CentraleSupélec within

LORIA UMR 7503

LABORATOIRE LORRAIN DE RECHERCHE EN INFORMATIQUE ET SES APPLICATIONS

Loria
Laboratoire lorrain de recherche en informatique et ses applications

cnrs Inria UNIVERSITÉ DE LORRAINE

Founded in 1997, LORIA is a joint research unit (UMR7503) under the supervisory authority of CNRS, Inria and the Université de Lorraine, located at the Faculty of Sciences and Technologies of Vandoeuvre-lès-Nancy and CentraleSupélec Metz Campus. Since its creation, LORIA has worked on fundamental and applied research in computer science. LORIA belongs to the scientific cluster AM2I (Automatics, Mathematics, Computer Science and Interactions) and is one of the largest laboratories of the Grand Est Region.

Research work is conducted by 5 departments and 28 teams, around 7 cross-cutting axes:

Research departments

- **Algorithms, Computation, Image and Geometry** (ABC, Adagio, Caramba, Gamble, MFX, Pixel, Tangram teams)
- **Formal methods** (Carbone, Mocqua, Mosel-Veridis, Pesto, Types teams): proofs, software validation and certification
- **Networks, Systems and Services** (Coast, Optimist, Resist, Simbiot teams): integrative approach for design, modeling, engineering, and assessment of robust and safe cyberphysic systems
- **Natural Language Processing and knowledge discovery** (K, Multispeech, Orpailleur, Semagramme, SMarT, Synalp teams): data mining, machine learning, visualization, clustering
- **Complex Systems, artificial Intelligence and robotics** (Bird, Biscuit, Capsid, Larsen, NeuroRhythms teams): autonomous systems, machine learning, artificial intelligence.

Cross-cutting axes

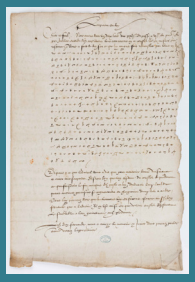
- ROBOTICS AND CYBER-PHYSICAL SYSTEMS
- CYBERSECURITY
- HEALTH
- E-EDUCATION
- AUTOMATIC LANGUAGE PROCESSING AND ARTIFICIAL INTELLIGENCE
- ENERGY
- FACTORY AUTOMATION

Application Domains

- Artificial intelligence,
- Cyber-physical systems,
- Cybersecurity,
- Education,
- Energy,
- Factory automation
- Health,
- Natural Language Processing,
- Robotics.

HIGHLIGHTS 2023

- **Charles V's encrypted letter**: a centuries-long riddle-solved. Thanks to the combined efforts of four researchers from Loria (CNRS, Inria, Université de Lorraine) and University of Picardie Jules Verne, an encrypted letter from Charles V has been decrypted and confirmed remarkable historic facts, five centuries after being written. Press release (French): https://bit.ly/49wZost



- A **test of time award for CGAL**: The CGAL (Computational Geometry Algorithms Library) Project has been selected for the *2023 Symposium on Computational Geometry* (SoCG) Test of Time Award. The prestigious award recognizes outstanding papers presented at the SoCG conference from at least 20 years ago that have had a significant impact on the field of computational geometry. Congratulations to the members of the **Gamble team** involved in this project. https://gamble.loria.fr/CGAL_ToT.html

- Two articles were presented at **Siggraph 2023**, the world's largest and most influential conference on computer graphics and interactive techniques: https://www.loria.fr/en/2023/07/the-mfx-team-creating-innovative-uses-for-3d-printing/ https://www.loria.fr/en/2023/08/pcbend-flexible-printed-circuits-for-maximum-creativity/

- A reinforced **French-German partnership** between CISPA and Loria on cybersecurity: https://www.loria.fr/en/2023/05/6th-french-german-day-for-cybersecurity/

- Cybersecurity: Creation of the **CYBI startup**: artificial intelligence to anticipate cyberattacks. https://www.loria.fr/en/2022/06/artificial-intelligence-to-anticipate-cyberattacks-launch-of-the-cybi-startup/

- Participation to the **European project euROBIN**. euROBIN is the Network of Excellence that brings together European expertise on Robotics and AI : https://www.eurobin-project.eu/

- **Dynalips**: speech animation at the frontiers of reality: https://www.loria.fr/fr/2023/06/dynalips-une-animation-de-la-parole-aux-frontieres-du-reel/ Pepite France prize for Dynalips: https://www.pepite-france.fr/10e-edition-du-prix-pepite-decouvrez-les-laureats/

