

## **Cristian Axenie, Dr. Eng.**

*Curriculum Vitae*



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## **Employment**

### **Staff Research Engineer**

Artificial Intelligence and Machine Learning in Big Data Analytics  
Huawei German Research Center, Germany (Full-time, 34h/week) since **1/04/2017**

### **Head of Laboratory / Principal Investigator**

Artificial Intelligence and Machine Learning for Virtual Reality Applications  
AUDI Konfuzius-Institut Ingolstadt Lab, Germany (Part-time, 6 h/week) since **1/10/2017**

### **Lecturer**

Artificial Intelligence and Machine Learning  
Technische Hochschule Ingolstadt, Germany (per term basis) since **1/10/2017**

### **Consultant for startup companies**

Applied Artificial Intelligence and Machine Learning (per contract basis) since **2016**

### **Software Engineer**

Embedded Linux Development  
WindRiver (Intel Corp.), Galați, Romania (Full-time, 40 h/week) **1/07/2009 – 31/08/2011**

### **Software Engineer (intern)**

Multi-core Digital Signal Processors (DSP)  
Freescale Semiconductor (NXP), Bucharest, Romania (Full-time) **1/07/2008 – 1/10/2008**

## **Education**

### **Postdoctoral Researcher**

Neuroscientific System Theory Group  
Neuroengineering Competence Center  
Technische Universität München, Germany (Part-time) **1/05/2016 – 31/03/2017**

### **Doctor of Engineering (Dr. Eng.)**

Neuroscience and Robotics (**Summa cum Laude**)  
Technische Universität München, Germany **1/10/2011 – 30/04/2016**  
Advisor: Prof. Dr. Jorg Conradt (KTH Stockholm) (Part-time + Scholarship)

**Master of Science (M.Sc.)**Advanced Control Engineering and Robotics (**top 1%**)

Electrical and Electronics Engineering Faculty,

Dunărea de Jos University (UGAL), Galați, Romania

**1/10/2009 – 30/06/2011**

Advisor: Prof. Dr. Razvan Solea (University of Galați) (Full-time + Scholarship)

**Bachelor of Science (B.Sc.)**Automation and Industrial Informatics (**top 1%**)

Computer Science Faculty,

Dunărea de Jos University (UGAL), Galați, Romania

**1/10/2005 – 30/06/2009**

Advisor: Prof. Dr. Alexandru Stancu (University of Manchester) (Full-time + Scholarship)

**Baccalaureat**

Mathematics and Informatics

National College Mihail Kogălniceanu, Galați, Romania (Full-time)

**15/9/2001 – 31/07/2005****Teaching experience****University teaching****Lecturer** (Huawei Research Center)

Tech Challenge Health &amp; Bio Practical Course

TUM, LMU and Hochschule München

UnternehmerTUM, Germany

**SS 2020****Lecturer**

Artificial Intelligence and Machine Learning

Technische Hochschule Ingolstadt, Germany

**WS 2017 - SS 2020****Instructor**

Computational Neuroengineering Practical

Brain Computer Interface Robot Control

Technische Universität München, Germany

**WS 2016****Teaching Assistant**

Computational Intelligence

Technische Universität München, Germany

**WS 2011 - WS 2016****Teaching Assistant**

Sensors and Transducers

Dunărea de Jos University (UGAL), Galați, Romania

**SS 2010, SS2011****Lecturer**

Assembler Programming

Dunărea de Jos University (UGAL), Galați, Romania

**WS2009, WS2010****Lecturer**

Digital Signal Processing

Dunărea de Jos University (UGAL), Galați, Romania

**WS2009, WS2010**

## **Research Workshops**

### **Workgroup leader**

Multisensory Integration and Neuromorphic Control for Flying Robots  
CapoCaccia Cognitive Neuromorphic Engineering Workshop  
Sardinia, Italy

**04/2013**

### **Workgroup leader**

Universal Neuromorphic Devices and Sensors for Real-Time Mobile Robotics  
Telluride Neuromorphic Cognition Engineering Workshop  
Telluride, USA

**07/2013**

### **Lecturer and Instructor**

Neural Learning Algorithms  
Basecamp.AI Winter School  
Vienna, Austria

**01/2017**

### **Workgroup leader**

Motor control using Cortico - Basal Ganglia model for Robot Arm reaching tasks  
Nengo Summer School at University of Waterloo  
Canada

**06/2016**

### **Lecturer and Instructor**

Neuromorphic Vision Sensors and Event-based Information Processing for Robotics  
IEEE CIS Summer School on Neuromorphic and Cyborg Intelligent Systems  
Zhejiang University, China

**09/2015**

## **Student theses supervision**

I have supervised over **30 students** at **Technische Universität München** between 2011 and 2016 on **Project Practical, Advanced Seminar, Bachelor and Master Theses**. Between 2017 and 2020 I have supervised **4 Bachelor theses and 1 Master thesis** at **Technische Hochschule Ingolstadt**.

