study. Each line is a user, each dot is a day. The dot colors are inferred biological states; Red dots are the menses; black dots are the most likely day of ovulation; blue dots are the follicular phase days; yellow dots are the luteal phase days © ISS QoL

Teaching

Giovanna Di Marzo Serugendo:

- **Self-organising Mechanisms and Design Patterns for Engineering Self-Organising Applications – A Smart Environment Application**, ISS, Master University Lyon (France)
- **Advanced Databases**, ISS, Bachelor course
- **Databases**, ISS, Bachelor course, 6 ECTS, 14 hours, 30 students
- **Contextualisation, qualité des services et mashup**, ISS, Bachelor course, 3 ECTS, 28 hours, 15 students
- **Design Science Research**, ISS, Master course, 3 ECTS, 84 hours, 20 students
- **Problèmes des sociétés contemporaines: économie et société numériques** , ISS, Bachelor course, 6 ECTS, 84 hours, 200 students
- **Projets transverses I, II**
- **Self-adaptive systems**, ISS, Master course, 4 ECTS, 42 Hours, 6 students
- **Outils collaboratifs d'environnements logiciels**, ISS, Bachelor

Dimitri Konstantas:

- **Réseaux de communication**, ISS, Bachelor, 48 hours, 12 students
- **Mobile Systems and Services**, ISS, Master, 48 hours, 10 students
- **Design of Multimedia Services**, ISS, Master, 48 hours, 12 students
- **Technologies for Services**, ISS, Master, 48 hours, 11 students
- **InfoSec (program director)**, ISS, Continuing education, 24 hours, 30 students
- **Systèmes d'information et sciences des services**, ISS, Master 2 Gestion d'entreprise / Continuing education, 24 hours, 20 students
- **MAS SCN (program director)**, Continuing education, 6 students

Laurent Moccozet:

- **Service Innovation Lab**, ISS, Master, 3 ECTS, 28 hours, 8 students
- **Introduction à la programmation**, ISS, Bachelor, 6 ECTS, 56 hours, 20 students
- **Services et technologies multimédia**, ISS, Bachelor, 6 ECTS, 56 hours, 60 students
- **Introduction à la sience des services**, ISS, Bachelor, 6 ECTS, 56 hours, 300 students
- **Interaction multimodale et affective**, CUI, Master, 6 ECTS, 56 hours

Figure 19: Co-chair/organizer, International Workshop on "Longitudinal Mobile, Wearable, and Ubiquitous Data Collection from Human Subject Studies" (LDC19) at the ACM Conference on Pervasive and Ubiquitous Computing (ACM UBICOMP 2019), London, UK © ISS QoL

Jean-Henry Morin:

- **Introduction à la Sécurité, Ethique et Règlementation des Services**, ISS, Bachelor course, 3 ECTS, 28 hours, 50 students
- **Design Science**, ISS, Bachelor course, 6 ECTS, 56 hours, 14 students (2016: Giovanna Di Marzo Serugendo)
- **Systèmes d'Information d'Entreprise**, ISS, Bachelor course, 6 ECTS, 56 hours, 10 students
- **Informatique et Systèmes d'Information I, Public Management**, ISS, Master course, 3 ECTS, 28 hours, 20 students
- **Selected Topics, Advanced Seminar on Industrial & Emerging issues**, ISS, Master course, 3 ECTS, 28 hours, 16 students
- **Service Innovation Lab**, ISS (shared with Laurent Moccozet), 3 ECTS, 28 hours, 9 students
- **Design Science & Design Thinking**, CUSO Doctoral Program in Computer Science, in cooperation with Prof. Yves Pigneur, University of Lausanne, 5 days program, 35 hours, 12 students
- **Introduction to Management Information Systems** (English), Undergraduate Level, Credit Hours 3(3), 80 students, Korea University Business School
- **Internet Business and Electronic Commerce** (English), Undergraduate Level, Credit Hours 3(3), 53 students, Korea University Business School
- **Design Thinking for Innovation**, Undergraduate Level, co-teaching with Prof. Kil-Soo Suh, Credit Hours 3(3), 40 students, Yonsei School of Business
- **Emerging Trends & Development in Global IT Industry** (English), Graduate Level, TRENDS & DEVELOPMENT IN GLOBAL IT INDUSTRY (English), GMBA, Module 2, 41 students, Korea University Business School

Jolita Ralyté:

- **Analyse des objectifs**, ISS, Bachelor, 3 ETCS, 28h, 30 students
- **Gestion de projet**, ISS, Bachelor, 3 ETCS, 28h, 30 students
- **CAS MATIS-MESSI**, Modélisation des services et des systèmes d'information, Continuing education, 10 ECTS, 96h, 10 students
- **CAS MATIS-DSI**, Direction des systèmes d'information et des services, Continuing education, 15 ECTS, 96h, 8 students
- **CAS/DAS/MAS MATIS – Management and Technology of Information Systems**, Program Director

Jean-Marc Seigneur:

- **CAS Blockchain**, Lifelong learning, 12 ECTS
- **e-Reputation, e-Marketing and Data Analytics - Courses and Tutorials**, Master, 6 ECTS, 52 hours, 25 students

Gilles Falquet and Claudine Métral:

- **Semantic Web technologies**, ISS, Master, 4 ECTS, 56 hours, 15 students
- With Giovanna Di Marzo: **Environnements collaboratifs de développement logiciel**, ISS, Bachelor, 3 ECTS, 28 hours

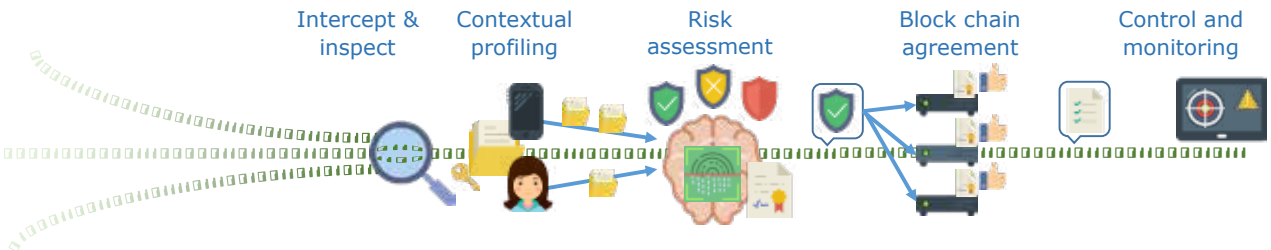
Gilles Falquet:

- **Algorithmique appliquée**, ISS, Bachelor, 6 ECTS, 28 hours, 30 students
- With Patrick Roth: **Interfaces personnes-machines**, ISS, Bachelor, 6 ECTS, 28 hours, 20 students
- With Didier Buchs: **Fondements formels des systèmes d'information**, Computer Science, Bachelor, 6 ECTS, 28 hours, 40 students
- **Algorithmics and Data Management**, ISS, Master in Business Analytics, 6 ECTS, 56 hours, 30 students
- With Giovanna Di Marzo, Jolita Ralyté, Dimitri Konstantas: **Projet transverse I**, ISS, Bachelor, 3 ECTS, 14 hours, 20 students
- With Giovanna Di Marzo, Jolita Ralyté, Dimitri Konstantas: **Projet transverse II**, ISS, Bachelor, 3 ECTS, 14 hours, 20 students
- With Thierry Pun, Patrick Roth, Laurent Moccozet: **Interfaces multimodales et affectives**, Computer Science, Master, 4 ECTS, 28 hours

Claudine Métral:

- **GEOTOOLS-DB: Modélisation des bases de données spatiales,** Master en développement territorial et Certificat complémentaire en géomatique, 3 ECTS, 28 hours, 50 students
- **Space-City: Modèles urbains 3D,** MSc en développement territorial, Certificat complémentaire en géomatique et MSc en systèmes et services numériques, 3 ECTS, 28 hours, 30 students

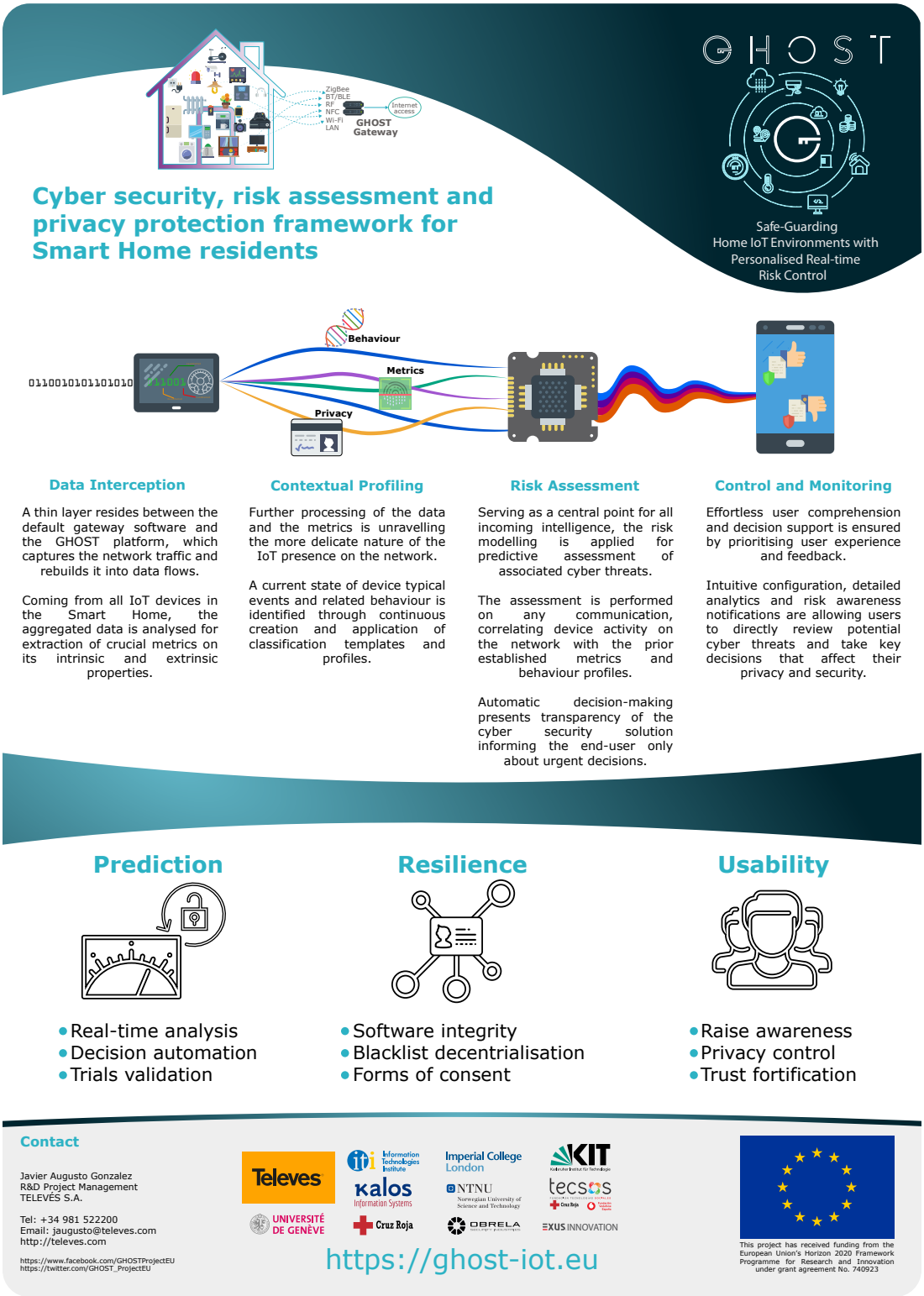
Figure 20: I-SEC lead on the scientific coordination of H2020 GHOST project



Katarzyna Wac:

- A guest lecturer at «**Sports Psychology and Identity**» course at the Department of Nutrition, Exercise and Sports, University of Copenhagen, Denmark. Lecture titled: «Theory-Driven and Data-Driven Sport Psychology», March 2019
- Lecturer for the "**Analysis, Design and Regulation of IT Infrastructure**", 'Communication and IT' Program, Department of Computer Science & Department of Media, Cognition and Communication, University of Copenhagen, Denmark (15 ECTS); 70 students, BSc level. Course co-designed by Prof. Wac, since September 2015
- Lecturer for the "**Design Project**", 'Communication and IT' Program, Department of Computer Science, Faculty of Science & Department of Media, Cognition and Communication, University of Copenhagen, Denmark (15 ECTS in 2015 and 7.5 ECTS since 2016); 70 students, BSc level. Course co-designed by Prof. Wac, since January 2015

Figure 21: Technical pager created by UNIGE for the H2020 GHOST project



latl.unige.ch

LATL

Laboratory for the Analysis and Technology of Language

Infoscope, Geneva, 2018 May 14th

Laboratory for the Analysis and Technology of Language

Domain activities

LATL (http://www.latl.unige.ch) has been active in the field of natural language processing since the early 1990's. Its main research focus is the development of a multilingual syntactic parsing model (the Fips parser), as well as the development of large lexicons and dictionaries.

The Fips parser is currently available for several of the main European languages (English, French, German, Italian and Spanish), with several other languages at various stages of development (Romanian, Greek, Japanese). In 2019 the LATL continued the development of the parsers for the above languages with a special stress on Italian and translation between Italian and French. It is based on a grammatical model inspired by Chomsky's generative grammar and on an object-oriented design for its implementation. The parser and its rich lexical database (Figure 1) are used in a number of applications, including machine translation (Figure 2), terminology extraction, speech-to-speech translation, and computer-assisted language learning.

The LATL works on a project of digital edition of Ferdinand de Saussure's manuscripts in collaboration with the Knowledge Engineering group. This year we have focused on the automatic transcription of manuscripts. In this task the LATL benefited from the internship fellow labour force. Financially the project was supported by a joint University of Geneva - University of Zurich funding project.

In October 2019 the LATL has set up a crowdsourcing platform in order to collect the language habits of Albanian speakers living in the Balkans as well as those living in Switzerland or Germany (Figure 3). This project is supported by a joint University of Geneva - University of Zurich funding project as well.

Team

Directors
Eric Wehrli
Honorary professor
H-index: 25

Luka Nerima
Senior researcher

Senior researchers
Dr. Vasiliki Foufi
Jean-Philippe Goldman

Assistants (PhD students)
Asheesh Gulati
Maria Ivanova
Lorenza Russo

Internship Fellow
Sophie Mauran (June to August)

External Associate Researcher
Giuseppe Cosenza

Administration
Eva Capitao
Elisabeth Giudicelli

Figure 1: Translation of Word in Context (TWiC) is a reading aid system for readers of materiel in foreign languages. Here in use on the Tages Anzeiger newspaper Website

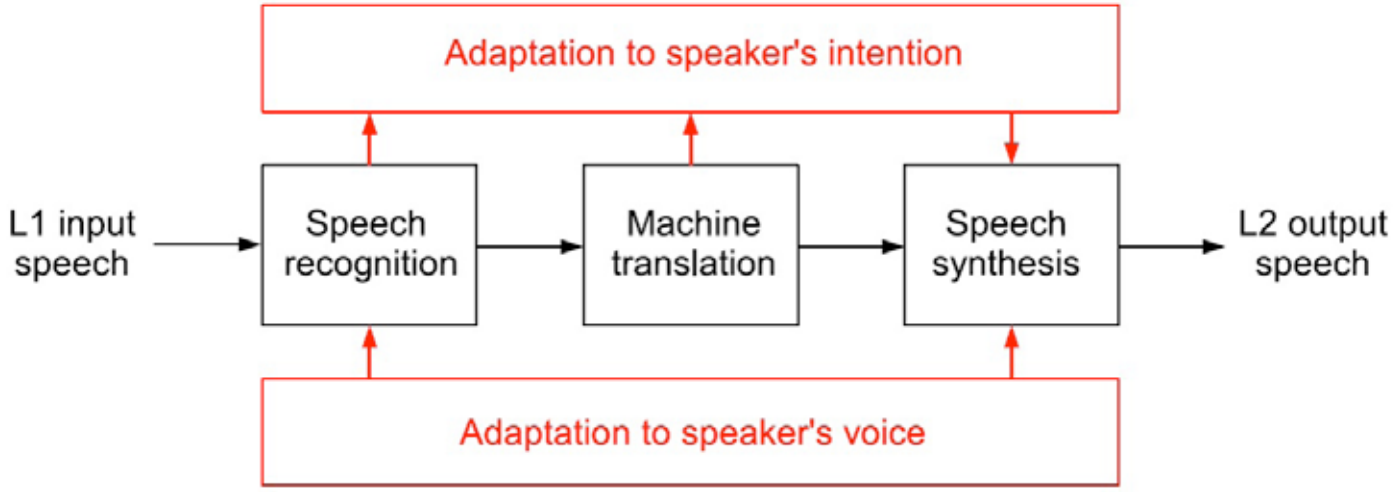


Figure 2: General concept of speech-to-speech machine translation, with SIWIS adaptations in red.

PhD Thesis

- Lorenza Russo, Machine translation between close languages: the case of French and Italian (Original title: La traduction automatique entre langues proches : le cas du français et de l'italien), June 2019

List of publications

Books and book chapters

[1] G. Cosenza, G. D'Ottavi & L. Nerima Eds. Saussure's manuscripts, among others - Booklet of abstracts, Colloque Le Cours de linguistique générale, 1916-2016, Genève 2017. Geneva, 2019.

[2] Vasiliki Foufi, Luka Nerima and Eric Wehrli. Multilingual Parsing and MWE Detection. In Representation and parsing of multiword expressions: Current trends, Yannick Parmentier & Jakub Waszczuk Eds. Language Science Press, Berlin, June 2019

PhD Thesis Committees

- Afef Selmi, L'ambiguïté anaphorique et la résolution automatique de l'anaphore pronominale, Eric Wehrli rapporteur, Université de Bourgogne, Dijon (France), December 2019

Conference organization as chair or co-chair

- Giuseppe Cosenza, co-organizer and co-chair of the Colloquium Philosophy of Language and Digital Humanities, Università della Calabria, Consenza (Italy), 7-9 May 2019

Member of conference/workshop program committees

- Luka Nerima, TALN review committee, TALN-RECITAL 2019, Toulouse (France), July 2019
- Eric Wehrli, TALN review committee, TALN-RECITAL 2020, Toulouse (France), July 2019

Invited Talks

- Philosophy of Language and Digital Humanities Archives, Text and Editions : which kind of digital model for Saussurean manuscript, Università della Calabria, Cosenza (Italy), 7 – 9 May, 2019

Funded research projects

Participation to European projects

MIAPARLE : Méthode interactive d'aide à la prononciation pour l'apprentissage d'une langue étrangère
INNOGAP – UNITEC

Participation to National projects

Practical lexicography for speakers and linguists: developing a usage-embedded dictionary of Albanian in multilingual Switzerland
Co-applicants: Prof. Barbara Sonnenhauser, UniZH. Applied Research, University of Geneva
Period: September 2019 - October 2020

—

CAsAnOMa: A computer-based tool for the assisted annotation of manuscripts
Co-applicants: Dr. Gerold Schneider, UniZH, Prof Eric Haeberli, UniGE. Applied Research
Period: September 2019 - October 2020

Technology transfer

LATL.ch is a technology start-up specialized in the development of linguistic software components. Closely associated with LATL laboratory, LATL.ch develops and commercializes products based on fundamental research conducted in the university lab. Two companies use its POS-Tagger: Acapela Group, a European Speech synthesis company, and ShareWizMe, a French innovative company specialized in real time analysis of contributions (ideas, feedback, comments).