- Science popularization: organization of "**Les Cigognes**" training course in mathematics and computer sciences for 25 high-school girls in the Grand Est Region: https://bit.ly/3U7BBuL

- Publication of the dystopian collection ***Think Before Loading***: These six dystopias were written at the beginning of November 2022 by 23 doctoral students in computer science at the Université de Lorraine, as part of the doctoral course Ethics in computer sciences: write your dystopia. https://thinkbeforeloading.loria.fr/fr

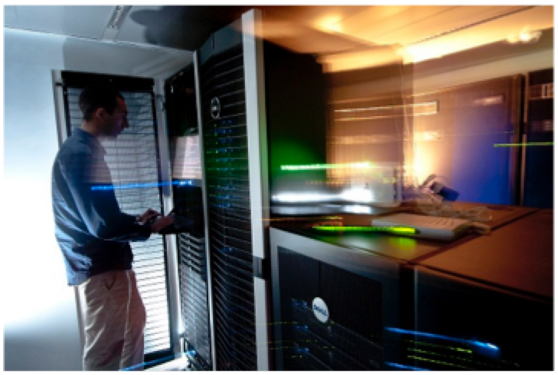
SMART-BIODIV PROJECT - SMART AI TECHNOLOGIES FOR BIODIVERSITY RESEARCH

Marine environments undergo rapid changes and the monitoring of their ecosystem status becomes critical. Such a monitoring requires gathering data, processing them and extracting indicators summarizing the status of the environment. However, the data in environmental sciences are often sparse and imbalanced, which constitute challenges for AI algorithms. This leads to the two directions followed in the SMART-BIODIV proposal:

- Harnessing the power of machine learning algorithms to complete and process sparse and imbalanced data that we often encounter in environmental sciences ;
- Designing indicators to qualify the ecological status of the considered environments. We will also exploit the large image databases collected by the partners on marine plankton and make them available to the challenge participants.

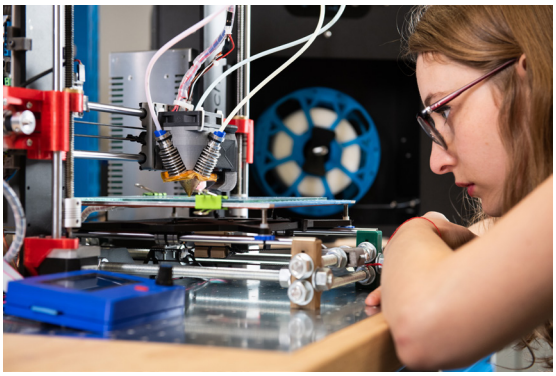
Loria and CentraleSupélec bring their expertise in computer science and more particularly in artificial intelligence applied to the particular theme of biodiversity. The team involved will lead the WP3 on hybrid AI and will also participate in the other WPs. The challenge of WP3 will be to incorporate business knowledge in the form of a relationship graph into predictive models of biodiversity.

CHALLENGE
IA-BIODIV



High Security Laboratory

A Grid5000 node



Creativ'Lab
Crédit photo Inria, D. Betzinger

Industrial Partners

- ALERION,
- Antsway,
- Cyber-Detect,
- Deezer,
- EDF,
- Eviden,
- Linagora,
- Meta,
- Naval Group,
- Orange,
- Scytl,
- Tessael,
- WALLIX.

Academic Partners

Inrae, CHRU de Nancy, Kyutech University, Université de Rabat, JAIST, CISPA, Université Fédérale de Rio Grande Do Norte, Université catholique de Brasilia (UCB)....

Key figures*

• Professors, Associate Professors & Researchers	11
• PhD Students	4
• Publications of the year (WoS)	5

*CentraleSupélec only

https://loria.fr

Director: Yannick Toussaint

+33 (0)3 83 59 20 00

yannick.toussaint@loria.fr

Assistant: Anne Chrétien

+33 (0)3 83 59 20 00

anne.chretien@loria.fr

Deputy Directors:

Sylvain Lazard

sylvain.lazard@loria.fr

Armelle Brun

armelle.brun@loria.fr

Head of administration: Céline Ranger

celine.ranger@loria.fr

Campus scientifique
BP 239
54506 Vandoeuvre-lès-Nancy Cedex