## **Research Grants**

**Project Leader** in **PERSEUS** (Platform for Enhanced Reality in Sport Exercise Understanding and Simulation) Project with a budget of **175000 EUR** within the **Zentrales Innovationsprogramm Mittelstand** (Central Innovation Programme for small and medium-sized enterprises) of the **Bundesministerium für Wirtschaft und Energie** (Federal Ministry for Economic Affairs and Energy).

**09/2019 – 04/2021**

## Fellowships

**Awarded a BayIntAn Fellowship (5000 EUR)** from **Bavarian Research Alliance** for establishing a cooperation on the development of a platform for neuromorphic sensorimotor adaptation with **ETH Zurich** and **University of California, Irvine**. **01/2017**

**Awarded a BayIntAn Fellowship (10000EUR)** by the **Bavarian Research Alliance** for establishing a cooperation on neurorobotics with **University of Waterloo, Canada** and the **University of Manchester, UK**. **07/2016**

**Awarded a Leonhard Lorenz-Stiftung Fellowship (7000EUR)** at **Technische Universität München** for novel ideas in neurotechnologies research. **04/2013**

**Awarded Research Fellowship (2500EUR)** by the **Science Network of Biomimetic and Biohybrid Systems** for leading a workgroup at the **CapoCaccia Cognitive Neuromorphic Engineering Workshop, Italy**. **05/2013**

**Awarded Research Fellowship (2500EUR)** by the **Science Network of Biomimetic and Biohybrid Systems** for leading a workgroup at the **Telluride Neuromorphic Cognition Engineering Workshop, USA**. **07/2013**

**Awarded a Bavarian Elite Research PhD Scholarship (4 years funding, ~120.000EUR)** by the **Bavarian Ministry of Sciences, Research and the Arts**. **04/2012**

## Honors and awards

**Best Paper Award** for *CHIMERA: Combining Mechanistic Models and Machine Learning for Personalized Chemotherapy and Surgery Sequencing in Breast Cancer* at the 2020 International Symposium on Mathematical and Computational Oncology. **10/2020**

**1st place at the Merck AI Research Challenge (2500EUR)** for the development of IRENA (Invariant Representation Extraction in Neural Architectures) Artificial Intelligence System. <https://www.thi.de/suche/news/news/thi-erfolgreich-in-ai-forschungswettbewerb> **08/2019**

**Awarded a nVidia GPU Grant**  
Neuromorphic Processing for Electric Autonomous Driving with Schanzer Racing Electric (SRE) project at Technical University of Ingolstadt. **04/2018**  
**Awarded Outstanding Reviewer Award** from **IOP Journal of Neural Engineering** **2016**

**Awarded 1st prize** at the **Daimler Automotive Big Data Analytics Hackaton** for the design of a neuro-fuzzy learning system for adaptive anomaly detection. **04/2016**

**Awarded the Microsoft Cognitive Technologies prize (500EUR)** at the **Burda Hackdays** for the development of a neural learning system for psychometric data analytics. **04/2016**

**Awarded 1st prize (5000EUR)** at the **BMW Automotive Hackdays** for the development of an artificial intelligence learning agent for predictive maintenance. **03/2016**

**Awarded 4th place** at the **National IBM “Best Linux Application”** programming contest for work in robot fault-tolerant control using custom embedded Linux. **09/2009**

**Awarded 1st prize** at the **13th International Scientific Sessions Polytechnic University of Timisoara**, Romania for work on nonlinear control for mobile robots. **05/2009**

**Awarded University of Galați Performance Scholarship** (100 EUR/month) **2006 - 2009**

## Selected publications

### *Journals*

*Biomedical Engineering, Computational Oncology, Artificial Intelligence*

1. D. Kurz, **C. Axenie**, Learning Personalized Virtual Reality Avatars for Chemotherapy-Induced Peripheral Neuropathy Rehabilitation in Breast Cancer, Deutsche Krebskongress (DKK) 2020, Oncology Research and Treatment, 43, Suppl. 1: 166. 2020.
2. **C. Axenie**, D. Kurz, Role of Kinematics Assessment and Multimodal Sensorimotor Training for Motion Deficits in Breast Cancer Chemotherapy-Induced Polyneuropathy: A Perspective on Virtual Reality Avatars, *Frontiers in Oncology*, 2020.
3. **H. Kondylakis, C. Axenie** et al., Technological and Data-Driven Innovations in Cancer Care: status and recommendations resulting from international workshop series Tech4Cancer, *JMIR* 2020.