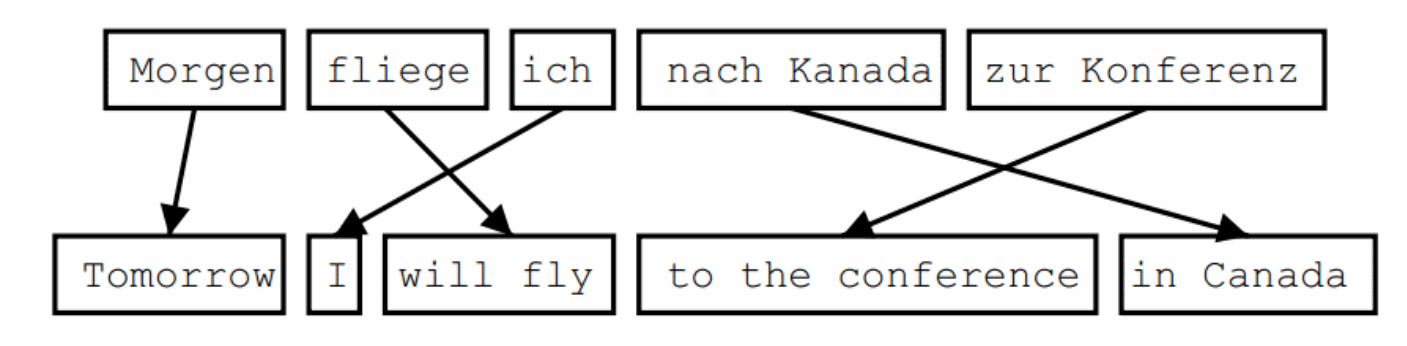


Figure 3: Word alignment in a bilingual parallel corpora

Teaching

Luka Nerima:

- **Databases**, Computer Science for the Humanities, Bachelor, 6 ECTS, 56 hours, 50 students
- **Information Systems and Service Modeling**, Computer Science for the Humanities, Bachelor, 6 ECTS, 56 hours, 60 students
- **Informatics I - Web Development**, Computer Science for the Humanities, Bachelor, 6 ECTS, 56 hours, 40 students
- **Project in Information and Communication Technology (Projet NTIC)**, Computer Science for the Humanities, Bachelor & Master, 6 ECTS, 56 hours, 20 students
- **Informatics II - Java seminar**, Computer Science for the Humanities, Bachelor, 3 ECTS, 28 hours, 7 students
- **Informatics II - Object Oriented Project**, Computer Science for the Humanities, Bachelor, 6 ECTS, 56 hours, 8 students
- **Empirical Methods in Natural language Processing Project**, Master, 6 ECTS, 56 hours, 2 student
- **Information and Communication Technology (NTIC)**, Computer Science for the Humanities, Bachelor, 6 ECTS, 56 hours, 15 students

From left to right: Luka Nerima, Jean-Philippe Goldman, Vasiliki Foufi, Eric Wehrli - March 2019

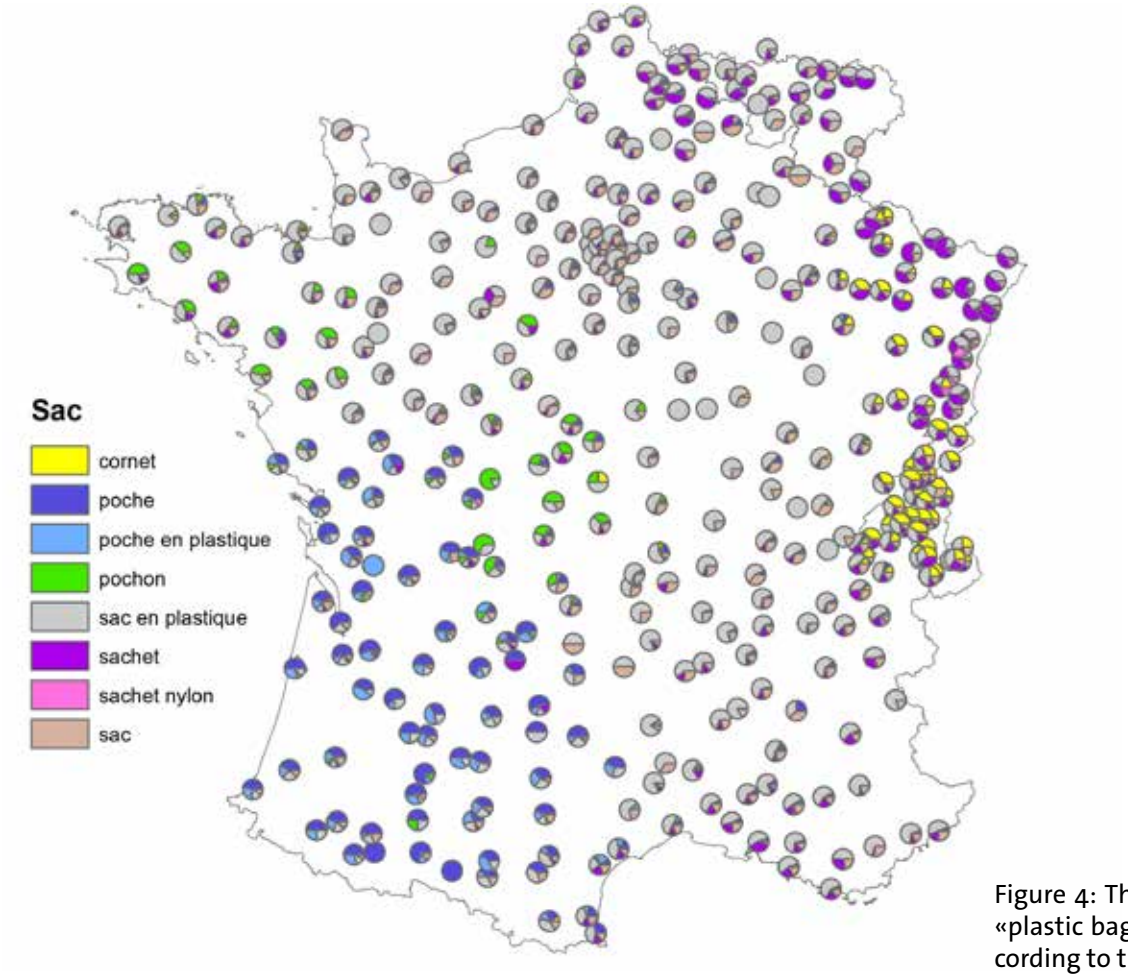
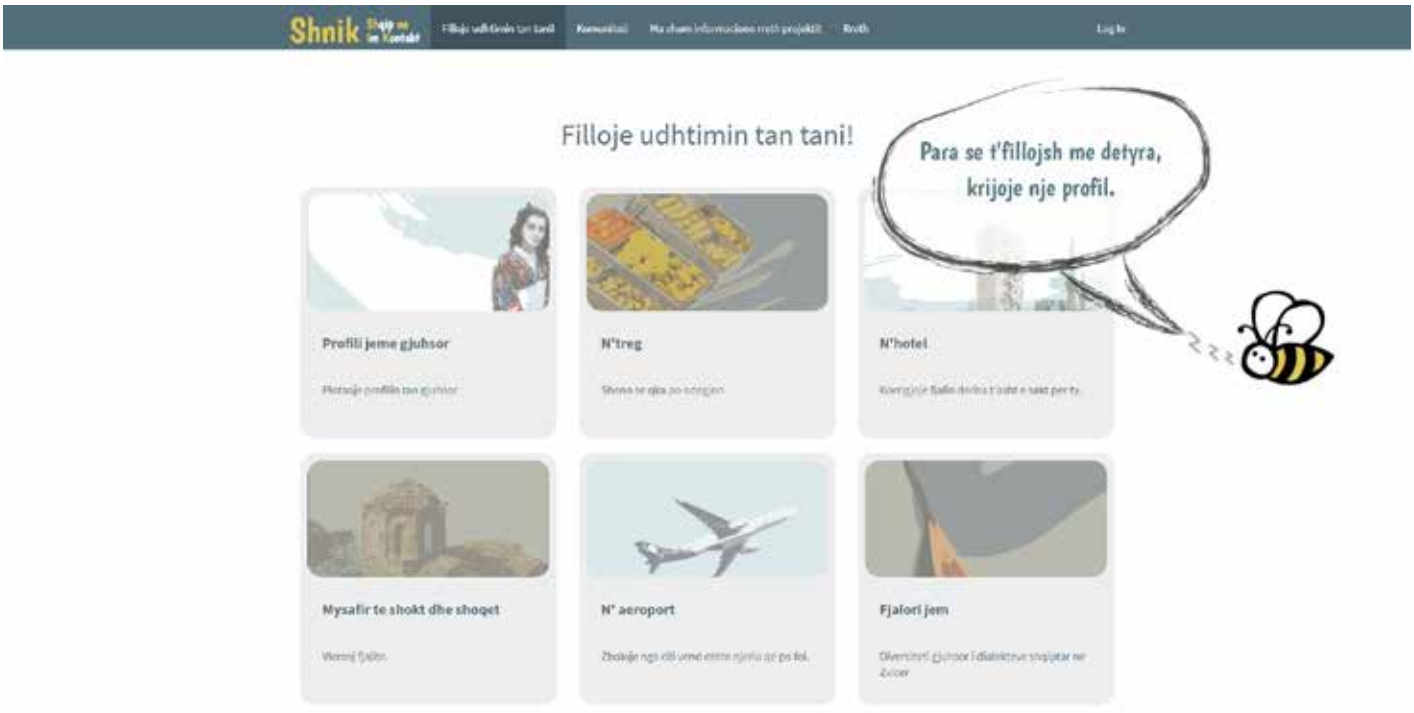


Figure 4: The denominations of the «plastic bag» in regional French, according to the results of [6]

Figure 5



unige.ch/fapse/mmef

MMEF

Laboratory of Multimodal Modelling of Emotion and

TecDay, Collège de Candolle, Geneva, 2019 April 4th

Laboratory of Multimodal Modelling of Emotion and Feeling

Website: https://www.unige.ch/fapse/mmef/en/

Domain activities

The team focuses on human consciousness as an embodied cybernetic process integrating mechanisms of perspective taking and emotional dynamics for appraisal and motivation. We study its relationships to the body and the brain, its role in learning and resilience, at the individual and intersubjective levels. We use a multidisciplinary and multimodal approach, combining virtual reality, psychophysiology, computational modeling and robotics.

Director
David Rudrauf
Associate professor

Senior researchers
Dr. Ben Meuleman
Dr. Yvain Tisserand
Dr. Manik Bhattacharjee

PhD students
Séolane Bouchoucha
Teerawat Monnor
Soheil Rayatdoost

Developers / Designers
Olivier Belli (Evolutio)

Internship Fellow
Rémi Renoud-Grappi,
Polytech Lyon

MMEF team in 2019

List of publications

Refereed papers in international journals

[1] Ognibene, D., Giglia, G., Marchegiani, L., & Rudrauf, D. (2019). Implicit perception simplicity and explicit perception complexity in sensorimotor communication. Comment on» The body talks: Sensorimotor communication and its brain and kinematic signatures» by G. Pezzulo et al. Physics of life reviews, 28, 36-38. doi:10.1016/j.plrev.2019.01.017

International and national advisory committees

- CADMOS committee member

PhD thesis committees

- Alain Cartalade, Membre du Jury, CEA/Sarclay, Gif-sur-Yvette, France
- Daniel Ribeiro, U. Mons Belgium
- Luis Ortega, Section de Biologie, UNIGE
- Anna Stopka, ETHZ
- Diana Suleimenova, Brunel University. London, UK

Conference organization as chair or co-chair

- PASC 2019, organization of two workshops

Funded research projects

Participation to National projects

Implementation of artificial affective agents capable of complex emotion and social perspective taking in virtual reality for behavioral science
SNF 205121_188753 (Division II)
Period: 2019 - 2022

Others

Editorial responsibilities

- Frontiers in Psychology (Acting editor)

Events organised in Geneva

- AIGS Edition 2019 : « Du corps et de l'âme, santé et religion à l'aune de l'intelligence artificielle » (conférence internationale). Co-organisateur avec Maître Nicolas Capt 6 novembre 2019 Genève, Campus Biotech

Invited talks

- Rudrauf, D. (2019, septembre). "Introduction to the Projective Consciousness Model: emergent psychology-inspired cybernetic frameworks for integrating perception, imagination, emotion, social cognition and action in global optimization solutions for autonomous virtual and robotic agents." ICVS - 12th International Conference on Computer Vision Systems: Adaptive Vision for Human Robot Collaboration. Thessaloniki, Grèce. (Les proceedings de ICVS 2019 seront publiés par Springer dans la série : "Lecture Notes in Computer Science" (LNCS)).
- Rudrauf, D. (2019, juillet), "Cybernetic foundations of the emergence of consciousness in nature and beyond". ISHPSSB Symposium 2019: Animal consciousness, Oslo, Norvège.
- Meuleman, B., and Rudrauf, D. (2019, juillet). Emotional coherence of fear. Talk presented at the International Society for Research in Emotion (ISRE) conference, Amsterdam, Hollande. (Présentation orale par Ben Meuleman).
- Rudrauf, D. (2019, mai): "The Projective consciousness model: Integrating perception, imagination, emotion and action in a global cybernetic framework". Perspectives on Consciousness Workshop, Tur Sinai Organic Farm, Jerusalem, Israel.

Participation in TV and Radio Programs

- TV. Les enjeux liés aux filtres de réalité augmentée, RTS,19h30, 20.05.2019 - https://www.rts.ch/play/tv/19h30/video/prof--david-rudrauf-explique-les-enjeux-lies-aux-filtres-de-realite-augmentee-?id=10447934&expandDescription=true
- TV. Les likes créent une dépendance au besoin fondamental de reconnaissance, selon le psychologue David Rudrauf, RTS,19h30, 25.04.2019 - https://www.rts.ch/play/tv/19h30/video/les-likes-creent-une-dependance-au-besoin-fondamental-de-reconnaissance-selon-le-psychologue-david-rudrauf?id=10389939&expandDescription=true

Public exhibitions and performances

- World Conference of Science Journalists (WCSJ2019), 5 juillet 2019, MMEF Lab, délégation Campus Biotech (30 journalistes scientifiques internationaux), Genève. Stands et démos : présentation CISA et MMEF ; implémentation du modèle de conscience projective pour des robots Cozmo v2.0 (simulations multiples, incluant Troubles du Spectre de l'Autisme et Syndrome d'Anxiété Sociale) ; VRelief ; Inflection : VR Climate Action ; Geneva Police VR training (version simplifiée).
- WSIS conference, 8-12 avril 2019, ITU, United Nation, Genève. Stands et démos: Inflection : VR Climate Action, teaser et v1.0 (alpha).
- Agora de la Formation, 21 mars 2019, Yverdon-les-Bains. Stands et démos : Geneva Police VR training v2.0 (alpha, version complète) (en présence d'officiers de police détachés).
- Délégation COOP, 10 mai 2019, Campus Biotech, Genève. Stands et démos : VRelief ; Inflection : VR Climate Action ; Geneva Police VR training (version simplifiée).
- Innosquare, 20 mai 2019, HPE innovation, Genève. Stands et démos : Inflection : VR Climate Action.
- Open Geneva "Fête de l'innovation", 28 mai 2019, Campus Biotech, Genève. Stands et démos : Inflection : VR Climate Action.

Lay people articles / communications

- Rudrauf, D. (2019) L'horizon de machines encore plus humaines. Pour se comprendre, humains et robots devraient être régis par les mêmes règles psychologiques. Psychoscope (5).
- Rudrauf, D. (2019, février). "Le post humain qui vient : vers la création de consciences artificielles". L'humain qui vient Rencontre 1 - Qui et quel sera l'humain qui vient ?, Centre Culturel Irlandais Paris

Others

Courses and tutorials

- **From psychology to cybernetics: the projective consciousness model**. Ecole d'été: School of Excellence in Advances in Artificial Intelligence, University of Milano-Bicocca & University of Tokyo, Como, Italie, September 2019
- **The Projective Consciousness Model and its applications to the modeling and remediation of neuropsychiatric disorders**. Ecole d'été: School of Excellence Universita degli Studi di Messina, Cyber physical systems in medicine: engineering at the service of life, Messina, Italie, July 2019

Teaching

- **Introduction au traitement du signal en psychologie, psychophysiologie et neuroimagerie**, FAPSE, Bachelor, 6 ECTS, 60 students
- **Analyse univariée des données : introduction au Modèle Linéaire Général**, FAPSE, Neurosciences, Master, 3 ECTS, 25 students
- **Intégration des signaux corporels et cérébraux dans l'étude de l'émotion : approches statistiques et expérimentales pour les sciences affectives**, FAPSE, Neurosciences, Doctoral schools SDSAF & LNDS, Master, 3 ECTS, 75 students

www.sib.swiss

CUI UNI GE

PIG

Proteome Informatics Group

TecDay, Collège de Candolle, Geneva, 2019 April 4th

Proteome Informatics Group

Domain activities

The Proteome Informatics Group (PIG) is involved in bioinformatics. Bioinformatics is a recently created discipline in which computer technology is applied to the understanding and effective use of biological data (see http://www.sib.swiss/bioinformatics-for-all/what-is-bioinformatics). At PIG, we concentrate on the study of proteins that are the active molecules of the cell. Extracting and studying proteins from a cell or a tissue requires the use of sophisticated experimental methods which generate large datasets. The analysis of this experimental data entails the identification and quantification of proteins, the determination of their cellular location, modifications, interactions and, ultimately, their function. This information is crucial to decipher cellular processes. This strongly motivates our group to develop software and databases that support data analysis and knowledge discovery in cooperation with Life scientists. These resources are made available through the ExPASy server (http://www.expasy.org). Our software tools mainly support experimental mass spectrometry data analysis, focused on the detection of posttranslational modifications. Our databases store knowledge of carbohydrates attached to proteins as well as protein-carbohydrate interactions.

Team

Director
Frédérique Lisacek
MER
H-index: 34

Senior researchers
Dr. Oliver Horlacher (Until March)

Assistants (PhD students)
Emma Ricart
Thibault Robin
Thomas Stricker (co-direction)
François Bonnardel (co-tutelle with University Grenoble-Alpes)

Developers / Designers
Julien Mariethoz
Frédéric Nikitin (From August to October)

Internship Fellow
Sania Delic (bachelor)

PIG team in 2016

List of publications

Refereed papers in international journals

[1] Notova S, Bonnardel F, Lisacek F, Varrot A, Imberty A (2019) Structure and engineering of tandem repeat lectins, Curr Opin Struct Biol.62:39-47.

[2] Chevalier M, Ricart E, Hanozin E, Pupin M, Jacques P, Smargiasso N, De Pauw E, Lisacek F, Leclère V, Flahaut C (2019) Kendrick mass defect approach combined to NORINE database for molecular formula assignment of nonribosomal peptides, J Am Soc Mass Spectrom. 30(12):2608-2616.

[3] Neelamegham S, Aoki-Kinoshita K, Bolton E, Frank M, Lisacek F, Lütteke T, O'Boyle N, Packer NH, Stanley P, Toukach P, Varki A, Woods RJ (2019) Updates to the Symbol Nomenclature For Glycans (SNFG) Guidelines, Glycobiology 29(9):620-624

[4] Rojas-Macias MA, Mariethoz J, Andersson P, Jin C, Venkatakrishnan V, Aoki NP, Shinmachi D, Ashwood C, Madunic K, Zhang T, Miller RL, Horlacher O, Struwe WB, Watanabe Y, Okuda S, Levander F, Kolarich D, Rudd PM, Wuhrer M, Kettner C, Packer NH, Aoki-Kinoshita KF, Lisacek F, Karlsson NG (2019) An E-workflow for implementing reporting guidelines in glycomics mass spectrometry, Nat Commun 10(1):3275

[5] Shen Q, Polom K, Williams C, de Oliveira FMS, Guergova-Kuras M, Lisacek F, Karlsson NG, Roviello F, Kamali-Moghaddam M (2019) A targeted proteomics approach reveals a serum protein signature as diagnostic biomarker for resectable gastric cancer, EBioMedicine 44:322-333

[6] Le Mercier P, Mariethoz J, Lascano-Maillard J, Bonnardel F, Imberty A, Ricard-Blum S, Lisacek F (2019) A bioinformatics view of glycan-virus interactions, Special Issue «The Glycobiology of Viral Infections», Viruses 11, 374

[7] Bonnardel F, Kumar A, Wimmerova M, Perez S, Varrot A, Lisacek F, Imberty A (2019) Architecture and blade assembly of ß-propeller lectins, Structure 27:764–775

[8] Marcelino I, Colomé-Calls N, Holzmuller P, Lisacek F, Canals F, Vachiéry N (2019) Sweet and sour Ehrlichia: Comparative glycoproteomics and phosphoproteomics evidence new players in Ehrlichia ruminantium pathogenesis, Frontiers in Microbiology 10:450

[9] Williams C, Polom K, Adamczyk B, Afshar M, D'Ignazio A, Kamali-Moghaddam M, Karlsson NG, Guergova-Kuras M, Lisacek F, Marrelli D, Mereiter S, Morley D, Parmentier F, Reis CA, Roviello F, Shen Q, Tognetti Y (2019) Machine learning methodology applied to characterize subgroups of gastric cancer patients using an integrated large biomarker dataset, European Journal of Surgical Oncology 45(2):e79

[10] Ricard E, Leclère V, Flissi A, Mueller M, Pupin M, Lisacek F (2019) rBAN: Retro-Biosynthetical Analysis of Non-ribosomal peptides, Journal of Cheminformatics 11:13

[11] Alocci D, Mariethoz J, Gastaldello A, Gasteiger E, Karlsson NG, Kolarich D, Packer NH, Lisacek F (2019) GlyConnect: glycoproteomics goes visual, interactive and analytical, Software tools and data resources Special issue of J Prot Research 18(2):664-677

[12] Bonnardel F, Salentin S, Robin X, Perez S, Lisacek F, Imberty A (2019) UniLectin3D, a database of carbohydrate binding proteins with curated information on 3D structures and interacting ligands, Nucleic Acids Res 47 (Database issue): D1236–D1244.

