Christoph Senn

Nationality: Swiss
chrigi.senn@gmail.com linkedin.com/in/chrigisenn github.com/delpart

7+ years of combined research and industry experience developing AI and simulation technologies from prototype to production.

Education

Tokyo Institute of Technology 2024
Doctor of Engineering in Information and Communications Engineering *Tokyo, Japan*

- **Dissertation:** Robust Predictions with Reservoir Computing
- Worked on robust predictions using non-linear dynamical systems. Wrote numerical simulations for physical reservoirs and implemented in-silico reservoirs based on recurrent neural networks, e.g., Echo State Networks.
- Implemented GPU accelerated simulations for mass-spring networks and cloth simulation.
- Teck stack: Julia, Python, Pytorch, Tensorflow, NVIDIA PhysX

Tokyo Institute of Technology 2018
Master of Engineering in Information and Communications Engineering *Tokyo, Japan*

Zurich University of Applied Sciences 2014
Bachelor of Science UAS in Computer Science *Winterthur, Switzerland*

Experience

Bandai Namco Studios April 2023 – current
Applied Research in Machine Learning *Tokyo, Japan*

- Global leader in game development and interactive entertainment.
- Implemented real-time soft-body physics and rendering based on neural networks.
- Curated and created datasets using state-of-the-art physics and path tracing techniques to train custom machine learning models. Coordinated with stakeholders from various teams with different backgrounds and communicated results accordingly.
- Achieved $10\ 100$x speedup for soft-body dynamics on consumer hardware (PC, PS5, XBOX) using neural networks and realized neural rendering at 40FPS.
- **Framework&Methods** C++, Python, PyTorch, ONNX, Unreal Engine, Houdini, Maya, Diffusion models, LLMs, Reinforcement Learning, GLSL

Zurich University of Applied Sciences May 2021 – April 2023
Research Associate for Safety-Critical Systems *Winterthur, Switzerland*

- Worked at the Institute of Applied Mathematics and Physics in an interdisciplinary team.
- Lead engineer for a predictive beam interlock system using machine learning for the European Spallation Source in Sweden.
- Coordinated development and experimentation with master students in my team. Implemented proof of concepts for the neural network models on FPGA and developed an experimentation pipeline with CI/CD capabilities. Additionaly co-supervised multiple student project in AI safety and computer vision and organised internal training sessions on AI in the form of journal clubs.
- **Framework&Methods** C, Python, PyTorch, VHDL/HSL, Unreal Engine

Cross Compass March 2020 – January 2022
Ai Engineer (part-time) *Tokyo, Japan*

- SMB doing AI consultancy for industry and supports basic research in artificial life through its own research institute.
- Worked part-time on various customer projects in anomaly detection and computer vision.
- Daily tasks ranged from EDA, to custom machine learning PoCs based on customer requirements.
- One key project was the obstacle detection for an autonomous wheelchair, for which I created a small, robust neural network that ran directly ran on the wheelchair.
- **Framework&Methods** Python, C++, SLAM, PyTorch

Zurich University of Applied Sciences August 2017 – December 2018
Research Associate for Safety-Critical Systems *Winterthur, Switzerland*

- Worked at the Institute of Applied Mathematics and Physics in an interdisciplinary team with a focus on functional safety analysis for the European Spallation Source (ESS).
- Worked on the STPA analysis of a critical component of the proton accelerator at the ESS. In addition furthered the development of the in-house STPA analysis tool SAHRA, organised internal teaching sessions on AI and worked on small internal software projects.
- Wrote a project proposal and helped acquire 500'000€ funding for an autonomous predictive interlock system, leveraging machine learning and FPGAs for real-time anomaly detections on top of existing hardware.
- **Framework&Methods** .NET C#/VB, Python, Javascript/Angular, Enterprise Architect, Winforms

Zurich University of Applied Sciences February 2016 – August 2016
Research Assistant for Safety-Critical Systems *Winterthur, Switzerland*

- Worked at the Institute of Applied Mathematics and Physics in an interdisciplinary team with a focus on the development of the internal safety analysis tool SAHRA.
- Development of SAHRA using C#.Net and VB.Net following the specifications.
- Integrated the modelling workflows necessary for STPA into Enterprise Architec leveraging the .Net platform.
- **Framework&Methods** .NET C#/VB, Enterprise Architect, Winforms