*Artificial Intelligence, Neurobotics, Sensor Data Analytics*

4. Hanna Kruppe, Lukas Sommer, Lukas Weber, Julian Oppermann, **Cristian Axenie** and Andreas Koch, Efficient Operator Sharing Modulo Scheduling for Sum-Product Network Inference on FPGAs, *FPT'20: International Conference on Field-Programmable Technology* (in review).
5. F. Mirus, **C. Axenie**, T. C. Stewart, J. Conradt, Neuromorphic Sensorimotor Adaptation for Robotic Mobile Manipulation: From Sensing to Behaviour, *Cognitive Systems Research*, 2018.
6. I. Sugiarto, **C. Axenie**, J. Conradt, FPGA-based Hardware Accelerator for an Embedded Factor Graph with Configurable Optimization, *ACM Journal of Circuits, Systems and Computers*, 2018.
7. **C. Axenie**, J. Conradt, Cortically inspired sensor fusion network for mobile robot egomotion estimation, *Robotics and Autonomous Systems*, 2014.
8. I. Susnea, **C. Axenie**, Cognitive Maps for Indirect Coordination of Intelligent Agents, *Studies in Informatics and Control* Vol. 24, 2015.
9. **C. Axenie**, C. Richter, J. Conradt, A Self-Synthesis Approach to Perceptual Learning for Multisensory Fusion in Robotics, *Sensors* 16(10) 1751, 2017.

## **Conference Proceedings**

### *Biomedical Engineering, Computational Oncology, Artificial Intelligence*

10. **C. Axenie**, D. Kurz, CHIMERA: Combining Mechanistic Models and Machine Learning for Personalized Chemotherapy and Surgery Sequencing in Breast Cancer, 2nd International Symposium on Mathematical and Computational Oncology 2020 (**Best Paper Award**).
11. D. Kurz, **C. Axenie**, PERFECTO: Prediction of Extended Response and Growth Functions for Estimating Chemotherapy Outcomes in Breast Cancer, BIBM2020.
12. **C. Axenie**, D. Kurz, Tumor Characterization using Unsupervised Learning of Mathematical Relations within Histopathological Breast Cancer Data, 29th International Conference on Artificial Neural Networks, ICANN2020.
13. **C. Axenie**, D. Kurz, GLUECK: Growth pattern Learning for Unsupervised Extraction of Cancer Kinetics, European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases 2020 (ECML-PKDD 2020).
14. **C. Axenie**, D. Kurz, PRINCESS: Prediction of Individual Breast Cancer Evolution to Surgical Size, IEEE 33<sup>rd</sup> International Symposium on Computer-Based Medical Systems, (CBMS20), Mayo Clinic, Rochester, US.
15. **C. Axenie**, D. Kurz, Adaptive Virtual Reality Avatars for Sensorimotor Rehabilitation in Chemotherapy-Induced Peripheral Neuropathy, 2020 Annual Meeting of the Multinational Association of Supportive Care in Cancer (MASCC2020).
16. **C. Axenie**, Armin Becher, Daria Kurz, Thomas Grauschopf, Meta-Learning for Avatar Kinematics Reconstruction in Virtual Reality Rehabilitation, IEEE International Conference on Bioinformatics and Bioengineering, BIBE2019.
17. C. S. Sanchez, J. Baumbach, S. Smyth, **C. Axenie**, Fuzzy Inference System for Risk Evaluation in Gestational Diabetes Mellitus, IEEE International Conference on Bioinformatics and Bioengineering, BIBE2019.

### *Artificial Intelligence, Neurobotics, Sensor Data Analytics*

18. Carlos Salort Sanchez, Alexander Wieder, Paolo Sottovia, Stefano Bortoli, Jan Baumbach, **C. Axenie**, GANNSTER: Graph-Augmented Neural Network Spatio-Temporal Reasoner for Traffic Forecasting, European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases 2020 - Workshop on Advanced Analytics and Learning on Temporal Data (ECML-PKDD 2020).
19. D. Xiaorui, Y. Erdem, I. Schweizer, **C. Axenie**, A Neural Framework for Learning Invariant Physical Relations in Multimodal Sensory Processing, <https://arxiv.org/abs/2006.16607>.