International and national advisory committees

- F.Lisacek member of Scientific Council of Interdisciplinary Sciences & Health Doctoral School (http://ediss.universite-lyon.fr)
- F.Lisacek member of the Advisory Board of the MIRAGE project - http://www.beilstein-institut.de/en/projects/mirage - Beilstein Institute, Frankfurt, Germany
- F. Lisacek member of the Advisory Board of IMforFUTURE (Innovative Training in Methods for Future Data) (H2020-MSCA-ITN-2016-721815)
- F.Lisacek member of Management Committee of INNOGLY COST Action (CA18103)

International and national Research Programs Committees

- F.Lisacek grant submission reviewer, Swiss National Science Foundation – SNSF (www.snf.ch), France, May 2019
- F.Lisacek grant submission reviewer, Fonds De La Recherche Scientifique – FNRS (www.fnrs.be), Brussels, Belgium, October 2019

PhD Thesis Committees

- Aidan Tay, External evaluator (F.Lisacek), University of New South Wales (Australia)
- Matthieu David, Rapporteur and member of jury (F.Lisacek), University of Nantes (France)
- Thomas Charlon, Member of jury (F.Lisacek), University of Geneva
- Oriane Machon, Rapporteur and member of jury (F.Lisacek), University of Grenoble-Alpes (France)
- Asier Ullate, Member of jury (F.Lisacek), University of Geneva

Member of conference/workshop program committees

- F.Lisacek in Program committee of WCB@ICML2019 (ICML Workshop on computational biology), https://sites.google.com/view/icml-compbio-2019/home, Long Beach, California, USA, June 14th
- F.Lisacek in Program committee of Beilstein Glyco-Bioinformatics Symposium, https://www.beilstein-institut.de/files/abstract_book_beilstein_glycobioinf_symposium_2019_online.pdf, Limburg, Germany, June 25th-28th

Refereeing

- F.Lisacek regular reviewer for Journal of Proteome Research (JPR), PROTEOMICS, Journal of Proteomics, Nucleic Acid Research, Bioinformatics, Molecular&Cellular Proteomics, Analytical Chemistry, Glycobiology. Extra reviews in 2019 for Nature Communications and Nature Methods

Editorial Responsabilities

F. Lisacek Editorial Board Member of:

- Glycobiology (Oxford Press)
- PLOS One
- Clinical Applications in Proteomics (Wiley)

Invited talks

- LS2 (Life Science Switzerland) Annual Meeting, Zurich, February 14-15,
- Gordon Research Conference on Glycobiology, Lucca (Barga), Italy, March 10-15,
- Global Challenges Science Week 2019, Grenoble, France, June 3-6,
- Beilstein Glyco-Bioinformatics Symposium, Limburg, Germany, June 25-28,
- 2nd Australasian Glycoscience Symposium, Adelaide, Australia, September 14
- Volkswagen Foundation Symposium "Interdisciplinarity Revisited", Berlin, Germany, October 3-4

Funded research projects

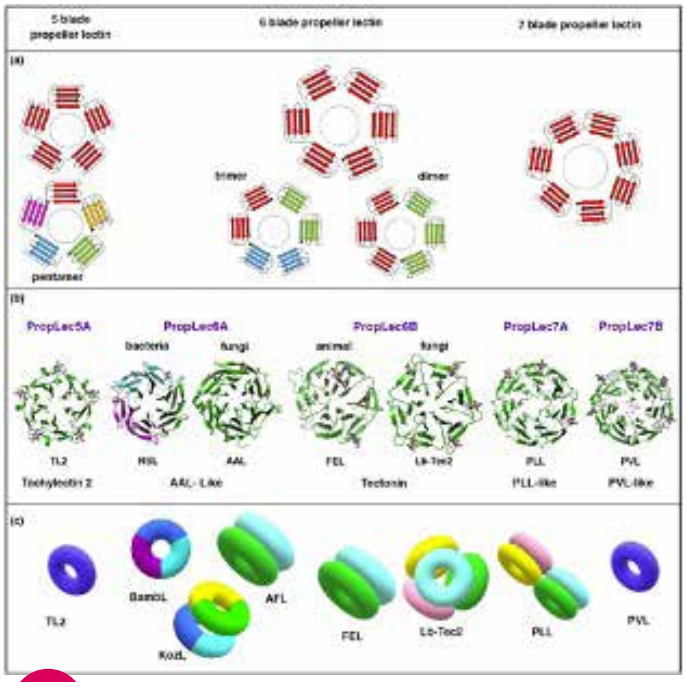
Participation to European projects

Une étude bioinformatique des lectines, classification et identification dans les génomes
Co-PI with A. Imberty (CNRS-CERMAV) of PhD grant of the Glyco@Alps programme (Initiative d'Excellence, Grenoble Alpes University)
Period: October 2017 - October 2020

CarboMet: Metrology of Carbohydrates for Enabling European Bioindustries
Work Package co-chair of Coordination and Support Action (H2020-FETOPEN-2-2016) coordinated by S. Flitsch (Uni. Manchester, UK).
Period: February 2017 - February 2021

Participation to National projects

NRPomics
Germaine de Staël funding programme of the Swiss Academy of Engineering Sciences (SATW) in collaboration with G. Hopfgartner (Uni. Geneva) and V. Leclère (Uni. Lille, France)
Period: January 2018 – December 2019



Sweet-Home
Glyco-driven modelling of homeostasis in the human gut microbiome
SNSF grant (31003A_179249)
Period: November 2018 - October 2021

The visual dictionary of bacterial glycans
UNIGE-UZH Co-funds in collaboration with T. Hennet (UZH)
Period: September 2018 - September 2019

Approche intégrative pour les glycosciences
UNIGE Co-funds "Alliance Campus Rhodanien" in collaboration with A. Imberty (Uni. Grenoble Alpes) and S. Ricard-Blum (Uni. Lyon 1)
Period: June 2018 - June 2020

Open software and databases

Glycomics@ExPASy
Bioinformatics services on ExPASy server fully hosted at SIB
Type: Databases + data analysis and search tools
External partners involved in the development (if any): CSEM
External partners involved in the development: University of Gothenburg, Sweden + University of Macquarie, NSW, Australia
Client or End user(s) : Life Science community
Brief description: The Glycomics@ExPASy backend is built on top of three databases (Host-pathogen interactions, Experimental mass spectrometry data of glycans and Glycoproteins). Tools are developed around the databases. They are either dedicated to solve a specific question (information extraction) or can be used in several applications and across the databases (data mining).
Website: http://www.expasy.org/glycomics

Teaching

- **Introduction to Systems Biology** , Master Biology, 42h, 3 ECTS, cancelled in 2019 due to the lack of students
- **Elements of bioinformatics**, Master Biology, 42h, 5 ECTS
- **Bioinformatics**, Bachelor Biology, 28h, 2 ECTS (François Bonnardel, tutor)
- **Introduction à la programmation des algorithmes**, Bachelor, 56h, 7 ECTS (François Bonnardel, tutor)
- **Modélisation et simulation de phénomènes naturels**, 14h, 4 ECTS (Thibault Robin, tutor)
- Organiser of and contributor to the **Glycosciences** workshop for UNIGE Doctoral School in Life Sciences, November 20-22.
- Contributor to **Glycoanalytics and Glycoinformatics** doctoral school course in Copenhagen, Denmark, October 10-11.

Figure 1: Different 3D-models of carbohydrate-binding proteins known as beta-propellers and suggestion of classification principles (a) Schematic representation of the different folds highlighting regularities (b) Structure of representative ß-propellers grouped in families defined by observed regularities (c) Different types of functional assemblies of ß-propellers.
(work of François Bonnardel and collaborators in Grenoble)

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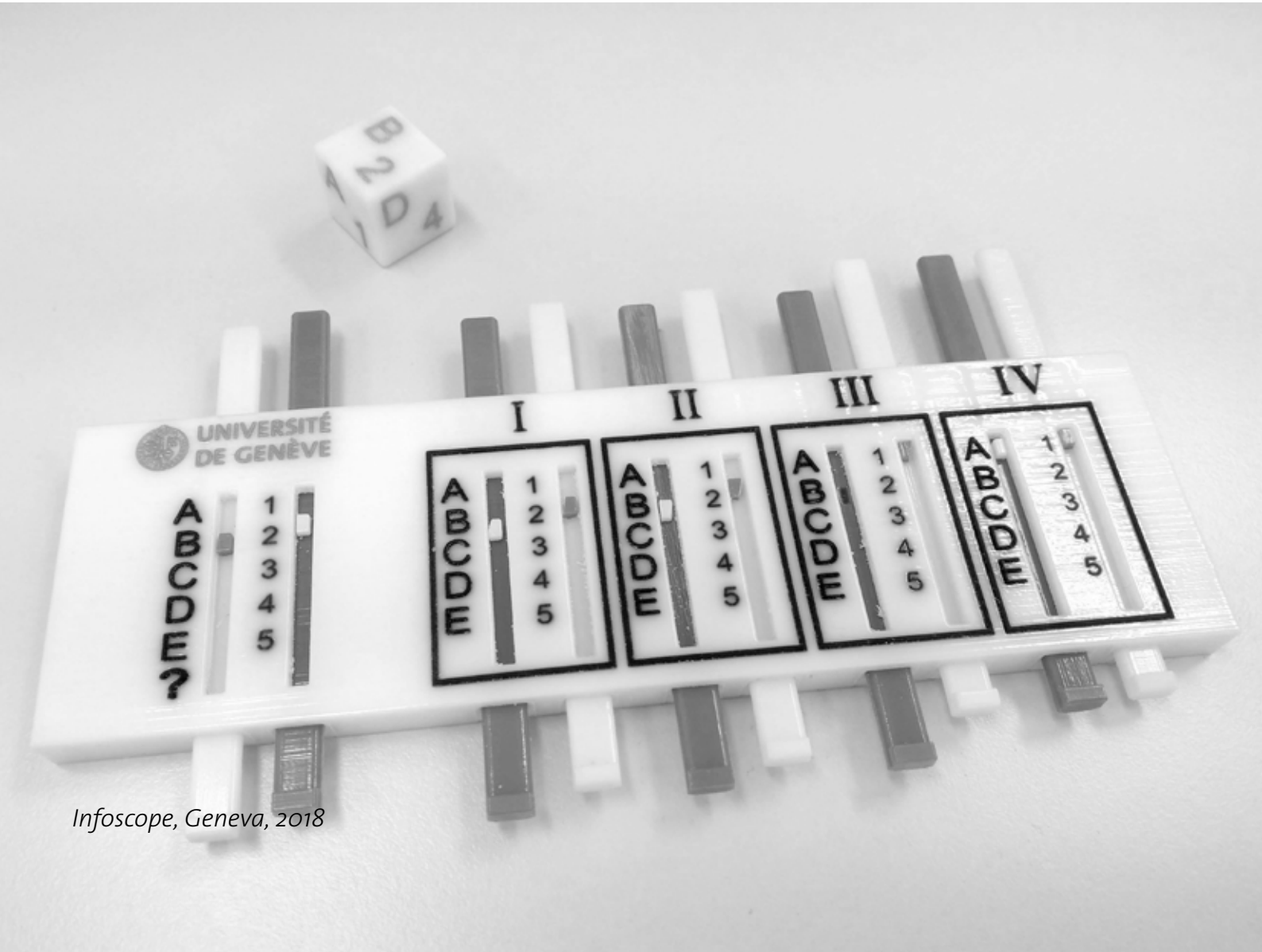
CUI UNI GE

SMV

Software Modeling and Verification



Infoscope, Geneva, 2018

Software Modeling and Verification

Domain activities

Symbolic Model Checking was developed with the idea of verifying complex high level models with a reasonable amount of work for the user. In particular we propose to separate the model to the informations for performing eficiently model checking (clustering, anonymization, partial unfolding). The introduction of new kind of decision diagrams ($\sum$ -DD) based on a generalization of the Shannon decomposition principles allow us to perform model checking for models with huge combinatorial explosion of states (around 10E4500 symbolic states). We are currently exploring the systematic use of rewriting of set of terms principles based on decision diagrams and operational control based on strategies as a metalevel in model checkers.

We currently develop several tools such as StrataGEM for the set rewriting principles, Stew as an abstraction over StrataGEM and Ardoises a meta-environment for managing formalisms and their veri cation tools. We also continue to organize a model checking contest in the conference Petri Nets in order to be able to compare existing model checkers on significant benchmarks. We also study programming language construction that check that the use of memory is alias safe. This language SafeScript is extending JavaScript in an elegant way. We also develop methods to adapt our formalisms (CREST) to the domain of modeling and verification of cyber-physical systems.

Several application domain have been covered by the team such as the development of a domain specific language for computing on sets (Trexmo Tool for the SECO). This language is applied successfully for expressing various models of toxicology analysis in the context of health in the workplace.

Team

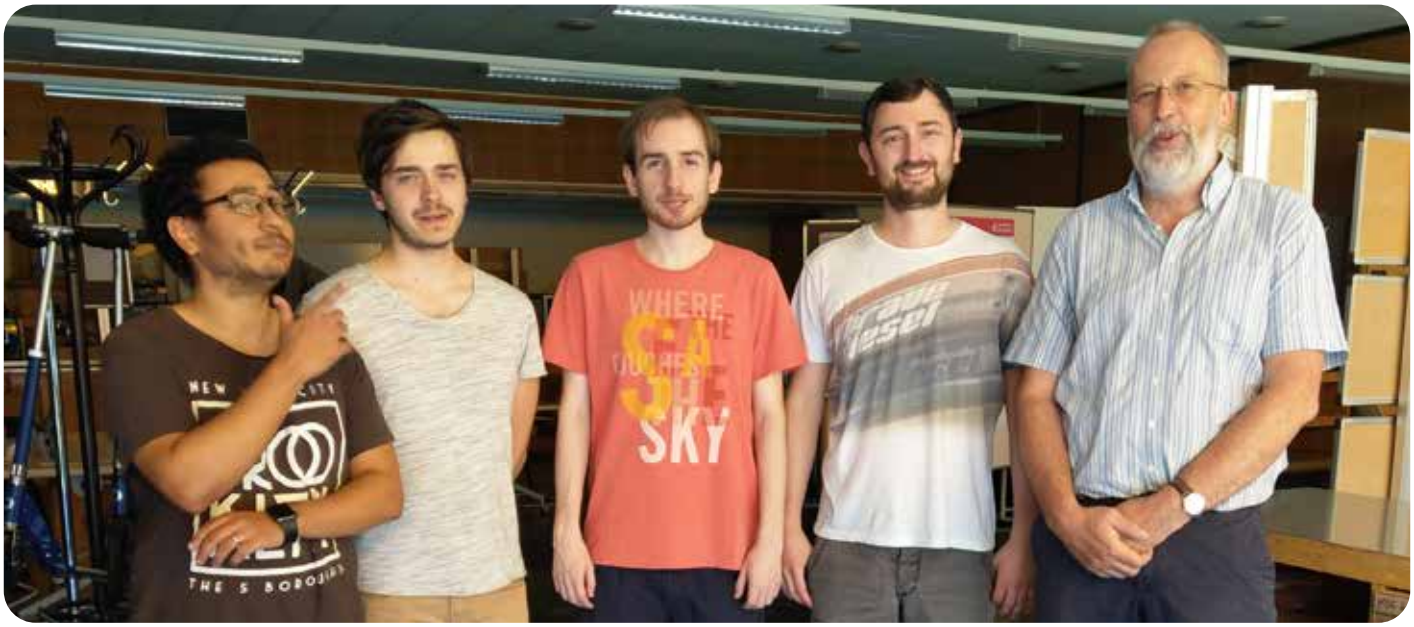
Director
Didier Buchs
Full professor
H-index: 20

Senior researchers
Dr. Alban Linard
Dr. Steve Hostettler

PhD students
Sahar Aljalbout
Eric Harth
Stefan Klikovits
Damien Morard
Dimitri Racordon

Administration
Maëlle Saintilan

SMV team in 2019 (from left to right): Dimitri Racordon, Guillaume Marthe (internship), Damien Morard, Stefan Klikovits, Didier Buchs



PhD Thesis

- Stefan Klikovits, A domain-specific language approach to hybrid cps modelling, June 2019
- Dimitri Racordon, Revisiting memory assignment semantics in imperative programming languages, September 2019
- Eric Harth, Program Understanding: The Narrative Hypothesis, January 2019, co-director Dr. Ph. Dugerdil

List of publications

Full refereed papers in Conference Proceedings

[] Sahar Aljalbout, Didier Buchs, Gilles Falquet: Introducing Contextual Reasoning to the Semantic Web with OWL ^C. ICCS 2019: 13-26

[] Sahar Aljalbout, Didier Buchs, Gilles Falquet: OWLC: A Contextual Two-Dimensional Web Ontology Language. LDK 2019: 2:1-2:13

[] Dimitri Racordon, Didier Buchs: Implementing a language with explicit assignment semantics. VMIL@SPLASH 2019: 12-21

[] Dimitri Racordon, Didier Buchs: Explicit and Controllable Assignment Semantics. CoRR abs/1907.11317 (2019)

Funded research projects

Participation to National projects

CPS-MOVE: Cyber Physical Systems Modeling and Verification
Hasler Project
Period: 2016 - 2019

Prove IT
Innosuisse 37024.1 INNO-SBM
Partners: Didier Buchs (UNIGE)
Period: May 2019 - May 2020

Teaching

- **Concurrency and repartition**, Computer Science, Bachelor, 4 ECTS, 56 hours, 14 students
- **Formal Methods**, Computer Science, Bachelor, 4 ECTS, 56 hours, 60 students
- **Semantics of Programming Languages**, Computer Science, Bachelor, 4 ECTS, 56 hours, 20 students
- **Software Modeling and Verification**, Computer Science, Master, 4 ECTS, 56 hours, 20 students
- **Advanced Formal Methods** (Optional), Computer Science, Master, 4 ECTS, 56 hours, 4 students

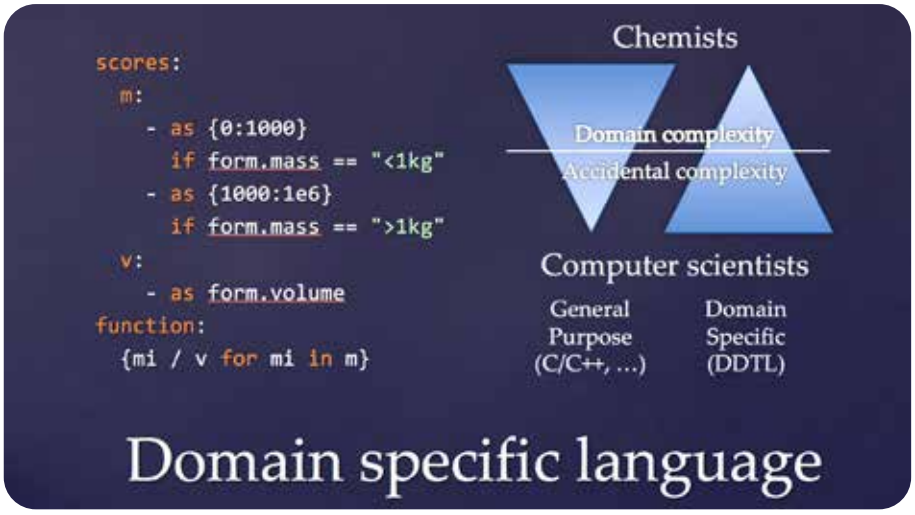


Figure 1: TREXMO is a tool built for chemical safety assessment, using multiple models of exposure. It is the result of a joined effort between the University of Geneva, the Institute for Work and Health and the State Secretariat for Economic Affairs.

