Tudor Jianu

PhD Candidate

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Summary

Proven expertise in applying computer vision and machine learning techniques to enhance autonomy in medical procedures. Skilled in designing and improving AI models using Python, with a focus on real-world applications in healthcare technology. Strong ability to work independently or in small, focused teams on complex, interdisciplinary projects. Thriving in mentally stimulating environments with an affinity for solving complex problems. Passionate about technology, with a deep appreciation for open-source projects and a commitment to leveraging innovative tools to optimize workflows and drive efficiency.

Skills

Technical Skills:	Machine Learning, Data Visualization, Artificial Intelligence, Medical Image Analysis, Multi-Modal Models, Database Systems, Computer Vision
Programming Languages:	Python, JavaScript, HTML, CSS, SQL, Bash
Tools:	PyTorch, Tensorflow, VIM, Docker, Linux, Git, Jupyter Notebooks

Work

Oct 2021 - Present
PhD Researcher in Artificial Intelligence and Endovascular Navigation — University of Liverpool

- Designed and implemented CathSim, a simulation environment for training and evaluating guidewire navigation tasks, streamlining AI development for endovascular procedures.
- Addressed complex challenges in Guidewire 3D reconstruction and triangulation by leveraging advanced computer vision techniques, leading to the development of Guide3D, a biplanar X-Ray dataset designed for segmentation and 3D reconstruction.
- Optimized autonomous navigation in complex vascular structures using reinforcement learning (RL) algorithms.
- Developed 'Splineformer', a transformer-based architecture utilizing B-spline representations to predict guidewire shapes efficiently.
- Supervised students in a diverse range of projects, fostering collaboration, problem-solving, and effective communication.

Oct 2021 - Present
Teaching Assistant — University of Liverpool

- Teaching Assistant for Computer Vision (COMP338): Supported students with coursework on image processing, feature extraction, and machine learning applications in vision.
- Teaching Assistant for Robotic Perception and Manipulation (COMP341): Assisted students with robotic control algorithms, perception systems, and manipulation tasks.
- Held office hours, graded assignments, and provided feedback on student projects.
- Conducted lectures and lab sessions, helping students apply theoretical concepts in practical experiments.

Jan 2023 - Apr 2023
Technical Lead — Digital Theme UK-Ukraine Twinning Initiative

- Designed and implemented the technical architecture for a seamless virtual conference experience.
- Collaborated with UK and Ukrainian academic institutions to align on research priorities and fostered international knowledge exchange.

Education

Oct 2021 - Present
PhD in Artificial Intelligence within Endovascular Navigation — University of Liverpool

- Developed novel AI techniques for autonomous guidewire navigation in endovascular procedures using deep learning and reinforcement learning.
- Published research papers in leading AI and robotics conferences and journals.
- Collaborated with interdisciplinary teams in healthcare and engineering to advance medical robotics research.

Sep 2020 - Sep 2021
Masters of Science in Computer Science — University of Liverpool

Courses: Database and Information Systems, Data Mining and Visualisation, Machine Learning and BioInspired Optimisation, Applied Artificial Intelligence, Computational Intelligence

- Published a [novel texture generation network](https://ieeexplore.ieee.org/abstract/document/9811801) for Sim2Real gap research in IEEE International Conference on Robotics and Automation (ICRA), contributing original insights to the field.

Sep 2017 - Aug 2021 **Bachelours of Arts in Business Administration** Coventry University
Courses: Project Management, Principles of Business Accounting, Introduction to Financial Services, International Finance

Publications

Dec 2024 **Guide3D: A Bi-planar X-ray Dataset for 3D Shape Reconstruction**
Tudor Jianu, Baoru Huang, Hoan Nguyen, Binod Bhattarai, Tuong Do, Erman Tjiputra, Quang Tran, Pierre Berthet-Rayne, Ngan Le, Sebastiano Fichera, Anh Nguyen
Asian Conference on Computer Vision (ACCV)

Developed [Guide3D](https://airvlab.github.io/guide3d/), the first high-resolution bi-planar X-ray dataset for 3D reconstruction in endovascular surgery, enabling accurate segmentation and advancing machine learning techniques for surgical tool navigation.

Sep 2024 **DeepWire: Spherical Coordinate-Based Deep Learning for Accurate Guidewire Shape Reconstruction**
T. Jianu, B. Huang, H. Nguyen, P. Berthet-Rayne, S. Fichera, and A. Nguyen
International Conference on Biomedical Signal and Image Processing (ICBIP)

Developed a novel deep learning network for 3D reconstruction of guidewire shapes in endovascular surgery applications, leveraging spherical coordinates to achieve high accuracy and outperform traditional methods

Jan 2024 **Autonomous Catheterization with Open-source Simulator and Expert Trajectory**
T. Jianu, B. Huang, T. V. Vo, M. N. Vu, J. Kang, H. C. Nguyen, O. M. Omisore, P. Berthet-Rayne, S. Fichera, and A. Nguyen
Elsevier (Handbook of Robotic and Image-Guided Surgery)

Developed and introduced [CathSim](https://airvlab.github.io/cathsim/), the first open-source simulator for endovascular intervention, addressing limitations in autonomous catheterization research. Validated the simulator against real robotic systems and demonstrated its effectiveness in training machine learning algorithms for endovascular navigation tasks.

Nov 2023 **3D Guidewire Shape Reconstruction from Monoplane Fluoroscopic Images**
Tudor Jianu, Baoru Huang, Pierre Berthet-Rayne, Sebastiano Fichera, Anh Nguyen
International Conference on Robot Intelligence Technology and Applications (RiTA)

We propose a novel method to reconstruct 3D shapes from monoplane fluoroscopic images, achieving state-of-the-art results on the 3D Guidewire dataset.

Aug 2022 **Cathsim: An open-source simulator for autonomous cannulation**
Tudor Jianu, Baoru Huang, Minh Nhat Vu, Mohamed EMK Abdelaziz, Sebastiano Fichera, Chun-Yi Lee, Pierre Berthet-Rayne, Ferdinando Rodriguez y Baena, Anh Nguyen
Transactions on Medical Robotics and Bionics (T-MRB)

An open-source simulator has been introduced to advance machine learning for autonomous endovascular navigation, offering high-fidelity catheter and aorta simulation with real-time force feedback.

May 2022 **Reducing Tactile Sim2Real Domain Gaps via Deep Texture Generation Networks**
Tudor Jianu, Daniel Fernandes Gomes, Shan Luo
International Conference on Robotics and Automation (ICRA)

Engineered a neural network that synthesizes realistic textures on simulated tactile images, targeting only contact areas to enhance realism and reduce the Sim2Real accuracy gap in robotic sensing tasks.

Volunteering

Oct 2021 - Present **Team Member** University of Liverpool (CS Outreach)
Contributed to educational outreach programs aimed at promoting computer science to schools and the general public, collaborating with the Electrical Engineering and Electronics Department.

- Led an Introduction to Programming Workshop at Liverpool World Museum using Pi2Go robots, engaging young learners with interactive coding lessons.
- Led a Deep Learning Workshop for Year 12 students during the Biograd Residential Program, introducing them to neural networks and AI, fostering early interest in advanced computer science topics.

Sep 2020 - Sep 2021 **President of Data Science and Artificial Intelligence (DSAI) Society** University of Liverpool
Founded and led the Data Science and Artificial Intelligence Society.

- Established the society from the ground up, setting strategic goals to foster student engagement in Data Science and AI.
- Organized networking events and hands-on workshops, connecting students with industry professionals and providing practical training.