20. **C. Axenie**, Radu Tudoran, Stefano Bortoli, Mohamad Al Hajj Hassan, Alexander Wieder, Goetz Brasche, SPICE: Streaming PCA fault Identification and Classification Engine in Predictive Maintenance, 2019 IoT Stream for Data Driven Predictive Maintenance Workshop, European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML PKDD 2019).
21. Sebastian Pohl, Armin Becher, Thomas Grauschopf, **C. Axenie**, Neural Network 3D Body Pose Tracking and Prediction for Motion-to-Photon Latency Compensation in Distributed Virtual Reality, 28th International Conference on Artificial Neural Networks, ICANN2019.
22. A. Becher, **C. Axenie**, T. Grauschopf, VIRTUOAIR: Virtual Reality TOOLbox for Avatar Intelligent Reconstruction, 2018 IEEE International Symposium on Mixed and Augmented Reality (ISMAR2018).

#### *Artificial Intelligence, Machine Learning*

22. **C. Axenie**, Radu Tudoran, Stefano Bortoli, Mohamad Al Hajj Hassan, Goetz Brasche, Dimensionality Reduction for Low-latency High-throughput Fraud Detection on Datastreams, 2019 IEEE International Conference on Machine Learning and Applications (ICMLA2019).
23. Carlos Salort Sanchez, Radu Tudoran, Stefano Bortoli, Mohamad Al Hajj Hassan, Goetz Brasche, **C. Axenie**, An Online Incremental Clustering Framework for Real-Time Predictive Analytics on Datastreams, 2019 IEEE International Conference on Machine Learning and Applications (ICMLA2019).
24. **C. Axenie**, Radu Tudoran, Stefano Bortoli, Mohamad Al Hajj Hassan, Goetz Brasche, NARPCA: Neural Accumulate-Retract PCA for Low-latency High-throughput Processing on Datastreams, 28th International Conference on Artificial Neural Networks, ICANN2019.
25. **C. Axenie**, Radu Tudoran, Stefano Bortoli, Mohamad Al Hajj Hassan, Goetz Brasche, STARLORD: Sliding window Temporal Accumulate-Retract Learning for Online Reasoning on Datastreams, 2018 IEEE International Conference on Machine Learning and Applications (ICMLA2018).

#### *Robotics, Sensor Data Analytics*

26. **C. Axenie**, Solea, R, Real time control design for mobile robot fault tolerant control. Introducing the ARTEMIC powered mobile robot, 2010 IEEE/ASME International Conference on Mechatronic and Embedded Systems and Applications, pages 7–13, 2010.
27. **C. Axenie**, Conradt, J, Learning Sensory Correlations for 3D Egomotion Estimation, Proc. of Conference on Biomimetic and Biohybrid Systems, pages 329–338, 2015. Springer.

## **Patents**

1. **C. Axenie**, Stefano Bortoli, Daniele Foroni, Goetz Brasche, Dynamic Optimizaiton-Free Traffic Light Signal Offset Control System, **2020**.

2. **C. Axenie**, Stefano Bortoli, Goetz Brasche, Learning Contextual Memory System for Traffic Light Optimization, **2020**.
3. **C. Axenie**, Radu Tudoran, Stefano Bortoli, Mohamad Al Hajj Hassan, Goetz Brasche, Short-Term Spatio-Temporal Traffic Prediction System, **2019**.
4. **C. Axenie**, Radu Tudoran, Stefano Bortoli, Mohamad Al Hajj Hassan, Goetz Brasche, Multisensory Learning System for Traffic Prediction, **2019**.
5. **C. Axenie**, Radu Tudoran, Stefano Bortoli, Mohamad Al Hajj Hassan, Goetz Brasche, Online Traffic Reasoner for City-Level Smart Traffic Light Management, **2019**.
6. **C. Axenie**, Radu Tudoran, Stefano Bortoli, Mohamad Al Hajj Hassan, Goetz Brasche, Automatic Model Selection for Timeseries Prediction on Data Streams, **2019**.
7. Radu Tudoran, **C. Axenie**, Stefano Bortoli, Mohamad Al Hajj Hassan, Goetz Brasche, Online Traffic Controller with Spatio-Temporal Learning Extensions for Online Machine Learning Prediction, **2019**.
8. Stefano Bortoli, Radu Tudoran, **C. Axenie**, Mohamad Al Hajj Hassan, Goetz Brasche, et al., DataBase-Embedded Streaming Engine, **2019**.
9. Stefano Bortoli, Radu Tudoran, **C. Axenie**, Mohamad Al Hajj Hassan, Goetz Brasche, A System for Higher-Order Stream Processing, **2018**.
10. **C. Axenie**, Radu Tudoran, Stefano Bortoli, Mohamad Al Hajj Hassan, Goetz Brasche, Streaming Random Forest, **2018**.
11. **C. Axenie**, Radu Tudoran, Stefano Bortoli, Mohamad Al Hajj Hassan, Goetz Brasche, Stream Feature Extractor, **2017**.