Because the result of these models can vary for a given situation, it is desirable to have a tool able to run a scenario against multiple models with little to no user overhead. However, building such a tool can be rather complex, because of the complexity induced by the models translations, which is beyond the expertise of chemists.

In order to address this issue, we offered them a domain specific language that hides out this “accidental complexity” and let them deal with their “domain complexity”.

Figure 2: Synchronisation diagrams for the co-simulation in cyber-physical systems (PN= Petri net model, CBD= causal block diagram)

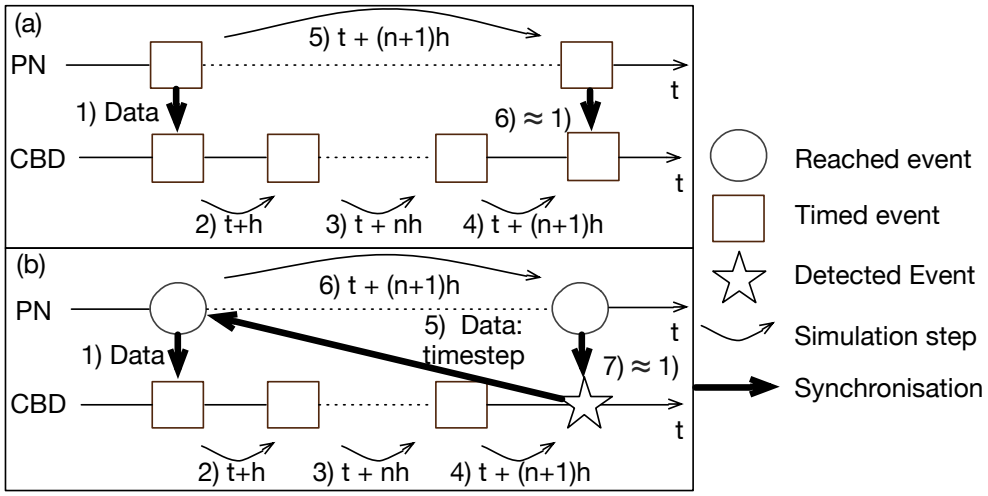
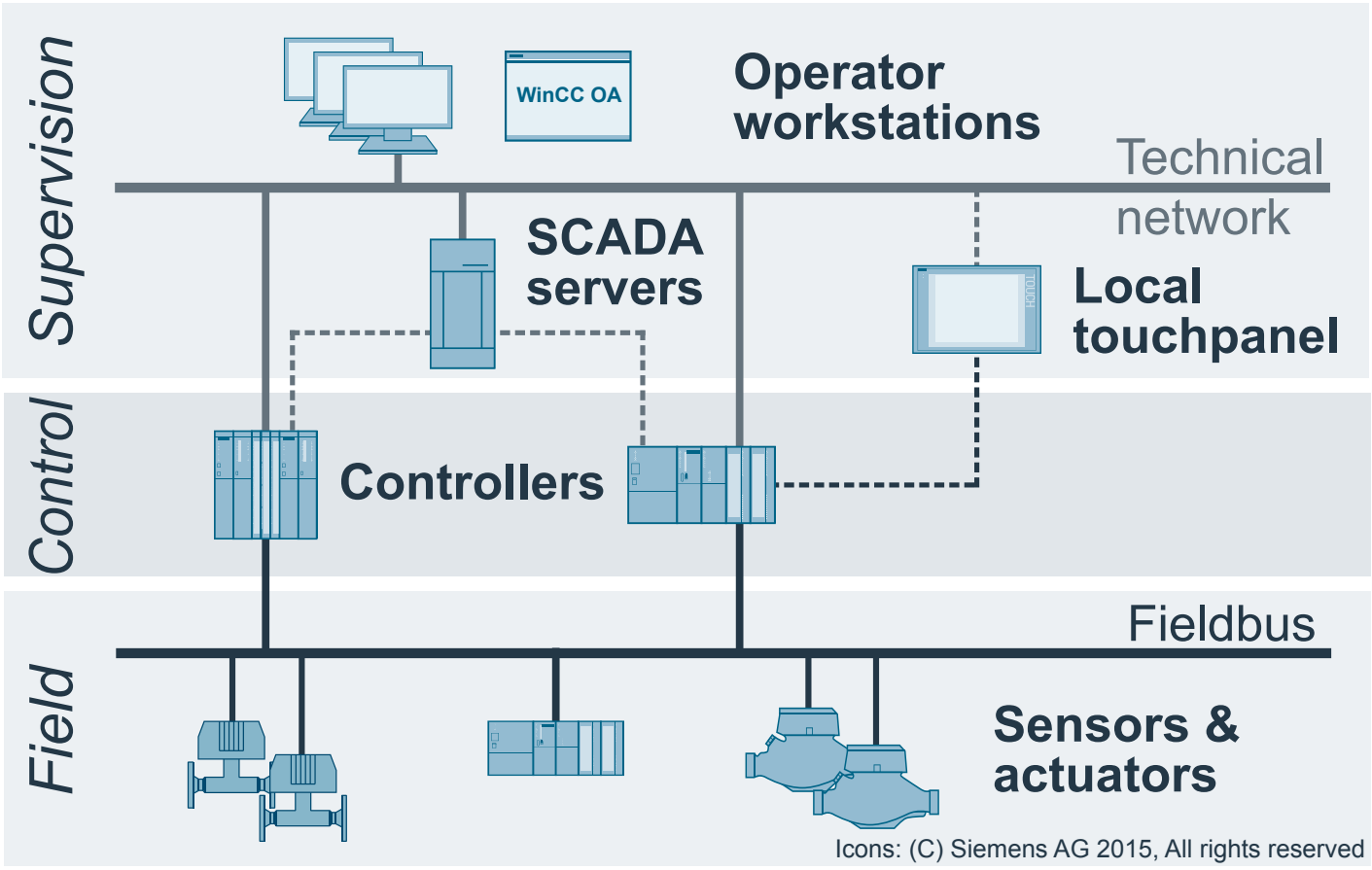


Figure 3: Layer model depicting the connection of field objects, frontend controllers (e.g. PLCs) and Operator Work Stations through SCADA (Supervisory Control and Data Acquisition) applications at CERN LHC



spc.unige.ch

SPC

Scientific and Parallel Computing

TecDay, Collège de Candolle, Geneva, 2019 April 4th

Scientific and Parallel Computing

Websites: http://spc.unige.ch - http://cui.unige.ch/~chopard - http://epicells.unige.ch

Domain activities

A main research activity concerns the study of complex systems, in particular the development of new numerical methods to model and simulate phenomena in natural sciences, economics, social systems and bio-medical applications. Cellular automata, Lattice Boltzmann and multi-agent techniques are central tools to address these questions. Parallel programs and algorithms are developed to implement the simulation on large PC clusters, supercomputers or GPUs to discover, explain or reproduce new phenomena.

Biomedical applications and multiscale problems are an important research direction. In the H2020 CompBioMed we are partner of a center of excellence for High Performance biomedical simulations. In particular we developed numerical models for the transport of red blood cells and platelets, in order to study various pathologies.

An important line of research focuses on computational fluid dynamics, cross-disciplinary modeling of complex systems, and high performance computing. He is the original developer and principal maintainer of the open-source software Palabos (www.palabos.org), which is widely used and acknowledged by the simulation community and has been used as a tool for more than 300 publications by universities world-wide. Palabos is used as a tool to spread the research of the UNIGE internationally, establish collaborations, and assess the expert position of the UNIGE in the field of lattice Boltzmann modeling.

Team

Directors

Bastien Chopard
Full professor
H-index: 46

Jonas Lätt
Professor
H-index: 20

Developers / Designers

Dr. Christophe Charpilloz
Joël Beny
Jean-François Burdet

Senior researchers

Dr. Christophe Coreixas
Dr. Jean-Luc Falcone
Dr. Franck Raynaud

PhD students

Anthony Boulmier
Raphaël Conradin
Christos Kotsalos
Pierre Kunzli
Jonathan Lemus
Sha Li
Francesco Marson
Rémy Petkantchin
Yann Thorimbert

Internship Fellow

Everton Lira (Brazil)

Administration

Anne-Isabelle Giuntini

SPC team in 2018

PhD Thesis

- Sha Li, Continuum model for flow diverting stents of intracranial aneurysms, 2019/01/14
- Luc Mottin, Assistance à la curation de publications scientifiques par des méthodes d'annotation automatiques, 2019/05/02
- Yann Thorimbert, Lattice Boltzmann simulations of complex flows, 2019/07/05

List of publications

Refereed papers in international journals

[1] Christophe Coreixas, Bastien Chopard, and Jonas Latt. Comprehensive comparison of collision models in the lattice Boltzmann framework: Theoretical investigations. Physical Review E, 100(3):033305, 2019.

[2] Christos Kotsalos, Jonas Latt, and Bastien Chopard. Bridging the computational gap between mesoscopic and continuum modeling of red blood cells for fully resolved blood flow. Journal of Computational Physics, 398:108905, 2019.

[3] Sha Li, Bastien Chopard, Jonas Latt. Continuum model for flow diverting stents in 3D patient-specific simulation of intracranial aneurysms. Journal of Computational Science, 38:101045, 2019.

[4] Yann Thorimbert, Jonas Latt, and Bastien Chopard. Coupling of lattice Boltzmann shallow water model with lattice Boltzmann free-surface model. Journal of Computational Science, 33:1–10, 2019.

[5] Alfons G. Hoekstra, Bastien Chopard, David Coster, Simon Portegies Zwart and Peter Coveney Multiscale Computing for Science and Engineering in the Era of Exascale Performance. Phil. Trans. R.Soc A377, 20180144. DOI 10.1098/rsta.2018.0144. (2019)

[6] Yann Thorimbert, Jonas Latt and Bastien Chopard. Implemention of lattice Boltzmann free-surface and shallow water models and their two-ways coupling.} MethodsX, 2019

Full refereed papers in Conference Proceedings

[7] Joel Beny, Christos Kotsalos, and Jonas Latt. Toward full GPU implementation of fluid-structure interaction. 2019 18th International Symposium on Parallel and Distributed Computing (ISPDC), Amsterdam, Netherlands, 2019, pp. 16-22.

[8] Anthony Boulmier, Franck Raynaud, Nabil Abdennadherand Bastien Chopard. On the Benefits of Anticipating Load Imbalance for Performance Optimization of Parallel Applications. IEEE Cluster 2019, Albuquerque, 2019

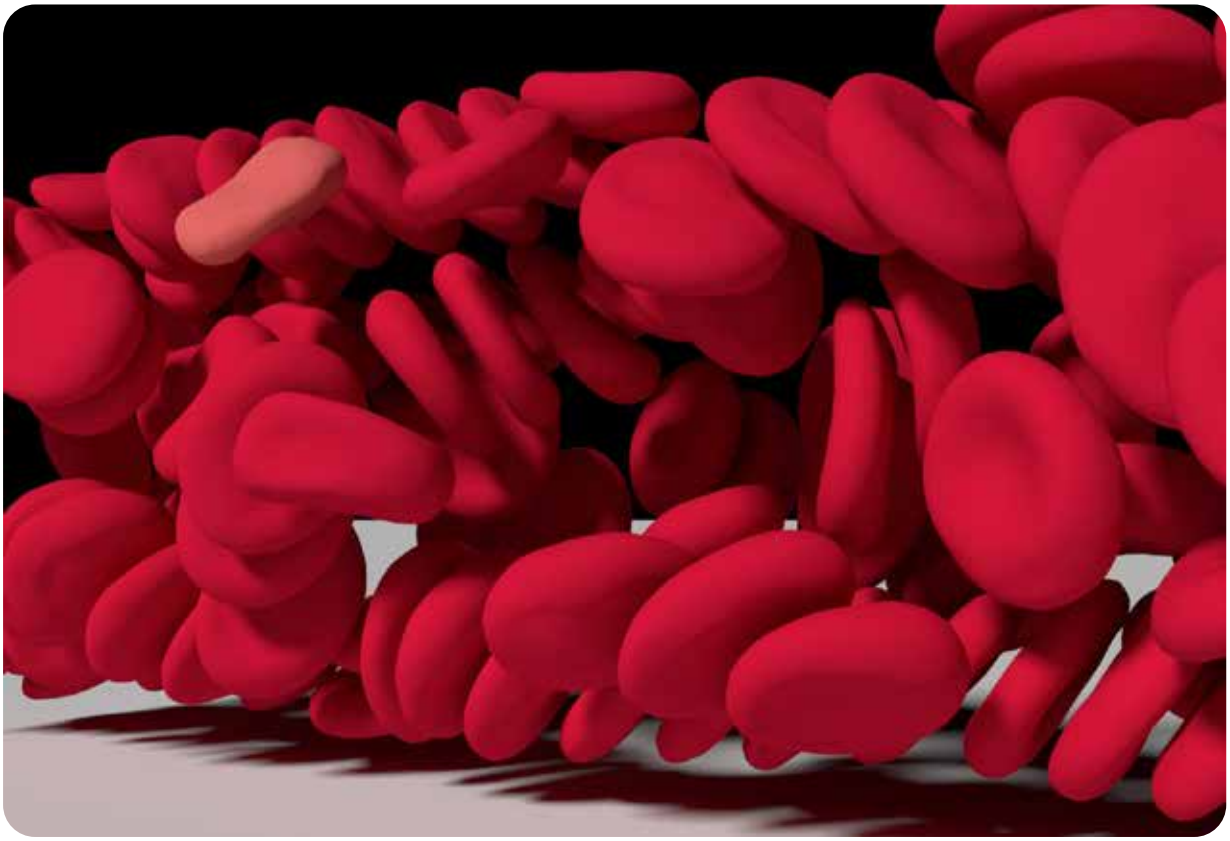
Books and book chapters

[9] Advance HPC-Based Computational Modeling in Biomechanics and System Biology. Mariano Vàzquez, Peter V. Coveney, Hernan Edardo Grecco, Alfons Hoekstra and Bastien Chopard eds (2019). Frontiers Media. doi: 10.3389/978-2-88945-817-2

Research and technical reports

[10] Anthony Boulmier, Franck Raynaud, Nabil Abdennadher and Bastien Chopard. On the Benefits of Anticipating Load Imbalance for Performance Optimization of Parallel Applications. https://arxiv.org/abs/1909.07168. 2019

Figure 1: Blood cells (Jonas Latt)



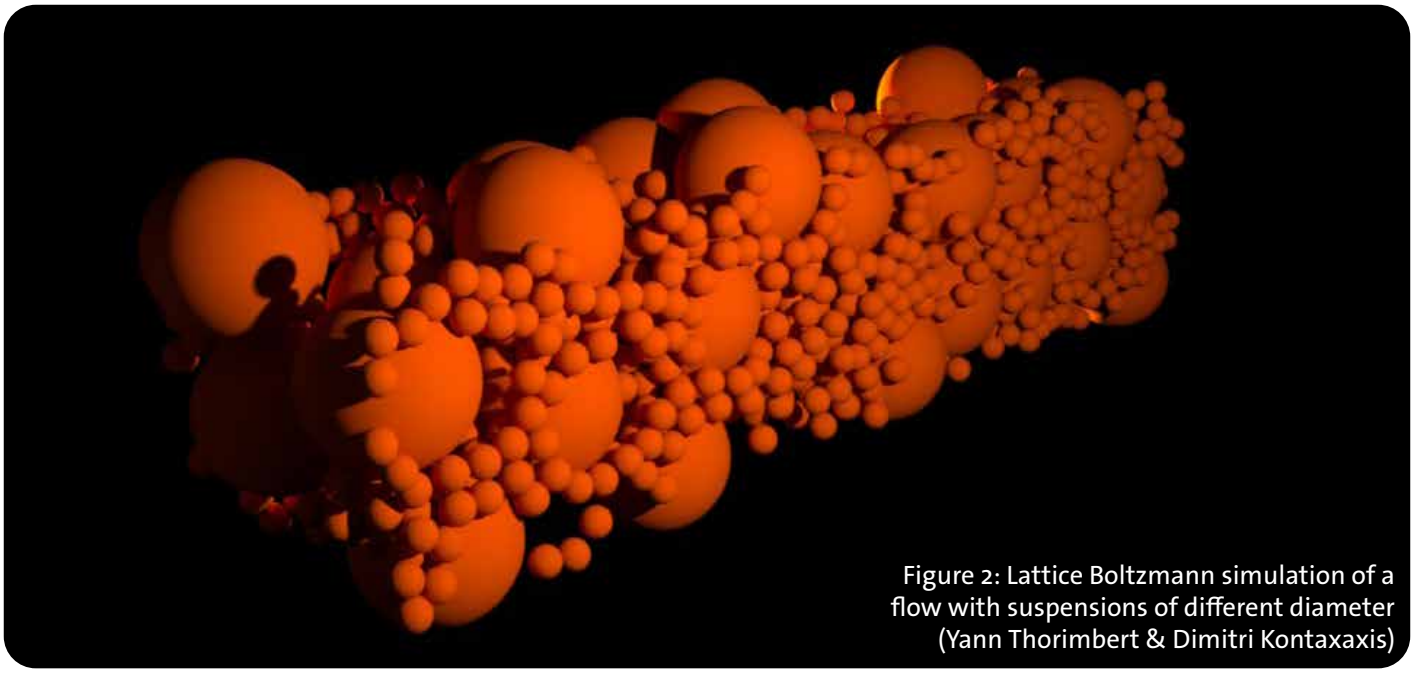


Figure 2: Lattice Boltzmann simulation of a flow with suspensions of different diameter (Yann Thorimbert & Dimitri Kontaxaxis)

International and national advisory committees

- CADMOS committee member

PhD thesis committees

- Alain Cartalade, Membre du Jury, CEA/Sarclay, Gif-sur-Yvette, France
- Daniel Ribeiro, U. Mons Belgium
- Luis Ortega, Section de Biologie, UNIGE
- Anna Stopka, ETHZ
- Diana Suleimenova, Brunel University. London, UK

Conference organization as chair or co-chair

- PASC 2019, organization of two workshops

Funded research projects

Participation to European projects

CompBioMed: A Centre of Excellence in Computational Biomedicine
H2020-EU.1.4.1.3, grant agreement No 675451
Partners: University College London, University of Edinbugh, Barcelona Supercomputing Center, University of Geneva, CBK Sci Con Limited, LifeTec Group, Evotec AG, Janssen, University of Amsterdam, SURFsara, University of Oxford, University of Sheffield, University Pompeu Fabra, Acellera, Bull (atos)
Web Site: http://www.compbiomed.eu/
Period: October 2016 - September 2019

INSIST: IN-Silico trials for treatment of acute Ischemic Stroke
H2020, grant agreement No 777072
Partners: Academic Medical Center (Amsterdam, The Netherlands), University of Amsterdam (The Netherlands), Erasmus Medical Centre (The Netherlands), University of Oxford (UK), Neuravi (Ireland), National University of Ireland Galway (Ireland), Catholic University of Leuven (Belgium), Politecnico di Milano (Italy), University of Geneva (Switzerland), Institut de Recherches Internationales Servier (France), Lomonosov Moscow State University (Russia)
Website: https://www.insist-h2020.eu/
Period: 2017 - 2021

Participation to National projects

Virtual Physiological Blood: an HPC framework for blood flow simulations in vasculature and in medical devices
PACS Project
Principal Investigator: Petros Koumoutsakos (ETH Zurich)
Co-Principal Investigators: Bastien Chopard, Mauro Pezzè
Period: July 2017 - June 2020
Web: https://www.pasc-ch.org/projects/2017-2020/virtual-physiological-blood/

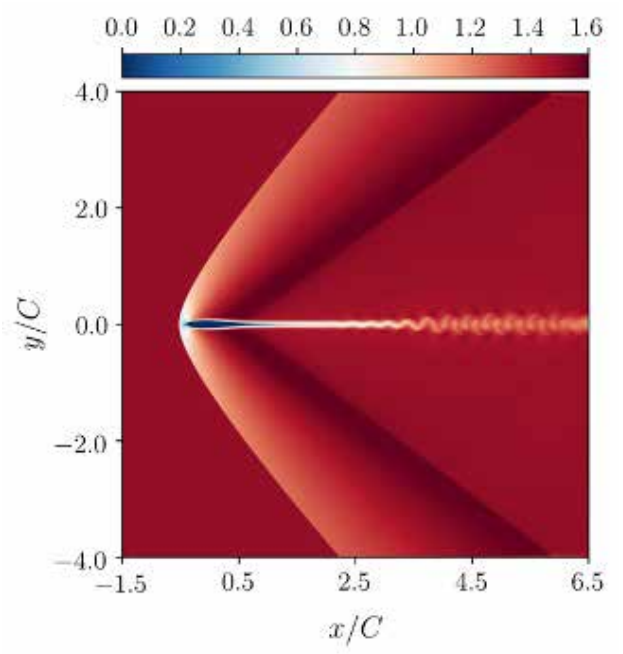


Figure 3: Simulation of supersonic flow around an airfoil, with a shock front

A 3D Cell-Based Simulation Framework for Morphogenetic Problem
SNF Sinergia project 170930
Partner: ETHZ
Period: 2017 - 2021

Others

Refeereeing

- Reviewer for many intenational journals

Editorial responsibilities

- Int. J. of Mod Phys, Editorial Board Member
- J. of Computational Sciences (JoCS), Editorial Board Member
- J. of Cellular Automata, Editorial Board Member
- Natural Computing Journal (NACO), Editorial Board Member

Invited talks

- DSFD (Discrete Simulation in Fluid Dynamics, Bangalore, India, July 2019. Fluid-structure interaction in supersonic flow simulations.
- ENIUS Training School, Bern, Sept 10, 2019. Biomedical applications with the Lattice Boltzmann method
- INSCI, Perpignan, Dec 3, 2019, Impact of immigrants on a multi-agent economical system.

