

Tudor Jianu

PhD Candidate

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Summary

Proven expertise in software engineering with a focus on applying computer vision and machine learning to solve complex, real-world problems. Skilled in designing, developing, and optimizing scalable software systems using Python, with experience in creating AI-driven solutions for healthcare technology. Adept at working independently or in small, agile teams to tackle interdisciplinary challenges. Thrive in intellectually stimulating environments, excelling in problem-solving and algorithmic thinking. Passionate about software development, with a strong commitment to open-source projects and leveraging innovative technologies to streamline workflows and enhance system efficiency.

Skills

Technical Skills:	Software Engineering, Data Visualisation, Deep Learning, Machine Learning, Computer Vision, Web Development
Programming Languages:	Python, JavaScript, HTML, CSS, SQL, Bash
Tools:	PyTorch, VIM, Linux, Docker, Jupyter Notebooks
Other Skills:	Version Control (Git), Debugging and Testing, Object-Oriented Design (OOD), Model-View-Controller (MVC)

Work

Oct 2021 - Present	PhD Researcher in Artificial Intelligence and Endovascular Navigation	University of Liverpool
	<ul style="list-style-type: none">Designed and implemented CathSim, a simulation environment for training and evaluating guidewire navigation tasks, applying advanced software engineering principles to create scalable and efficient solutions that bridge healthcare and AI technologies.Solved 3D reconstruction challenges with advanced computer vision techniques, creating Guide3D, a dataset for segmentation and 3D modeling, demonstrating skills in data engineering and visualization for scientific research.Optimized navigation in complex structures using Multi-Modal Reinforcement Learning, showcasing expertise in algorithm design, deep learning, and interdisciplinary applications of AI.Developed “Splineformer”, a transformer-based architecture leveraging B-spline representations for efficient guidewire shape prediction, showcasing advanced expertise in model architecture design and innovative problem-solving.Supervised students on diverse research projects, fostering interdisciplinary collaboration and effective knowledge sharing to support team-based research and innovation.	
Sep 2024 - Present	Web Developer	University of Liverpool
	<p>Designed, developed, and deployed a full-stack web application, leveraging modern technologies and frameworks to create a robust and scalable solution.</p> <ul style="list-style-type: none">Developed a scalable back-end architecture with MongoDB and Mongoose ORM, showcasing expertise in efficient data management and database optimization for complex applications.Built interactive, user-centric interfaces with React, demonstrating proficiency in creating responsive visualizations and intuitive software solutions.Streamlined full-stack development using Next.js, leveraging server-side rendering to enhance performance and scalability for data-rich applications.	
Oct 2021 - Present	Teaching Assistant	University of Liverpool
	<ul style="list-style-type: none">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.	
Jan 2023 - Apr 2023	Technical Lead	Digital Theme UK-Ukraine Twinning Initiative
	<ul style="list-style-type: none">Designed and implemented the technical architecture for a seamless virtual conference experience.Collaborated with UK and Ukrainian academic institutions to foster international knowledge exchange.	

Education

- Oct 2021 - **PhD in Artificial Intelligence within Endovascular Navigation** **University of Liverpool**
Present
- Developed novel AI techniques for autonomous guidewire navigation in endovascular procedures using Deep Learning and Reinforcement Learning.
 - Collaborated with interdisciplinary teams and engineering to advance medical robotics research.
- Sep 2020 - **Masters of Science in Computer Science** **University of Liverpool**
Sep 2021
- 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** for Sim2Real gap research in IEEE International Conference on Robotics and Automation (ICRA), contributing original insights to the field.
- Sep 2017 - **Bachelours of Arts in Business Administration** **Coventry University**
Aug 2021
- 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**
T. Jianu, B. Huang, H. Nguyen, B. Bhattarai, T. Do, E. Tjiputra, Q. Tran, P. Berthet-Rayne, N. Le, S. Fichera, and A. Nguyen
Asian Conference on Computer Vision (ACCV)
- Developed **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.
- Oct 2024 **Translating simulation images to x-ray images via multi-scale semantic matching**
J. Kang, T. Jianu, B. Huang, B. Bhattarai, N. Le, F. Coenen, and A. Nguyen
MICCAI Workshop on Data Engineering in Medical Imaging
- This paper introduces a method using multi-scale semantic matching to translate endovascular simulator images into realistic X-ray images, preserving structure critical for medical applications while addressing style discrepancies.
- Aug 2024 **CathAction: A Benchmark for Endovascular Intervention Understanding**
B. Huang, T. Vo, C. Kongtongvattana, G. Dagnino, D. Kundrat, W. Chi, M. Abdelaziz, T. Kwok, T. Jianu, T. Do, H. Le, M. Nguyen, H. Nguyen, E. Tjiputra, Q. Tran, J. Xie, Y. Meng, B. Bhattarai, Z. Tan, H. Liu, H. S. Gan, W. Wang, X. Yang, Q. Wang, J. Su, K. Huang, A. Stefanidis, M. Guo, B. Du, R. Tao, M. Vu, G. Zheng, Y. Zheng, F. Vasconcelos, D. Stoyanov, D. Elson, and A. Nguyen
IEEE Transactions on Medical Imaging (under review)
- CathAction** introduces a large-scale dataset with 500,000 annotated frames and 25,000 segmentation masks, setting benchmarks and addressing challenges in catheterization understanding to advance real-world endovascular intervention applications.
- Aug 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
- 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
Handbook of Robotic and Image-Guided Surgery 2nd Edition, Elsevier
- Developed and introduced **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**
T. Jianu, B. Huang, P. Berthet-Rayne, S. Fichera, and A. Nguyen
International Conference on Robot Intelligence Technology and Applications
We propose a novel method to reconstruct 3D shapes from monoplane fluoroscopic images, achieving state-of-the-art results on the 3D Guidewire dataset.
- Apr 2023 **Unsupervised adversarial domain adaptation for sim-to-real transfer of tactile images**
X. Jing, K. Qian, T. Jianu, and S. Luo
IEEE Transactions on Instrumentation and Measurement
ACTNet introduces an adaptive attention mechanism and task-related constraints to enable zero-shot sim-to-real transfer for tactile perception, achieving state-of-the-art performance with 92.85% accuracy without real-world labels.
- Aug 2022 **Cathsim: An open-source simulator for autonomous cannulation**
T. Jianu, B. Huang, M. N. Vu, M. E. M. K. Abdelaziz, S. Fichera, C.-Y. Lee, P. Berthet-Rayne, F. Rodriguez y Baena, and A. Nguyen
Transactions on Medical Robotics and Bionics
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**
T. Jianu, D. F. Gomes, and S. Luo
International Conference on Robotics and Automation
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 - **Outreach Team Member** **University of Liverpool**
Present 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 **“Introduction to Programming Workshop”** at Liverpool World Museum using Pi2Go robots, engaging young learners with interactive coding lessons and fostering interdisciplinary knowledge-sharing.
 - Led a **“Deep Learning Workshop”** for Year 12 students during the Biograd Residential Program, introducing them to neural networks and AI concepts, closely aligned with the development and application of machine learning models.
- Sep 2020 - **President of Data Science and Artificial Intelligence (DSAI) Society** **University of Liverpool**
Sep 2021 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.

Interests

- Research:** Medical Image Analysis, Deep Learning, Large Language Models
- Sports & Fitness:** Bouldering, Gymnastics