## Invited talks

**Invited talk at Technische Universität München, Munich School of Engineering**, in the "World of Engineering" Lecture Series with the topic of Online Machine Learning.

**06/2019**

**Invited talk at Lions Club Salzburg** on Real-World AI and VR Applications.

**02/2019**

**Invited talk at Lions Club Ubersee Cyber** on AI and VR for the Future of Society.

**09/2018**



**Invited talk** at the **Institute for Cognitive System, TU Munich** on Online distributed streaming machine learning: Big Data, Fast Data, All Data.

**07/2017**

**Invited talk** at Basecamp.AI Winter School, Vienna in Neural Learning Algorithms.

**01/2017**

**Invited talk** at **TEDx - Calea Domneasca - Dare to leave a mark** in Galați, Romania on Artificial and Biological Intelligence: From Applications to Ethics.

**07/2017**

**Media coverage** in **Wired Magazine** about work on neuromorphic computation for visual rehabilitation at **Wellcome Trust Competition: Hack the Senses** in London, UK.

<https://www.wired.co.uk/article/how-to-hack-senses-see-sound>

**07/2016**

## **Professional service**

**Organizer** of the **Artificial Reality Research and Cooperation Seminar**

Technische Hochschule Ingolstadt (THI),  
South China University of Technology (SCUT) and  
Audi Konfuzius-Institute Ingolstadt.

**02/2019**

**Program-committee member**

International Conference of Artificial Neural Networks (ICANN)

**2013, 2019, 2020**

International Symposium Computer Based Medical Systems (CBMS)

**2020**

European Conference on Machine Learning and Principles and Practice of Knowledge

Discovery in Databases (ECML PKDD)

**2019, 2020**

**Reviewer**

MDPI Sensor Journal, IOP Journal of Neural Engineering

**since 2016**

Frontiers in Robotics, Frontiers in Oncology

**since 2019**

MDPI Symmetry Review Board

**seit 2020**

**Advisory board / Consulting**

Soley GmbH, GoalPlay GmbH&Co.KG, UnternehmerTUM

**2016 - 2018**

## **Professional development**

**Innovation Road-mapping for Emerging Technologies Certificate**

Fraunhofer Institute for Systems and Innovation Research, Karlsruhe

**06/2019**

**Deep Learning Expert Workshop Certificate**

nVidia Deep Learning Institute, Munich, Germany

**05/2017**

**Entrepreneurial Thinking Workshop Certificate** (Prof. Breugst)

Entrepreneurship Research Institute, TUM Graduate School, Munich, Germany

**12/2014**

**Effective Student Mentoring Workshop Certificate** (Dr. Werther)  
Münchener Institut für Systemische Weiterbildung (MISW)  
Technische Universität München Graduate School, Munich, Germany **04/2014**

**Technical Writing Workshop Certificate** (Prof. Diepold)  
Technische Universität München Graduate School, Munich, Germany **10/2012**

**Designer certificate on dependable embedded systems analysis and design**  
University of Luzern (Switzerland) - Prof. Erich Styger. **09/2008**

## Professional societies

IEEE, Computational Intelligence Society **since 2007**  
Free Software Foundation **since 2012**  
European Association for Cancer Research **since 2020**

## Other skills

Languages for humans: German(A), Italian(I), French(A), English(A), Romanian(N), Russian(B).  
Languages for machines: C/C++ (A), Python (I), Java (A), Matlab (A), R (B).  
\* Scale: B (basic), I (intermediate), A (advanced), N (native)

## References

### Prof. Jörg Conradt

KTH Stockholm, Sweden ([conr@kth.se](mailto:conr@kth.se))  
Research collaborator, former supervisor

### Prof. Maarten De Vos

Oxford University, UK ([maarten.devos@eng.ox.ac.uk](mailto:maarten.devos@eng.ox.ac.uk))  
Research collaborator

### Prof. Giacomo Indiveri

ETH Zurich, Switzerland ([giacomo@ini.uzh.ch](mailto:giacomo@ini.uzh.ch))  
Research collaborator

### Prof. Timothy Constandinou

Imperial College London, UK ([t.constandinou@imperial.ac.uk](mailto:t.constandinou@imperial.ac.uk))  
Research collaborator

### Prof. Alexandru Stancu

Manchester University, UK ([alexandru.stancu@manchester.ac.uk](mailto:alexandru.stancu@manchester.ac.uk))  
Research collaborator, former supervisor

*Cristian Alexe*  
*Alexe*