Participation in TV and Radio Programs

- Codez la science, Service de presse du CERN, Septembre 2019, https://bit.ly/2VBMd04

Others

- Organization of CADMOS HPC Course (Champéry, Switzerland), 3 days, 20 participants

Open software and databases

The Palabos software project
Open-source library for numerical simulation of fluid flow through the lattice Boltzmann method. Software used by numerous international researchers and referenced in over 300 scientific publications.
Website: http://palabos.unige.ch

Teaching

- **Méthodes Heuristiques d'apprentissage et d'optimisation**, Computer Science, Master, 6 ECTS, 70 hours, 20 students
- **Parallelisme**, Computer Science, Bachelor, 4 ECTS, 56 hours, 20 students
- **Algorithmique**, Computer Science, Bachelor, 4 ECTS, 56 hours, 30 students
- **Algorithme probabilistes**, Computer Science, Master, 4 ECTS, 56 hours, 8 students
- **Modélisation et simulation de phénomènes naturels**, Computer Science, Master, 4 ECTS, 56 hours, 18 students
- **Principe de fonctionnement des ordinateurs**, Computer Science, Bachelor, 4 ECTS, 56 hours, 11 students
- **Programmation pour biologistes**, Computer Science, Bachelor, 84 hours, 3.5 ECTS, 58 students
- **Introduction à l'infromatique pour mathématiciens**, Computer Science, Bachelor, 75 hours, 4 ECTS, 40 students

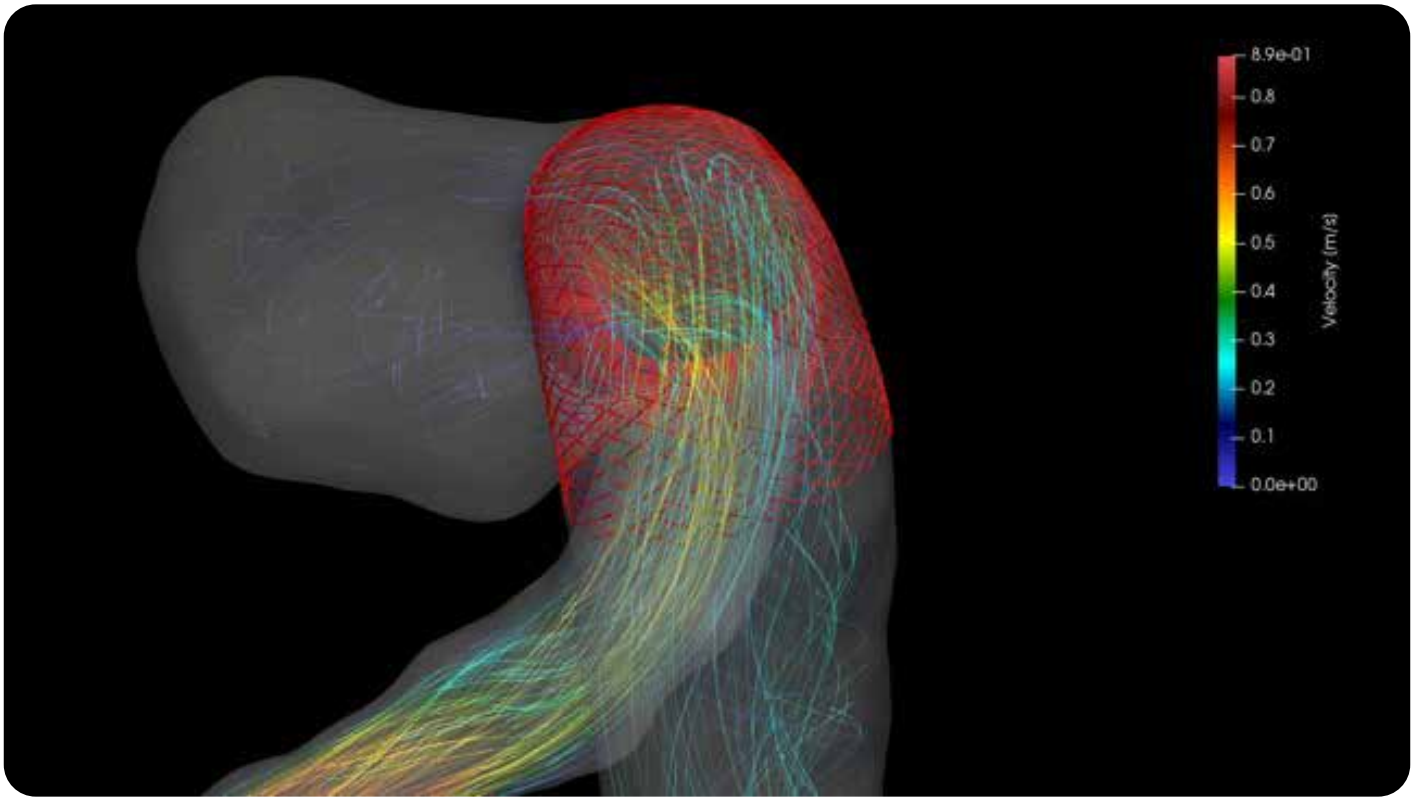


Figure 4: bloodflow in a cerebral aneuyrsm with a flow diverter (Sha Li & Dimitri Kontaxaxis

tcs.unige.ch

CUI UNI GE

TCS

Theoretical Computer Science

Infoscope, Geneva, 2018

Theoretical Computer Science

Domain activities

Experimental driven research on Topology Control Protocols for Wireless Sensor Networks (WSN) using transmission power and throughput rate feedback schemes. The goals include link qualification in terms of symmetry and coherence and link quantification. Transmission power constitutes the link «generator» and throughput rate the link «regulator» to meet the qualitative and quantitative criteria for links between WSN nodes .

Research on designing a geographic routing algorithm for large scale networks, which is an extension to the Virtual Raw Anchor Coordinate localization based geographic routing. The goal is to perform routing in wireless ad-hoc network in a hierarchical manner, where in the top level routing is done between two geographic regions and in the bottom level performing routing to the exact node. A randomized protocol is designed and evaluated with simulations.

Design of a distributed publish/subscribe algorithm for an ubiquitous sensing scenario. We consider unstructured and free-geocoordinates sensing networks in which no network protocol is provided. Our solution, which avoids implying all the nodes of the network in the dissemination process, uses a distributed notification service defined by Directional Random Walks (DRW). A DRW is a probabilistic technique able to go forward into the network following a loop-free path. The principle assumed in our research is that two lines in a plane cross.

Also research on Future Networks, Internet of Things and Crowdsensing. Our efforts focus on problem modeling aspects and incentive formulation regarding the crowd participation in tasks that aim at optimizing spatial and temporal coverage issues.

Also, research on radiation aware wireless networking; studying the cumulative impact on ERM caused by multiple wireless sources in terms of numbers, topology, protocol, etc.

Team

Director
José Rolim
Full professor
H-index: 26

Senior researchers
Dr. Pierre Leone (MER)

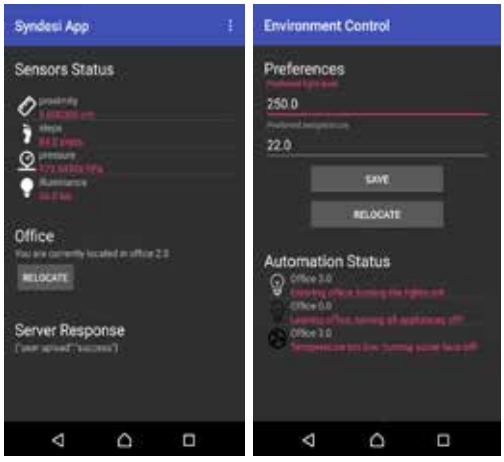
Senior Lecturer
Dr. Eduardo Solana

Assistants (PhD students)
Mathias Bavarel
Alexandre Quentin Berger
Julia Buwaya
Stéphane Kündig

Administration
Maëlle Saintilan

Figure 1: Crowdsensing and location-based automation in TCS-lab premises via a mobile application

Mobile Crowdsensing



Sensor
Sensor-Actuator

Indoor Localization

List of publications

Refereed papers in international journals

[1] Pierre Leone, Steve Alpern, A symbolic programming approach to the rendezvous search problem, submitted.

[2] Pierre Leone, Julia Buwaya, Steve Alpern, Search-and-Rescue Rendezvous, submitted.

[3] Pierre Leone, Kasun Samarasinghe, José D. P. Rolim: Every Schnyder drawing is a greedy embedding. Theor. Comput. Sci. 807: 234-244

[4] Constantinos Marios Angelopoulos, Sotiris E. Nikoletseas, Theofanis P. Raptis, José D. P. Rolim: User Incentivization in Mobile Crowdsensing Systems. Mission-Oriented Sensor Networks and Systems

[5] Sotiris E. Nikoletseas, Theofanis P. Raptis, Christoforos L. Raptopoulos, José D. P. Rolim: Radiation Control Algorithms in Wireless Networks. Mission-Oriented Sensor Networks and Systems (2) 2019: 719-756

Full refereed papers in Conference Proceedings

[6] Stéphane Kündig, Constantinos Marios Angelopoulos, Sanmukh R. Kuppanagari, Jose Rolim, Viktor K. Prasanna. Crowdsourced Edge: A Novel Networking Paradigm for the Collaborative Community, submitted

Books and book chapters

[7] Pierre Leone, Kasun Samarasinghe: Geometric Routing Without Coordinates but Measurements. Mission-Oriented Sensor Networks and Systems (1) 2019: 603-634

Conference organization as chair or co-chair

Jose Rolim

- DCOSS 2019 IEEE International Conference on Distributed Computing in Sensor Systems, Santirini, Greece, May 2019 – co-chair steering committee
- RANDOM 2019 – 23rd International Workshop on Randomization and Computation – MIT , August 2019 - chair steering committee
- ALGOSENSORS 2019 - 16th International Workshop on Algorithms for Sensor Systems, Wireless Ad Hoc Networks and Autonomous Mobile Entities – Munich, Germany - member steering committee
- IPDPS 2019 – 31st IEEE International Parallel & Distributed Processing Symposium. May 2019, Rio de Janeiro, Brazil - member steering committee

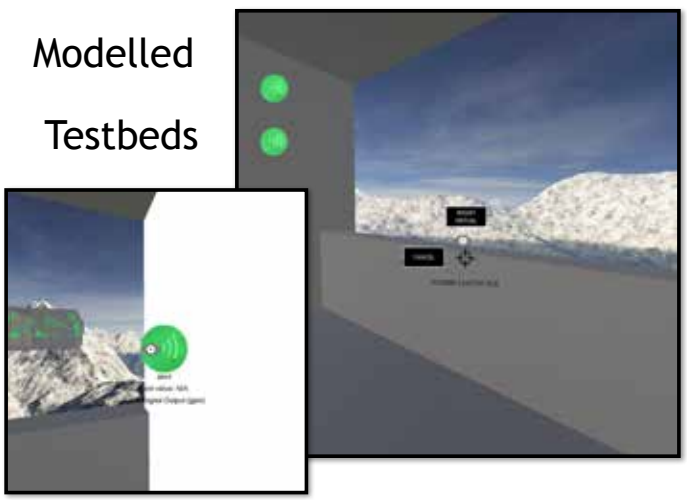


Figure 2: Testbed modelling and augmentation with virtual resources in a 3D, interactive web framework

Member of conference/workshop program committees

Jose Rolim

- 15th Annual Conference on Theory and Applications of Models of Computation –TAMC 2019- April 13-16, Kokura, Japan

Pierre Leone

- ICSOFT 13th International Conference on Software Technologies
- MobiWac 17th ACM International Symposium on Mobility Management and Wireless Access
- AdHocNow 18th International Conference on Ad Hoc Networks and Wireless
- UBICOMM Thirteenth International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies, Vehicular 2019, Internet 2019

Stéphane Kündig

- SMACE: 1st International Workshop on Smart Circular Economy - DCOSS – June, Santorini, Greece

Others

Refeereeing

Pierre Leone

- Ad Hoc Network
- Transactions on Knowledge Discovery from data
- COMNET Computer Networks

Stéphane Kündig

- IEEE Access
- The multidisciplinary Open Access Journal

Editorial responsibilities

Pierre Leone

- Member of the Editorial Board of the Ad-Hoc Sensor and Wireless Networks
- Member of the Editorial Board of the journal Algorithms

Invited talks

- Eduardo Solana. Quantum Computing: Disruptive Threat or Opportunity? Zero-Day Conference 2019. October 24, 2019. Geneva
- Eduardo Solana. Quantum: A Double-Edged Sword? CISO 360 Congress 2019. June 19-21, 2019. Rome

Others

- Development of a new INFOSCOPE workshop "InfoAcoustique" in collaboration with Faculty of Science/ Physics Section, Institut Universitaire de Formation des Enseignants (IUFE) : From acoustics to health, a short hearing diagnosis and how to measure noise with a smartphone and start exploring science (Julia Buwaya)
- Development of a new INFOSCOPE workshop on Cryptography in collaboration with Laurent Moccozet and Elie Zagury (CUI) (Eduardo Solana)
- Expert referee in the ICT berufsbildung Federal Examinations for Cyber Security Specialists (November 2019) (Eduardo Solana)
- Contribution an ITU-T standard, published in January 2019: "Y.4205:Requirements and reference model of IoT-related crowdsourced systems" (Stéphane Kündig).

Courses and tutorials

- **Menaces liées à internet: cloud, risques et protection des données, cryptographie**, Tutorial, Computer Science, Certificate of Advances Studies, 8 hours, 15 students, November 2019 (Eduardo Solana)
- **Cloud Security**, Tutorial, Computer Science, Master of Advanced Studies, May 2019 (Eduardo Solana)

Teaching

- **Complexité et calculabilité**, Computer Science, Bachelor, TP, 4 ECTS, 56 hours, 53 students
- **Langages formels**, Computer Science, Bachelor, TP, 4 ECTS, 56 hours
- **Logiciels et réseaux informatiques**, Computer Science, Bachelor, 6 ECTS, 42 hours, 80 students
- **Cryptographie et sécurité**, Computer Science, Bachelor, 5 ECTS, 56 hours, 40 students
- **Securité des systèmes d'information**, Computer Science, Master, 4 ECTS, 56 hours, 15 students
- **Securité avancée**, Computer Science, Master, 2 ECTS, 28 hours, 5 students
- **Base de données**, Computer Science, Bachelor, TP, 6 ECTS, 56 hours, 34 students

Figure 3: Project website of ongoing Mobile Crowdsensing Experiments of the TCS group

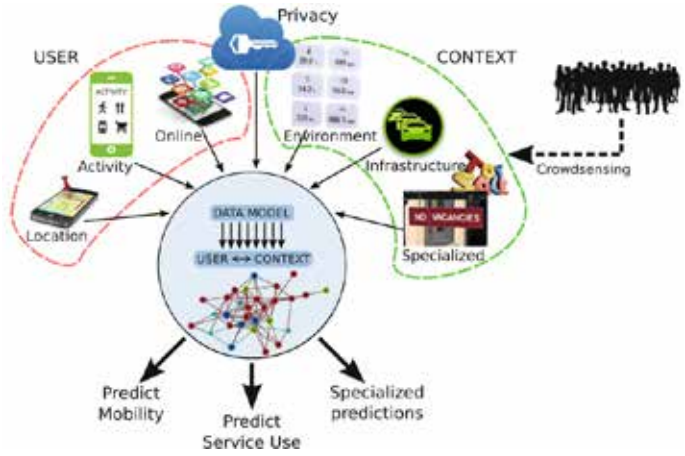


Figure 4: Mobile Crowdsensensing Platform Scheme «VIVO», TCS in collaboration with Uni Bern, SUPSI Lugano and Chalmers Sweden

Figure 5: User interface of the TCS NoiseBay project

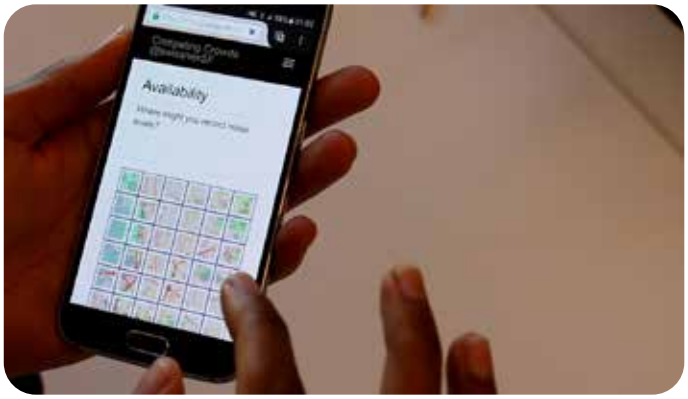
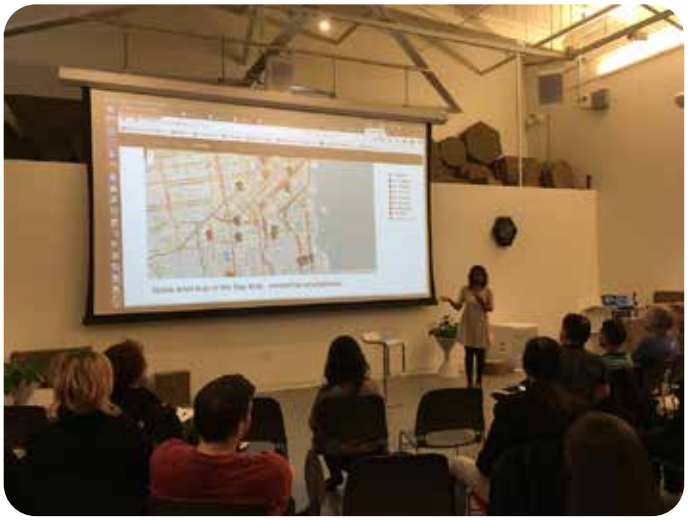


Figure 6: Presenting results at swissnex San Francisco



Thesis completed

Georges Wylfred Bediang

Doctor ès Economy and Management, mention Information Systems

18th June, 2019

Directors: Prof. Gilles Falquet
Prof. Antoine Geissbuhler

Un modèle sémantique basé sur les ontologies pour le partage et la réutilisabilité des itinéraires cliniques à travers le contexte (ShaRE-CP)

Les itinéraires cliniques sont considérés comme des outils de management de la qualité. Ils constituent un moyen de gérer efficacement et de manière efficiente la prise en charge des patients au cours de leurs soins. Plusieurs bénéfices sont associés à leur utilisation notamment en termes d'amélioration de la qualité des soins. Habituellement les itinéraires cliniques intègrent non seulement les données issues de la littérature scientifique (médecine basée sur les preuves) mais surtout, ils tiennent compte du contexte (par exemple, la disponibilité des ressources matérielles, financières, humaines ou autres) dans lequel les interventions requises doivent être réalisées. C'est cette adéquation entre choix des interventions et disponibilité des ressources qui en fait un outil pertinent pour l'amélioration de la qualité des soins.