Baggenstos & Co AG December 2007 – Juli 2009
Network Engineer *Wallisellen, Switzerland*

- Serviced and installed/configured customer networks (mostly small enterprises), automation of administrative and monitoring tasks.
- **Framework&Methods** Windows Server, Microsoft Exchange, Networking

AZW and Hug Engineering August 2003 – July 2007
Draughtsman *Wallisellen, Switzerland*

- Apprenticeship as a technical draughtsman. Designed diesel particulate filters for ships, trains, greenhouses and power plants using 2D and 3D CAD.
- **Framework&Methods** AutoCAD, Autodesk Inventor, Siemens NX CAD

Technical Skills

Languages: C, C++, Julia, Python, Java, GLSL, VB.Net, C#.Net, Rust, Assembly, VHDL, Verilog
Concepts: Software Engineering, Artificial Intelligence, Machine Learning Learning, Diffusion Models, Transformers, Large Language Models, Game Engines, ML in Games, Generative AI (Image, Text and Video), Computer Graphics, Variational Methods, Numerical Simulations, Reservoir Computing, Artificial Life, Evolutionary Algorithms, AI Safety, Differential Physics, Neural Cellular Automata

Community Involvement

ISAL Member of the International Society for Artificial Life

npj Digital Medicine Reviewer for deep learning based submission

Languages

German Native

English C2
CAE, TOEFL iBT - 116/120

French B1

Japanese B1

Thai A1

Publications

[1] C. W. Senn, C. Frischknecht-Gruber, M. Weyland, and R. M. Füchslin, “Neural lindenmayer systems,” in *Proceedings of the 2024 Artificial Life Conference*, 2024.

[2] C. W. Senn, “Memory in conductive fabrics for reservoir computing,” *International Journal of Unconventional Computing*, 2024.

[3] C. Frischknecht-Gruber, B. Ricchiuto, M. Reif, J. Weng, and C. W. Senn, “Ensuring safety in highly automated vehicles: A review of testing and validation methods for robustness and reliability,” in *ESREL 2023*, Sep. 2023.

[4] C. Frischknecht-Gruber, M. Reif, and C. W. Senn, “A review of global efforts towards establishing safety directives for intelligent systems,” in *ESREL 2022*, Aug. 2022.

[5] S. Brunner, C. Frischknecht-Gruber, M. Reif, and C. W. Senn, “Deep gaussian mixture model - a novelty detection method for time series,” in *ESREL 2022*, Aug. 2022.

[6] C. W. Senn and I. Kumazawa, “Abstract reservoir computing,” *AI*, Feb. 2022.

[7] C. W. Senn and I. Kumazawa, “Abstract echo state networks,” in *Artificial Neural Networks in Pattern Recognition*, Springer International Publishing, 2020, pp. 77–88.

[8] C. W. Senn and I. Kumazawa, “Robust echo state networks,” in *Proceedings of the 29th Annual Conference of Japanese Neural Network Society (JNNS 2019)*, Sep. 2019.

[9] C. Frischknecht-Gruber, M. Marti, C. W. Senn, B. Contreras, and S. S. Krauss, “Integration of security into cast,” in *2nd Japanese STAMP Workshop*, Nov. 2017.

[10] S. S. Krauss, M. Rejzek, C. W. Senn, and C. Hilbes, “Sahra - an integrated software tool for stpa,” in *4th European STAMP Workshop*, Sep. 2016.

[11] S. S. Krauss, M. U. Reif, M. Rejzek, C. W. Senn, and C. Hilbes, “Stpa – sicherheitsanalyse für komplexe systeme,” in *safe.tech 2016*, Apr. 2016.

[12] R. Bernhardsgrütter, C. W. Senn, R. M. Füchslin, C. Jaeger, K. Nakajima, and H. Hauser, “Employing L-systems to generate mass-spring networks for morphological computing,” in *Proceedings of International Symposium on Nonlinear Theory and its Applications (NOLTA2014)*, Research Society of Nonlinear Theory and its Applications, IEICE, Sep. 2014, pp. 184–187.