La maitrise de la cohérence entre tous ces éléments de connaissance associée à la complexité de la gestion de leur évolution dans le temps constitue un des défis importants pour ceux qui ont la charge de développer et d'implémenter les itinéraires cliniques. Il est donc important d'établir un modèle sémantique commun permettant de représenter et de décrire les concepts et les liens sémantiques propres à un itinéraire clinique d'une part, et d'autre part, de représenter et de décrire les concepts et les liens sémantiques associés aux domaines de connaissances qui interagissent avec celui-ci (guidelines, contexte, ressources, etc.).

Bien que plusieurs modèles sémantiques basés sur les ontologies aient été proposés pour représenter les itinéraires cliniques et ses interactions avec d'autres domaines de connaissances, force est de constater qu'il n'existe pas de travaux ayant tenté de formaliser explicitement les interactions qui existeraient entre les différents domaines de connaissances que sont les itinéraires cliniques, les guidelines et le contexte. De plus, de nombreux défis existent encore à savoir : (i) le besoin de représenter formellement les relations sémantiques qui existent entre les itinéraires cliniques, les guidelines et le contexte ; et (ii) la nécessité pour un itinéraire clinique de s'adapter de manière cohérente à l'évolution des connaissances provenant des guidelines ou du contexte afin de faciliter son partage et sa réutilisabilité d'un contexte donné à un autre.

Les objectifs de cette thèse étaient de développer une ontologie qui intègre les concepts et les relations sémantiques relatifs aux domaines de connaissances que sont les itinéraires cliniques, les guidelines et le contexte, d'établir les liens et les interactions sémantiques qui existent entre ces domaines de connaissance, d'évaluer et de valider la consistance de ce modèle d'ontologie.

Nous avons développé une ontologie de domaine dénommée Shareable and Reusable Clinical Pathway Ontology (ShaRE-CP). Il s'agit d'un modèle sémantique modulaire de gestion des itinéraires cliniques qui intègre quatre domaines de connaissance à savoir : les itinéraires cliniques, les guidelines, les ressources en santé et le contexte dans lequel un itinéraire clinique est déployé. Cette ontologie décrit d'une part, les concepts et les relations qui existent au sein de ces quatre domaines de connaissance. D'autre part, elle identifie et met en évidence les liens et autres interactions sémantiques qui existent entre les concepts issus des différents domaines de connaissance. Pour une meilleure intégration et réutilisation, cette ontologie intègre elle-même d'autres ontologies à l'instar de : l'ontologie des services OWL-S, l'ontologie du temps, l'ontologie Dublin Core, ainsi que d'autres bases de connaissances.

Sur la base de la pertinence en santé publique (épidémiologie) et de l'évaluation de sa faisabilité, nous avons développé et validé par les professionnels de la santé travaillant à la maternité de l'Hôpital Central de Yaoundé (un des hôpitaux de référence du Cameroun), un itinéraire clinique destiné à la prise en charge des patientes ayant une pré-éclampsie sévère. Les données issues de cet itinéraire clinique ont été représentées au sein de l'ontologie ShaRE-CP. Il en est de même d'autres modules de l'ontologie à savoir : les recommandations de bonnes pratiques (guidelines OMS) pour la prise en charge des patientes souffrant de pré-éclampsie et d'éclampsie, les ressources requises pour la prise en charge des patientes souffrant de pré-éclampsie et d'éclampsie dans un pays en développement et enfin, le contexte de l'Hôpital Central de Yaoundé propre à l'exécution de cet itinéraire clinique. Les interactions sémantiques entre les différents faits et connaissances ont été également représentés.

Enfin, pour tester et valider le fonctionnement et la consistance de cette ontologie et ce en accord avec les objectifs de recherche, nous avons identifié quelques cas d'utilisation qui ont été résolus au travers de l'exécution d'un moteur de raisonnement, d'application de règles SWRL et d'interrogations
via des requêtes SPARQL.

Le modèle qui est proposé dans cette thèse à travers cette ontologie offre de nombreuses possibilités. Il pourrait servir de base sémantique pour la mise en place d'un système d'aide à la décision destiné à la planification pertinente et cohérente des soins (à l'échelle d'un système de santé ou d'un hôpital). Il
aiderait ainsi les développeurs d'itinéraires cliniques, les gestionnaires de santé ou de soins à concevoir des itinéraires cliniques dits intelligents c'est-à-dire qui respectent au mieux les différentes contraintes issues des domaines de connaissances (guidelines, contexte) connexes aux itinéraires cliniques. Ce modèle peut également servir de support pour la gestion (exécution et suivi) des soins à l'échelle d'un patient. Son caractère modulaire offre la possibilité de le connecter aux données des patients contenues dans un dossier patient électronique.

Doctorat thesis: Univ. Genève, 2019 - GSEM 68 - 2019/06/18
https://archive-ouverte.unige.ch/unige:123705

Vincenzo Daponte

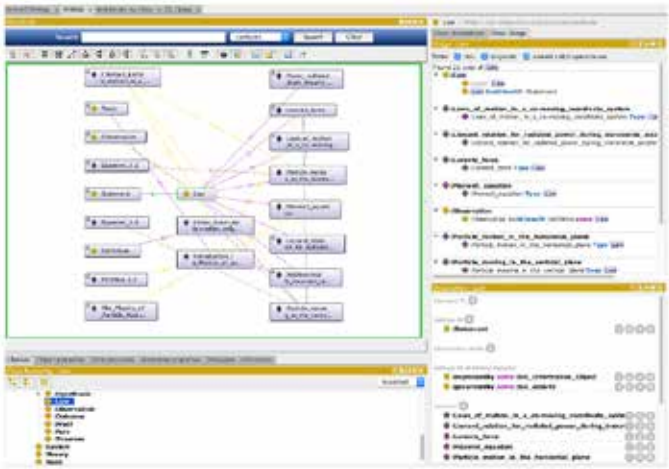
Doctor ès Economy and Management, mention Information Systems

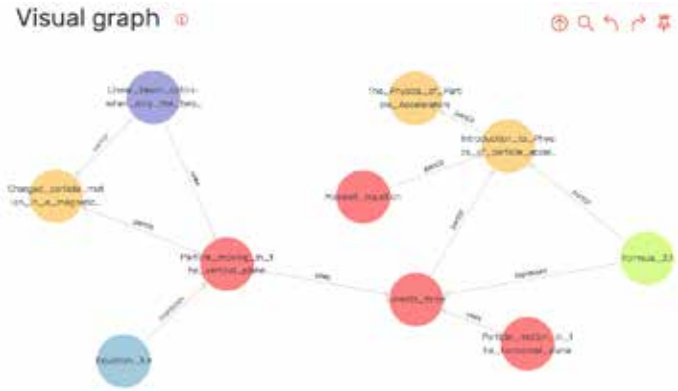
13nd September, 2019

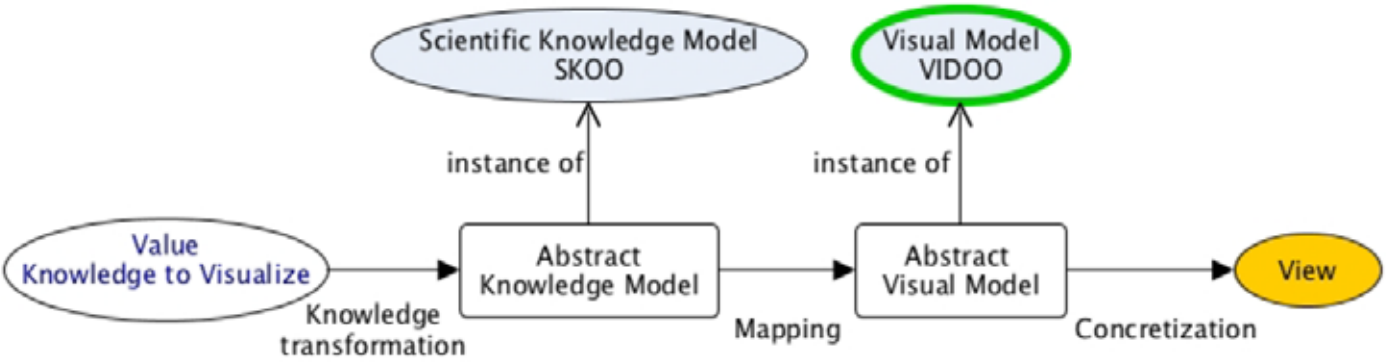
Directors: Prof. Gilles Falquet
Dr. Andrea Bocci

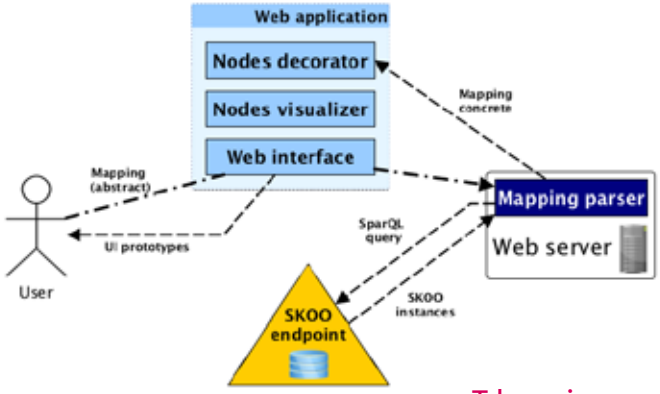
Analysis and specification of scientific knowledge visualization techniques

Scientific knowledge embraces all the notions of the scientific subjects, such as mathematics, physics, chemistry and more. This knowledge whether recent or well established requires to be visualized to various users and for different tasks. The purpose of this work is to improve the design and development process of scientific knowledge visualization systems by enabling the creation of User interface (UI) prototypes from the scientific knowledge to visualize. To achieve this purpose a methodology is proposed that is punctuated in formal steps and employs conceptual and practical tools. How to formally represent and to visualize this knowledge are the first research questions addressed by two reference models, the Scientific Knowledge Model (SKM) and the Visual Model (VM). The SKM exposes the formalism, the concepts and the relations among them regarding the knowledge represented; while the VM groups the visual elements with their properties used to present the knowledge to the user. The association of these two models is achieved by a mapping language designed to declare abstract representations of the desired UI prototypes. Algorithms to transform these abstract representations into concrete UI prototypes have been also designed and developed. The methodology and the tools employed have been tested using various scientific knowledge sources and the results, including the real use case of the CERN CMS High Level Trigger configuration management system, are presented.









Doctorat thesis: Univ. Genève, 2019 - GSEM 71 - 2019/09/13
https://archive-ouverte.unige.ch/unige:125816

Thesis completed

Eric Harth

Doctor ès Sciences, mention Computer Science

19th January, 2019

Directors: Prof Didier Buchs
Prof. Philippe Dugerdil

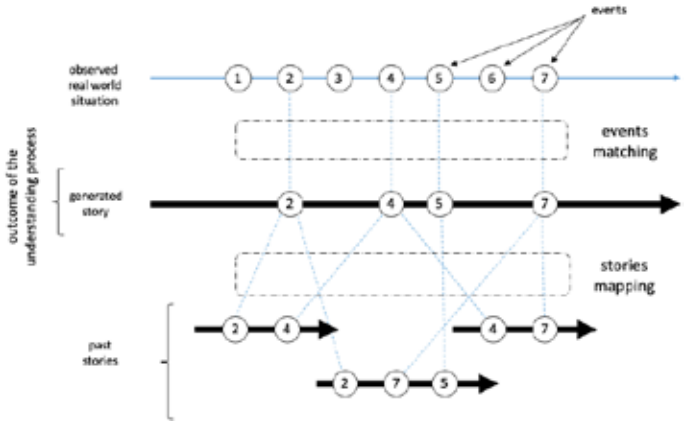
Program understanding, the narrative hypothesis

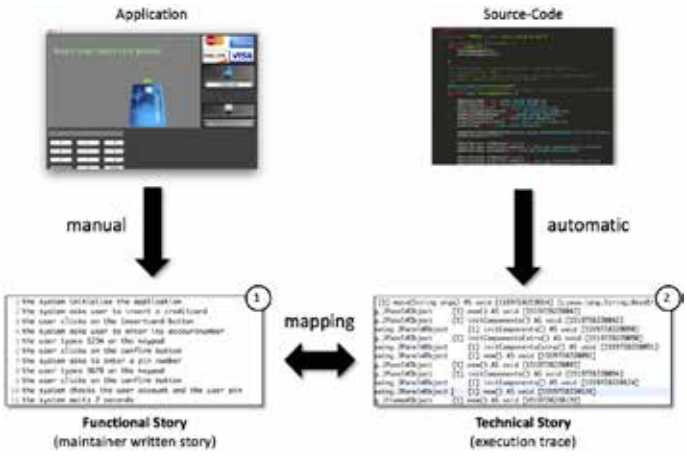
Program understanding, a central part of development and maintenance, has been widely studied over the last few decades, and many models have been proposed to describe how engineers comprehend software and what techniques may improve and reduce the time spent in understanding software.

However, instead of modelling what understanding is, most of these studies focus on strategies and techniques applied by engineers when trying to understand software. The paradox is that the goal of these techniques is usually ill-defined. How then can we assess their relevance?

The purpose of this thesis is to propose an operational definition of software understanding in the context of software development and maintenance and to study the limitations and constraints that follow from this definition. In particular, this will allow us to explain why it is so difficult to understand software written by others. Based on this, we present the tools that we developed and show how they could be applied to a set of case studies.

The thesis is structured as follow: First, we analyze the models and techniques for understanding proposed over the last three decades.



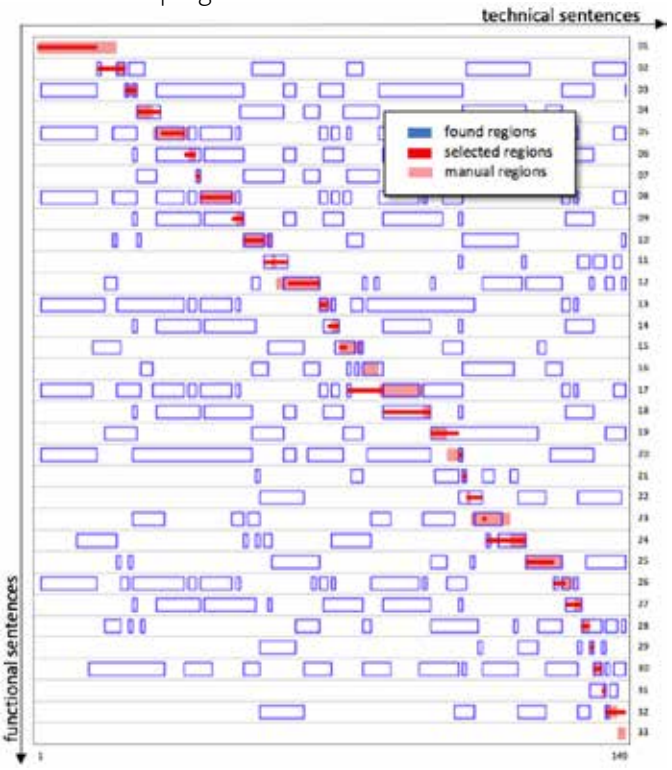


Second, we propose a new model of software understanding that is adapted from the strong story hypothesis, a term coined by Winston suggesting that understanding may be equivalent to story manipulation operations through replications, merges or deletion.

Third, based on our model of software understanding, we study how to represent the domainlevel application behaviour and source code statements as two comparable stories, both written in natural language. We show that using NLP and information retrieval techniques (IR), we can "map" the human-oriented (i.e., domain level) story to the technical story (i.e., source code), which is associated with the runtime execution of the software.

Fourth, based on the concept assignment problem proposed by Biggerstaff & Mitbander, we present the techniques we use to extract some sequences of domain concepts from the execution of the software (i.e., the execution trace) to shape a high-level story describing what the code is actually doing.

In conclusion, we discuss the implications of our approach and future directions in software maintenance research, showing the way new tools could be developed to understand software programs.



Doctorat thesis: Univ. Genève, 2019 - Sc. 5306 - 2019/01/19
https://archive-ouverte.unige.ch/unige:114918

Stefan Klikovits

Doctor ès Sciences, mention Computer Science

13th June, 2019

Director: Prof. Didier Buchs

A domain-specific language approach to hybrid CPS modelling

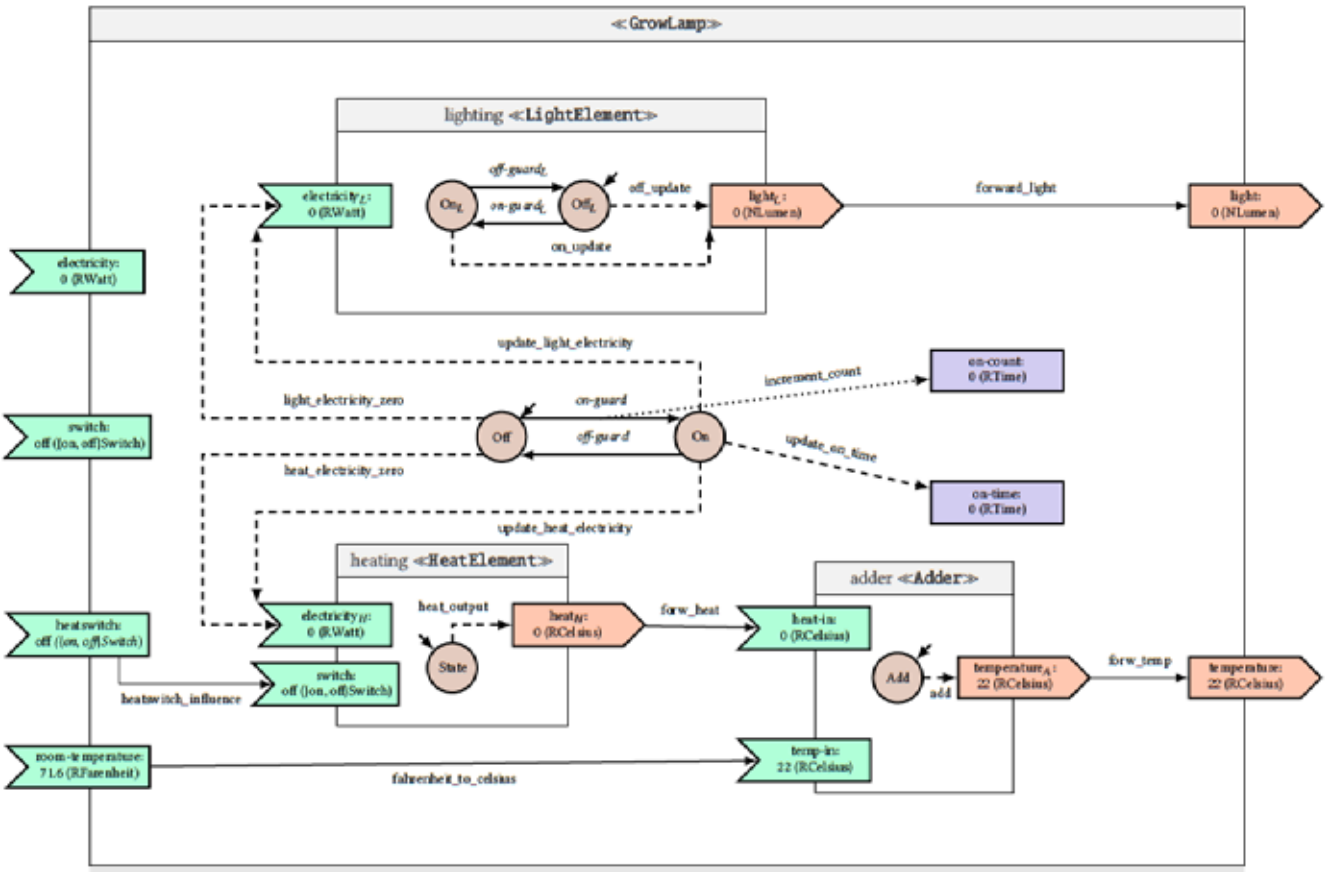
The recent advent of cyber-physical systems (CPSs) in end-user applications extends the need for sophisticated model creation, simulation and system verification from classical systems engineering domains to new application areas. Since CPSs such as smart homes and office automation seamlessly integrate technology into everyday life, their safety and correctness become paramount. The intricacy of modelling these systems stems from the merging of two opposing system views: While flows of physical energy and resources are mostly described using mathematical methods such as differential equations, engineered applications are usually best expressed using automata and similar discrete formalisms. Many tools that support such hybrid models lean toward academic use, requiring extensive modelling experience, and neglect usability. Commercial platforms try to mitigate these shortcomings but involve significant financial investment. Additionally, tool creators aim to maximise their products' versatility and application areas, thereby widening the distance between software and target domain. This introduces complexity and configuration effort and increases the risk for errors not directly related to the system itself.

This thesis explores the use of domain-specific languages (DSLs) to bridge the gap between systems and models. It describes the creation of the Continuous REactive SysTems language (CREST), a DSL dedicated to the combined modelling of physical resources and engineered behaviour. The language offers architectural concepts such as hierarchical system composition and typed ports, reactive dataflow aspects that assert a synchronous model behaviour, continuous variable evolution and support for non-deterministic systems. While the language is certainly the main contribution, CREST's design considerations provide additional value to the modelling community. The findings of this project are described according to three research phases.

First, an initial analysis investigates the requirements of CPSs whose behaviour is based on the flow of resources such as heat or electricity and extracts the properties that must be provided by a modelling language or tool. These results are then used to evaluate current modelling software and formalisms.

The second part builds upon these insights to design CREST, a hybrid modelling DSL. CREST reuses well-established concepts from existing formalisms and merges them into a coherent language, whose formal semantics open the door towell-defined execution and simulation. CREST is implemented as crestdsl, a Python-based, internal DSL that allows efficient modelling and simulation.

The last research topic describes the application of formal verification on CREST models. This advanced use case is explored from theoretical and practical points of view. Additionally, it has been implemented in crestdsl proving its viability. The positive result of the approach highlights the capabilities of CREST, the practicability of the hybrid DSL modelling approach and confirms their effectiveness.



Doctorat thesis: Univ. Genève, 2019 - Sc. 5354 - 2019/06/13
https://archive-ouverte.unige.ch/unige:121355

Thesis completed

Athanasios Kyritsis

Doctor ès Economy and Management, mention Information Systems

19th December, 2019

Directors: Prof. Dimitri Konstantas
Dr. Michel Deriaz

Enhancing wellbeing using artificial intelligence techniques

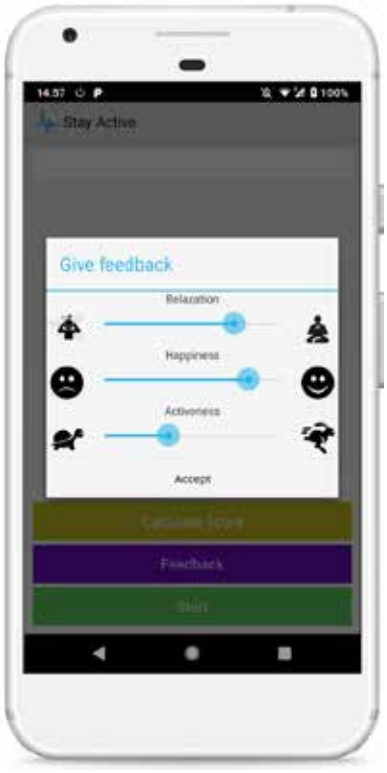
The landscape of technology is rapidly evolving, and its pace of growth is not slowing down. During the last decades, and especially after the mass adoption of the internet, new technological advances have revolutionized every aspect of human life. We are living in the ubiquitous computing era, where connected devices form the internet of things and produce data faster than we can logically process. With the latest advances in mobile communications and with the widespread use of smartphones and connected sensors, various aspects of wellbeing can be monitored and improved. The goal of this thesis is to propose new algorithms, methodologies, and applications that can be used as components in health and wellbeing systems that support healthy aging, enhance human-machine interactions, and support postoperative rehabilitation with the use of modern connected devices and machine learning techniques. The core research question of the thesis is the following: «How can artificial intelligence techniques ameliorate human wellbeing by using data produced by modern smart devices?»

In this thesis, we initially investigate how modern technology and applications that support healthy aging can be attractive to be used by older adults. We conducted a research study in order to understand the needs and requirements of older adults, as well as the reasons behind the age technology gap. In this study, we provide useful insights to developers who are building user-centric applications and want to appeal to users of all age groups.

We are then presenting three components we developed that leverage the use of modern technologies to improve daily living. We are presenting a low-cost, easy to deploy and use, indoor localization system with room-level accuracy. The algorithm we are proposing takes into account signals from radio frequency beacon transmitters like Bluetooth beacons and the room geometry when inferring a position. We continue by presenting a mood and stress detection system that monitors non-invasive sensor data and smartphone usage patterns in order to estimate the psychological state of the users. We are then presenting methods of detecting abnormal behavior from activity and mobile app usage data. Unsupervised anomaly detection techniques were employed for detecting potentially problematic scenarios during the day and for triggering relevant actions.

In the frame of building context-aware applications, we have also contributed towards developing activity recognition systems using inertial sensors. Initially, we present all the parameters that have an impact on every stage of the development of an activity recognition system. We have analyzed the significance of the parameters in the design, implementation, testing, and evaluation phase of an activity recognition system with an experiment that included several activities to be identified. We put all this acquired knowledge into practice by building an activity recognition system optimized for a specific scenario. We created a gait recognition system targeting people who have undergone lower body orthopedic surgery. We collaborated with the physiotherapist team of Hirslanden Clinique La Colline, an orthopedic clinic in Geneva. We built a system that is meant to be used by the physiotherapists during the rehabilitation phase of a patient, in order to be able to monitor the evolving gait pattern of the patient during everyday life, and not only during the time-limited physiotherapy sessions.

The thesis contributions include techniques on how machines can learn about different human aspects from data. All the presented components in the thesis can be used to support wellbeing systems that enhance daily life.



Doctorat thesis: Univ. Genève, 2019 - GSEM 75 - 2019/12/19
https://archive-ouverte.unige.ch/unige:130751

Sha Li

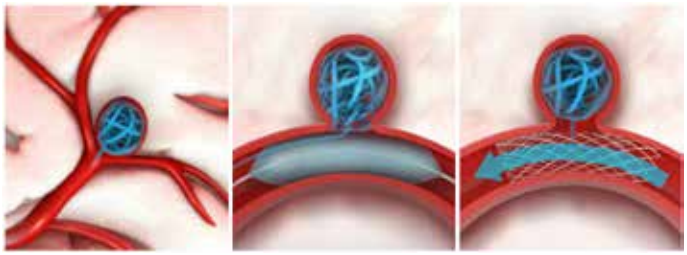
Doctor ès Sciences, mention Computer Science

14th January, 2019

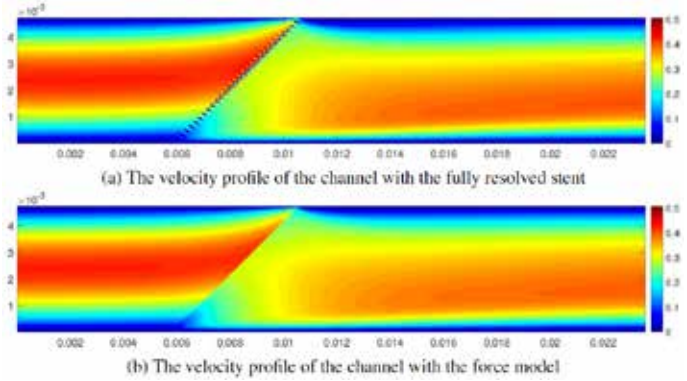
Directors: Prof. Bastien Chopard
Dr. Jonas Latt

Continuum model for flow diverting stents of intracranial aneurysms

Aneurysmal subarachnoid hemorrhage remains an important cause of stroke mortality and morbidity. Hemodynamic factors are considered to be a major factor in the progression and rupture of intracranial aneurysms. Flow diverting stent (FDS) is an emerging paradigm for treating traditionally difficult intracranial aneurysms. It is placed in the parent artery to divert the blood flow from the aneurysm sac and promote the progressive thrombosis. In the field of medical FDS, numerical simulation is a tool of high importance for the investigation and development of new flow diverters. It is also used to assist patient-specific decision making, for example during a medical stent placement procedure for the consolidation of an arterial aneurysm. How- ever, fully resolved simulations of the stent are often prohibitively expensive, opening the path for approximate but more efficient simulations framework which model the effect of the FDS through a coarse-grained, macroscopic approach. Porous media model was proposed for this purpose, assuming that FDS can be described as a porous media, obeying Forchheimer's law. How- ever, FDS are not 3D porous media and a solution based on screen model are more adapted. In this thesis, we develop a screen based flow diverter model (SFDM) which circumvents deficiencies of some aspects of the porous media model.



Our framework is developed from the existing screen models which, as opposed to porous media models, are explicitly built to reflect the physics of thin porous structures, like a flow diverter stent. We first reviewed the hydraulic equations of screen in the literatures, then proposed a 2D framework which are able to predict the pressure drop and flow deflection across a stent. The deflection part determined by the drag coefficient, is different from the homogeneous porous media prototype.



(a) The velocity profile of the channel with the fully resolved stent

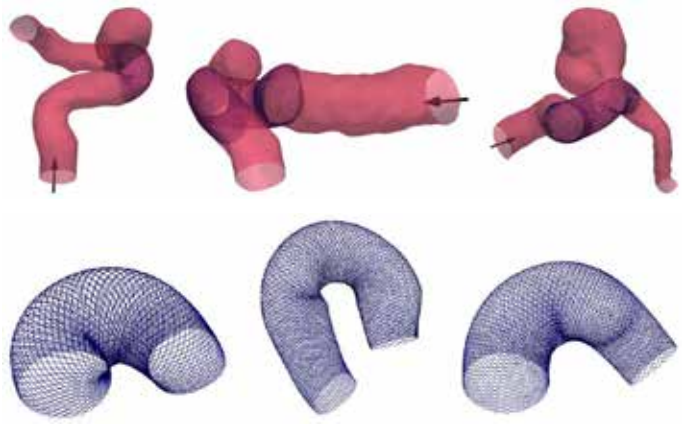
(b) The velocity profile of the channel with the force model

The 2D SFDM is tested on several ideal aneurysms under various conditions, such as different stent placements, varying homogeneous porosities and pulsatile inlet velocities. The model can effectively reduce the velocity and wall shear stress in the aneurysm sac as a fully resolved stent.

Afterwards, the framework of SFDM is extended to 3D and is applied for actual medical flow diverters in patient-specific aneurysms. The numerical tests show that the 3D SFDM can reproduce the results of direct numerical simulation both qualitatively and quantitatively, and are capable of reducing the simulation time by an order of magnitude or more. Additionally to the theoretical framework of the SFDM, the thesis discusses in detail the procedure required to deploy the model for a given stent and artery.

All the simulations above are carried out in the Palabos which is an open source solver based on Lattice Boltzmann method (LBM). The LBM force models and boundary conditions that we utilize for the simulations of stented aneurysms and SFDM are already integrated in the solver.

In summary, we developed, validated and deployed a screen based flow diverter model which can greatly reduce the computational time for the blood flow in stented aneurysm with reasonable accuracy. It opens the possibility to be included in a medical imaging device which is a fast enough simulation mode for helping a clinician to assess the benefit of a given FDS for a specific patient.



Doctorat thesis: Univ. Genève, 2019 - Sc. 5307 - 2019/01/14
https://archive-ouverte.unige.ch/unige:115538

Akram Abdulghani Hezam Mohammed

Doctor ès Economy and Management, mention Information Systems

18th September, 2019

Directors: Prof. Dimitri Konstantas
Dr. Niels Alexander Nijdam

A reference model for securing IoT

In this thesis we discuss machine learning methods performing automated variable selection for learning sparse predictive models. There are multiple reasons for promoting sparsity in the predictive models. By relying on a limited set of input variables the models naturally counteract the overfitting problem ubiquitous in learning from finite sets of training points. Sparse models are cheaper to use for predictions, they usually require lower computational resources and by relying on smaller sets of inputs can possibly reduce costs for data collection and storage. Sparse models can also contribute to better understanding of the investigated phenomenons as they are easier to interpret than full models.
We are specifically interested in problems with non-trivial sparse relationships amongst the data. In particular, problems where the dependencies exhibit some sparse patterns that can be exploited in the modelling but for which the prior understanding is not sufficient to formulate explicit constraints to be hard-wired into the model. We build on the ideas of learning with structured sparsity to factor such patterns into the models.
Furthermore, as the relationships may be too complex to be satisfactorily captured by simple linear functions we allow the methods to operate over a broader space of nonlinear functions. For this we rely on the theory of regularised learning in the reproducing kernel Hilbert spaces (RKHSs) and extend it in the direction of sparse learning in nonlinear nonadditive models.
Throughout the thesis we propose multiple new methods for sparse learning over reduced set of input variables. We initially concentrate on the problem of multivariate time series forecasting and develop methods that learn forecasting models together with discovering the Granger causality dependencies amongst the series.
We first consider dependencies that are organised around a limited set of series functioning as leading indicators for the whole system or its parts. Our method discovers these leading indicators as well as the groups of series depending on them together with learning the predictive model.
We next allow for nonlinear relationships amongst the series. Calling upon the theory of learning vector-valued functions in the RKHS and the ideas of multiple kernel learningwe provide the model with enough flexibility to search for the predictive function while still uncovering sparse Granger causal dependencies.
In the second half of the manuscript we focus on the more general problem of learning sparse nonlinear regression functions. Making parallels to linear modelling, we formulate new regularisers based on partial derivatives of the function to promote structured sparsity in the nonlinear model. We show how these can be incorporated into the kernel regression problem and reformulated into a problem solvable in practice by an iterative algorithm derived from the alternating direction method of multipliers (ADMM).
Finally, we address the scalability issues of sparse learning with kernel methods. We use the random Fourier features to approximate the kernel function and shift the sparsity search from the original function space into the space of the random features. We thus significantly reduce the dimensionality of the search space and therefore the computational complexity even when working over large datasets with thousands of data instances.

Doctorat thesis: Univ. Genève, 2019 - GSEM 72 - 2019/09/18
https://archive-ouverte.unige.ch/unige:123701

Luc Mottin

Doctor ès Sciences, mention Bioinformatique

2nd May, 2019

Director: Prof. Bastien Chopard
Prof. Patrick Ruch

Assistance à la curation de publications scientifiques par des méthodes de triage et d'annotation automatiques

La revue de la littérature constitue une étape fondamentale de la recherche scientifique. En effet, l'exploration de méthodes et des résultats existants, dans un domaine particulier, répond à plusieurs objectifs. Entre autres, elle permet d'identifier les informations pertinentes à la réalisation d'un projet ou encore de mettre ses idées et conclusions en perspective avec les réalisations d'autres experts. Or, cette littérature est une gigantesque base de connaissances, non structurées, dans laquelle sont stockées les contributions sans cesse plus nombreuses de la communauté scientifique. Dans ce contexte, le rôle des curateurs consiste à traiter la littérature au fur et à mesure de sa production et à assurer la fiabilité de l'information proposée. Par leur intermédiaire, les publications scientifiques sont annotées, contrôlées et les entités identifiées sont mises en relation avec d'autres sources de connaissances. Les curateurs ont aussi pour objectif de rendre l'ensemble des informations (trouvées ou créées) accessible et réutilisable pour la communauté, d'où la conception de bases de données spécifiques.

neXtProt est l'une de ces ressources, conçue et maintenue par le groupe CALIPHO de l'Institut Suisse de Bioinformatique dans le but de contribuer à la compréhension des protéines humaines. Pour faire face à l'augmentation spectaculaire de la quantité d'information produite par la recherche, tout en maintenant le standard de qualité de l'information proposée dans cette base, les curateurs de neXtProt ont décidé de mettre en oeuvre des méthodes d'automatisation du processus de curation en collaboration avec le groupe SIB Text-Mining. In fine, neXtA5 est une plateforme de support à la curation de la littérature résultant de cette collaboration.

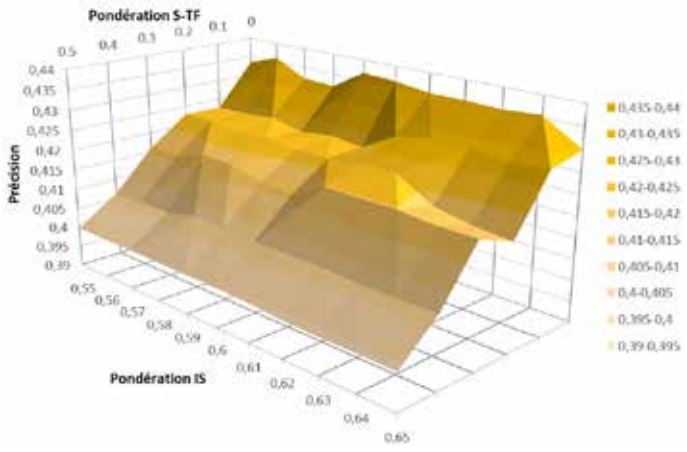
Différentes approches de recherche d'information et de fouilles des données textuelles, ainsi que certaines de leurs applications, sont donc présentées dans l'État de l'Art de cette thèse. Cependant, dans le contexte de la curation de neXtProt, plusieurs problématiques viennent contraindre le développement des méthodes entièrement automatisées, en particulier :

- l'absence de données d'entraînement équilibrées pénalise fortement les méthodes d'apprentissage automatique ;
- la nomenclature utilisée par les auteurs de publications ne correspond pas systématiquement à un standard, et leur style d'écriture dépasse parfois la capacité d'interprétation d'une machine ;
- la validation de l'information demeure une étape critique du processus de curation.

Le premier chapitre expérimental de cette thèse est consacré à la recherche d'information dans une collection de documents (MEDLINE). Ce chapitre a pour but de démontrer que l'annotation massive de document, en fonction d'axes spécifiques (à savoir « maladies », « processus biologiques », « fonctions moléculaires », « composants cellulaires », « interactions entre protéines » et « modifications post-traductionnelles »), permet d'améliorer la précision du triage – première étape d'une tâche de curation. Ainsi, nous proposons une approche novatrice consistant à exploiter la présence de descripteurs onto-terminologiques, dans le document, au moyen d'une combinaison linéaire de facteurs tels que la fréquence d'apparition des concepts ou encore leur spécificité. Notre approche est affinée par le réglage de la combinaison linéaire en fonction de l'axe de la curation et obtient expérimentalement des résultats variables. La précision obtenue est significativement supérieure à PubMed sur le classement des documents pour la curation : +562% (maladies), +301% (processus biologiques), +2400% (fonctions moléculaires), +371% (composants cellulaires), +236% (interactions entre protéines) et +268% (modifications post-traductionnelles). En complément à cette stratégie d'ordonnancement visant à améliorer la précision, nous avons implémenté une stratégie d'expansion de requête afin de renforcer le rappel du système (+30%). D'autre part, l'expansion de requête contrebalance efficacement l'usage répandu de synonymes dans les articles biomédicaux comme le montre l'amélioration du triage observée (+13% en fonction des maladies et +12.5% pour les processus biologiques sur la moyenne des réciproques des rangs). D'ailleurs, en adaptant l'expansion de requête à certains descripteurs relatifs aux interactions entre protéines nous parvenons à augmenter la précision du triage de +11% supplémentaires, tandis que ce gain est de +30% quand la méthode est adaptée aux modifications post-traductionnelles. Finalement, étant donné les informations disponibles, d'autres approches ont été envisagées afin d'enrichir la recherche d'information, mais les résultats obtenus démontrent une influence moindre sur le triage de documents.

Dans le second chapitre expérimental de cette thèse, nous mettons l'accent sur l'annotation de la littérature scientifique. Nous formulons l'hypothèse que la validation des annotations peut être simplifiée grâce à la modélisation de la tâche de curation. Ainsi, la première partie de ce chapitre porte sur l'efficacité de notre module d'annotation avec notamment une évaluation de la reconnaissance d'entités nommées. Avec un F-score moyen de 0.62 (de 0.49 à 0.77 en fonction du corpus), cette série de tests a notamment permis d'ajuster notre système pour les règles syntaxiques de la reconnaissance de motifs. La seconde partie de ce chapitre est ensuite consacrée à l'utilisation de neXtA5 en tant que plateforme de support à la curation de la littérature. Une phase de test en situation réelle a été réalisée par quatre curateurs du groupe CALIPHO et montre une précision de la recherche d'information variant de 63% à 80% pour l'axe maladies (avec et sans l'accord interannotateurs), et de 67% à 84% pour l'axe processus biologiques. En revanche, seuls 25% des annotations de neXtA5 ont été validés par les curateurs pour l'axe maladies et 35% pour l'axe processus biologiques. Ces résultats indiquent un nombre conséquent de faux-positifs incluant des concepts trop généraux qu'il convient de filtrer selon les préférences des utilisateurs. Nous avons alors cherché à prioriser les annotations suggérées par neXtA5 selon deux stratégies : une pondération TF.IDF pour les maladies et l'injection d'un score issu d'un catégoriseur multiclasse pour les concepts de la Gene Ontology. Nous observons alors une amélioration sur la pertinence de +23% en tête de liste pour les maladies (+29% au rang 5) et de +31% pour les processus biologiques (+25% au rang 5).

Nous avons montré que le processus de curation peut être optimisé à différents niveaux par l'exploitation automatique de descripteurs onto-terminologiques et la modélisation du comportement des curateurs. En priorisant les publications selon des axes prédéfinis, nous discutons l'impact de notre outil de triage sur la productivité des curateurs. En ce qui concerne la curation des maladies, et en croisant différentes études sur le sujet, notre système permet d'envisager un gain de temps d'environ 12%. En outre, l'automatisation du processus global est susceptible de limiter l'introduction d'erreurs entre les différentes étapes de la curation.



Doctorat thesis: Univ. Genève, 2019 - Sc. 5339 - 2019/05/02
https://archive-ouverte.unige.ch/unige:118269

Dimitri Racordon

Doctor ès Sciences, mention Computer Science

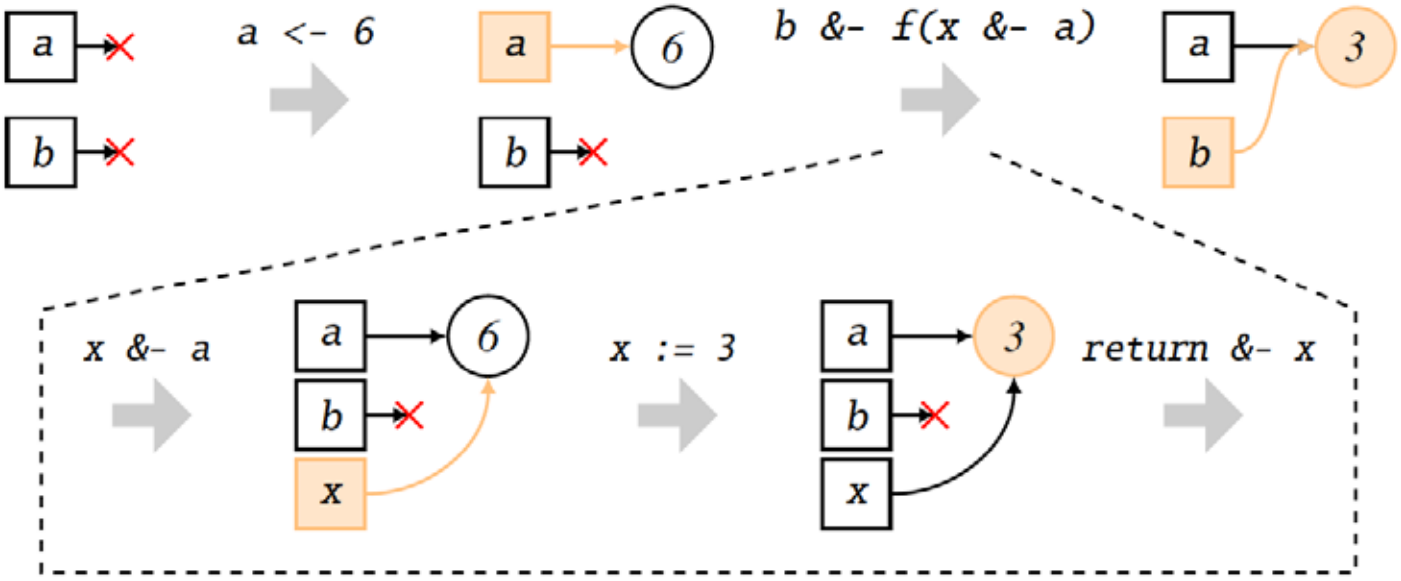
3th September, 2019

Director: Prof. Didier Buchs

Revisiting memory assignment semantics in imperative programming languages

Programming languages have become an unavoidable tool, not only for computer experts, but also for scientists and engineers from all horizons. For the sake of usability, modern programming languages typically sit at a very high abstraction level and hide the intricacies of data representation and memory management. The continuing growth in computational power has enabled this evolution, allowing compilers and interpreters to support features once thought unrealistically expensive, such as automatic garbage collection algorithms and powerful static type inference. While this has undeniably contributed to make code simpler to write and clearer to read, relics of the underlying model still transpire in most languages' semantics. In imperative programming languages, where computation is expressed in terms of successive mutations of a program's state, leaks at any level of abstraction may lead to unintuitive and/or misunderstood memory assignment behaviors. In particular, the interplay between values and variables can prove to be a prolific source of confusion. While both are usually perceived as interchangeable notions, values are semantic objects that live in memory while variables are syntactic tools to interact with them. As both concepts are not necessarily thetered in a one-to-one relationship, foreseeing the reach of a modifying operation requires a clear understanding of the memory abstraction.

This thesis proposes a model to better reason about memory management. Our first objective is to provide a more accurate description of memory assignment semantics, in a universal and unambiguous way. The resulting model marks a clear distinction between variables and values, that highlights situations where aliasing occurs and situations where assignments may have side eects beyond the mutation of a single variable. Such a model is presented formally by the means of a complete semantics, and informally with examples of its application to some nontrivial examples. It is then used to describe memory errors related to assignment. Two methods are proposed. The first is based on an instrumentation of the dynamic semantics to detect accesses to uninitialized or freed memory. The second relies on a capability-based type system to guarantee memory safety statically. Finally, Anzen, a general purpose language based on the aforementioned model, is introduced as an attempt to empirically validate its practicality.



Doctorat thesis: Univ. Genève, 2019 - Sc. 5409 - 2019/09/03
https://archive-ouverte.unige.ch/unige:127105

Lorenza Russo

Doctor ès Humanities, mention Linguistics

17th June, 2019

Director: Prof. Eric Wehrli

La traduction automatique entre langues proches: les cas du français et de l'italien

Ce travail s'inscrit dans le cadre de la traduction automatique entre langues proches et porte sur le couple de langues français-italien. Nous avons comparé deux traducteurs automatiques à base de règles: Apertium (Forcada, 2011) -- un traducteur qui se base sur un module d'analyse syntaxique dite ``de surface'' ou ``superficielle'' (shallow parsing en anglais) -- et Its-2 (Wehrli et Scherrer, 2009 -- un traducteur qui se base sur un module d'analyse syntaxique dite ``profonde'' (deep parsing en anglais). Les performances de ces deux systèmes ont été comparées à celles d'un système statistique à base neuronale (Google Traduction, Wu, 2016).

Dans ce travail, nous cherchons à vérifier l'hypothèse selon laquelle l'analyse syntaxique de surface est suffisante pour la traduction automatique entre langues proches étant donné qu'elles présentent un grand nombre de caractéristiques linguistiques communes.

Après une brève introduction (chapitre 1), nous abordons la question de la proximité linguistique entre le français et l'italien au niveau syntaxique, plus précisément au niveau des sous-catégorisations verbales partagées entre ces deux langues (chapitre 2) et au niveau des collocations dites ``transparentes'' (i.e., qui présentent le même comportement syntaxique et sémantique) (chapitre 3).

Au chapitre 4, nous comparons la stratégie de traduction d'Apertium avec celle d'Its-2. Nous évaluons les performances des deux systèmes lors de la traduction entre les langues proches espagnol-français. La raison pour laquelle le couple de langues espagnol-français a été choisi pour ces évaluations réside dans le fait qu'au début de ce travail de thèse Apertium ne possédait pas de module de traduction pour le couple français-italien. Compte tenu de ce manque, nous donnons au chapitre 5 les détails de l'implémentation du module de traduction français-italien que nous avons effectuée en Apertium.

Au chapitre 6, nous nous tournons vers la traduction automatique d'un phénomène linguistique spécifique au niveau duquel le français et l'italien se distinguent -- les pronoms clitiques -- afin de déterminer si les performances des trois systèmes (Apertium, Its-2 et Google Traduction) diffèrent lorsque le français et l'italien ne se comportent pas comme des langues proches.

Nos évaluations nous amènent à conclure que dans certains cas l'analyse syntaxique de surface peut être suffisante pour la traduction entre langues proches, mais lorsque l'on observe de plus près la qualité syntaxique des résultats obtenus, une telle approche ne semble pas suffisante. Par exemple, lors de la traduction des pronoms clitiques du français vers l'italien, nous avons pu constater que là où les pronoms clitiques se comportent de manière similaire entre le français et l'italien, Apertium atteint un pourcentage de traductions correctes de 44% (contre 85% atteint par Its-2). Cependant, lors de la traduction d'un phénomène linguistique plus compliqué nécessitant un nombre plus élevé de règles de transfert -- comme, par exemple, pour la traduction des séquences clitiques --, le système donné 0% de résultats corrects, alors qu'Its-2 atteint 45% de traductions correctes.

Outre les études effectuées pour déterminer dans quelle mesure une analyse syntaxique de surface est suffisante pour traduire entre langues proches, d'autres questions ont été soulevées dans ce travail de recherche, telles que les problèmes liés au choix de la mesure d'évaluation des systèmes de traduction automatique ainsi que les difficultés en lien avec les corpus à utiliser.

Finalement, avec ce travail de recherche nous donnons à la communauté scientifique des corpus que nous avons construits nous-mêmes et qui présentent l'avantage d'un meilleur contrôle sur des phénomènes linguistiques spécifiques, des tables de correspondance des collocations transparentes entre le français et l'italien ainsi qu'un module de traduction français-italien accessible sur la plateforme Apertium.

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Yann Thorimbert

Doctor ès Sciences, mention Computer Science

5th July, 2019

Directors: Prof. Bastien Chopard
Dr. Jonas Latt

Lattice Boltzmann simulations of complex flows

The lattice Boltzmann method (LBM) has been supplemented with various numerical models during the last decades, enabling the direct simulation of flows with increasing complexity. For instance, fluid-structure interactions can be accurately described thanks to the combination of LBM with an immersed boundary approach which is not intrisically formulated for the LBM. Multiple applications of the LBM are presented in this work, all sharing the property to aim at the simulation of complex flows.

As a first topic, a lattice Boltzmann model designed for the simulation of dilute and dense finite-sized rigid particle suspensions is presented. A bottom-up approach is used that fully resolves the mechanical interaction between fluid and particles. The model consists in coupling a lattice Boltzmann scheme for Newtonian and incompressible fluid flows, with an immersed boundary scheme to simulate two-ways fluid-particles interaction. A simple yet robust contact model is introduced, that includes repulsive elastic collisions between particles and neglects lubrication corrections. This model is applied to simple sheared flows with rigid spherical particles. Results are given for the relative apparent viscosity of the particle suspensions as a function of the particle volume fraction and strain rate of the flow. It is shown that, using the proposed approach, no lubrication model is needed in the Newtonian regime, provided that the model includes an elastic contact model. The algorithm presented, therefore, can be based only on physically sound and simple rules, a valuable feature for aiming at resolving polydispersed and arbitrarily shaped particle suspensions. A comparison of the numerical results with Krieger-Dougherty law confirms that the simulations are not sensitive to the particle Reynolds number for Rep << 1 in the Newtonian regime. It is shown that the proposed model is sufficient to obtain a correct description of the rheology of spherical particle suspensions up to volume fraction equal to 0.55 (approaching the critical random packing fraction for monodispersed spheres). It is demonstrated that the fluid-solid density ratio does not impact significantly the simulations in absence of gravity, which allows to increase the performance and stability of the implemented algorithm. Finally, a glimpse of bidisperse sphere distributions and three-phase suspensions is shown.

Second, a direct comparison between a real wave flume and a 3D numerical wave flume is developed through the analysis of an oscillating water column energy converter, in order to validate the lattice Boltzmann approach for simulating such a device. The numerical model uses a volume-of-fluid approach and handles the water-air coupling into the converter air chamber. The experimental and numerical setup are described. Comparisons for water level during free oscillation test, water level and air pressure under regular wave attacks are given and show that the lattice Boltzmann model is accurate in these conditions.

Third, a scheme for coupling a 2D lattice Boltzmann free-surface solver with a 1D lattice Boltzmann shallow water solver is presented. This method is used to save computational effort and efficiently realize multiscale systems. The accuracy of the coupling is validated with two tests. First, the numerical and analytic solutions are compared in a setup with fixed inflow current and outflow water level in a canal. Second, the physics of wave propagation and reflection is investigated in a coupled simulation, and compared to the solutions obtained with both a pure free-surface simulation and a pure shallow-water simulation. Finally, a performance test is carried out to demonstrate that the overhead of the coupling is negligible. A quantitative validation of this type of coupling for the lattice Boltzmann method is novel, and opens the door to a range of large-scale simulations of canals and other hydrodynamic systems.

Finally, automatic grid refinement and coherent noise generation are addressed in a last part, where some links between these topics and the previous ones are shown.

Doctorat thesis: Univ. Genève, 2019 - Sc. 5373 - 2019/07/05
https://archive-ouverte.unige.ch/unige:129125

Administrative Staff


Marie-France Culebras


Elisabeth Giudicelli


Anne-Isabelle Giuntini


Maëlle Saintilan


Séverine Walter

The administrative staff of CUI is dedicated to serving at its best the community of researchers, teachers and students. Essentially covering four domains :

Administration: Its role is to manage the CUI budget, logistics, communication, etc. It also manages the Web site, the production of documents (activity report, flyers, etc.) as well as the organization and coordination of public and promotional events such as TecDays, Nuits de la science, etc.

- **Elie Zagury** is direction assistant.

Secretariat: Works at the departments level of CUI. Hiring and contract renewals of doctoral students as well as all the tasks related to CUI operations are handled by the secretariat. It also provides a perfect connection to major University services such as HR, accounting, etc.

- **Marie-France Culebras** is full-time secretary;
- **Elisabeth Giudicelli** is part-time secretary (40% CUI + 40% continuing education) ;
- **Anne-Isabelle Giuntini** is part-time secretary (50%);
- **Maëlle Saintilan** is full-time secretary;
- **Séverine Walter** is part-time (50%) student secretary.

IT: Two systems-engineers manage the basic computer infrastructure of CUI (data storage, backups, servers, network, etc.) using Linux, Mac and Windows. Their help and support is appreciated daily by the whole CUI community. This service works closely with the University IT Division.

- **Nicolas Mayencourt** is system-engineer;
- **Daniel Agulleiro** is system-engineer.


Daniel Agulleiro


Nicolas Mayencourt


Elie Zagury

Library: The CUI Library provides services and tasks as any specialized library of an universitary center. It is part of the library network of the University of Geneva (http://www.unige.ch/biblio/sciences/infos/cui.html) and is proud to offer some specifities in its field. Its current collection contains approximately 10'000 books and 25 specialized print journals.

- **Amélia Marcelino** is head librarian.


Amélia Marcelino

Financial Report

CUI

Staff	CHF 1'070'259.-
• Academic	CHF 364'557.-
• Administrative and Technical	CHF 503'566.-
• Employer's social contributions	CHF 202'136.-
Operating costs - Investment	CHF 56'800.-
Operating costs - Others	CHF 176'948.-
CUI subtotal	**CHF 1'304'007.-**

Faculty of sciences (Computer Science Department)

Staff	CHF 3'365'483.-
• Academic	CHF 2'563'751.-
• Administrative and Technical	CHF 165'857.-
• Employer's social contributions	CHF 635'875.-
Operating costs - Investment	CHF 88'993.-
Operating costs - Others	CHF 33'840.-
Sciences subtotal	**CHF 3'488'316.-**

Geneva School of economics and management

Staff	CHF 986'971.-
• Academic	CHF 795'696.-
• Employer's social contributions	CHF 191'275.-
Economics and management subtotal	**CHF 986'971.-**

Geneva School of Social Sciences

Staff	CHF 747'038.-
• Academic	CHF 600'502.-
• Employer's social contributions	CHF 146'536.-
Social Sciences subtotal	**CHF 747'038.-**

Faculty of humanities (Unit of Computer Science for the Humanities)

Staff - Academic, incl. Charges (estimation)	CHF 574'046.-
Operating costs	CHF 20'000.-
Humanities subtotal	**CHF 594'046.-**

TOTAL BUDGET	**CHF 7'120'378.-**

External funding obtained by the professors	Credit
CUI	
UE-funded Projects	CHF 472'442.-
Swiss-funded Projects	CHF 296'297.-
CUI subtotal	**CHF 768'738.-**
Faculty of sciences (Computer Science Department)	
UE-funded Projects	CHF 363'249.-
Swiss-funded Projects	CHF 1'293'362.-
Sciences subtotal	**CHF 1'656'611.-**
Geneva School of economics and management	
UE-funded Projects	CHF 246'851.-
Swiss-funded Projects	CHF 1'626'691.-
Economics and management subtotal	**CHF 1'873'542.-**
Geneva School of Social Sciences	
UE-funded Projects	CHF 0.-
Swiss-funded Projects	CHF 139'859.-
Social Sciences subtotal	**CHF 139'859.-**
Faculty of humanities (Unit of Computer Science for the Humanities)	
UE-funded Projects	CHF 0.-
Swiss-funded Projects	CHF 19398.-
Humanities subtotal	**CHF 0.-**
TOTAL CREDIT	**CHF 4'458'148.-**

TecDay
Collège de Candolle, *Geneva*
2019 April 4th

« Cryptographie » animation

Infoscope
Battelle, Carouge
2018 May 14th

Miguel De Bruyne (CUI student) and Aslam Cader (Computer Science student), animators for Infoscope. « Jeu mobile » animation

TecDay
Collège de Candolle, *Geneva*
2019 April 4th

Some students experimenting « Post-numérisation » animation

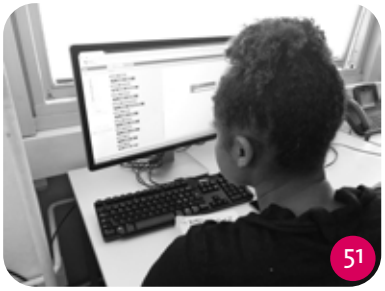
(R)amène ta science
C.O. Vuillonex, *Geneva*
2019 April 12th

« Cryptographie » animation

Infoscope
Battelle, Carouge

CUI customized cardboards for « VR/AR » animation

Infoscope
Battelle, Carouge
2018 May 14th

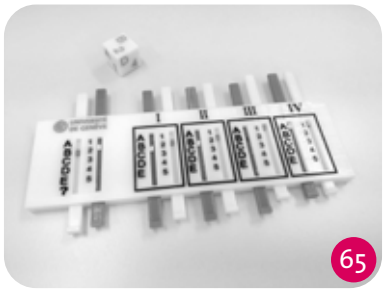


Student experimenting « Jeu mobile » animation

TecDay
College de Candolle, Geneva
2019 April 4th

Raphaël Lutz (Computer science student), animator for Infoscope. « Jeu mobile » animation.

Infoscope
Battelle, Carouge



Special board 3D-printed by CUI for « Algorithmique collective » animation

Nuit de la science
Parc de la Perle du Lac, Geneva
2018 July 7th

Two yound visitors experimenting « VR/AR » animation

Nuit de la science
Parc de la Perle du Lac, Geneva
2018 July 7th

Théo Giovanna (Computer Science student), animator for Infoscope. « Trie-toi, toi même! » animation

illustrations
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