Tudor Jianu

PhD Student of Artificial Intelligence in Medical Robotics

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Summary

Tudor Jianu completed an MSc in Data Science and Artificial Intelligence at the University of Liverpool and is currently working towards a PhD in Artificial Intelligence focused on medical robotics. Specializes in research areas that include autonomous navigation in endovascular procedures. Beyond the academic sphere, shows a strong inclination for creating clean software solutions. Thrives in fast-paced, innovative environments committed to pushing the boundaries of medical technology.

Skills

Technical Skills:	Machine Learning, Algorithms, Data Mining, Data Visualization, Artificial Intelligence, Database Systems
Soft Skills:	Planning, Problem-Soving, Collaboration, Communication, Active Learning, Innovation, Mentoring, Leadership, Responsibility
Programming Languages:	Python, Ruby, SML, Bash, HTML, CSS, SQL, JavaScript
Tools:	VIM, Docker, Linux, Git, Jupyter Notebooks

Work

Oct 2021 - Present **PhD Researcher** University of Liverpool

Pursuing a Ph.D. in autonomous endovascular navigation, Tudor excels in integrating deep learning, software development, and data science. Engineered an endovascular simulator using Python and MuJoCo, demonstrating expertise in areas like reinforcement learning and neural networks. Notable for problem-solving and team collaboration skills, which extend to mentoring and conducting AI workshops.

- Developed an endovascular simulator, CathSim, using Python
- Deployed scripts on HPC's (Barkla)
- Researched and applied state-of-the-art neural network architectures
- Created an autonomous agent capable of performing endovascular navigation tasks
- Presented at the Hamlyn Symposium of Medical Robotics
- Supervised and guided trainee researchers, providing essential technical advice to foster academic development
- Developed demonstrations for SmartLab using industrial manipulators (UR5) and instance segmentation networks (Mask-RCNN)

Oct 2021 - Present **Team Member** University of Liverpool CS Outreach

The Department of Computer Science at the University of Liverpool actively engages in educational outreach programs to promote computer science. In collaboration with the Electrical Engineering and Electronics department, a range of events and resources are offered to schools and the general public.

- Delivered an Introduction to Programming Workshop at Liverpool World Museum using Pi2Go robots
- Participated in continuous improvement by generating suggestions, engaging in problem-solving activities to support teamwork.
- Generated ideas while working in a small team to produce activities for a series of fun and engaging events to market the university
- Developed an Introduction to Machine Learning activity as part of Computer Science Summer School activities.
- Created Machine Learning activities by modifying TypeScript and HTML code
- Created various educational activities for the Computer Science Department

Education

Oct 2021 - Present **PhD in Computer Science** University of Liverpool

Distinguished expertise in deep learning methodologies, including convolutional neural networks, multi-layer perceptrons, and transformers.,Contributed to the development of a sim-to-xray image mapping network.,Actively participated in mentoring and supervising master's students during their thesis work.,Conducted workshops on AI and Deep Learning as part of the outreach group.,Presented work at the esteemed Hamlyn Symposium within the Recent Advances in Autonomous Surgery workshop.

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

Courses: COMP516 - Research Methods in Computer Science, COMP517 - Programming Fundamentals, COMP518 - Database and Information Systems, COMP533 - Maths and Statistics for AI and Data Science, COMP527 - Data Mining and Visualisation, COMP532 - Machine Learning and BioInspired Optimisation, COMP534 - Applied Artificial Intelligence, COMP575 - Computational Intelligence, COMP702 - MSc Project

Sep 2017 - Aug 2021 **Bachelours of Arts in Business Administration** Coventry University

Courses: A106MC - Design Your Own Project, 110SAM - Internal Business Relations, 148HRM - Managing People, 105MKT - Marketing Essentials, 108SAM - Quantitative Methods for Business, 117ECN - The Economic Environment of Business, 120SAM - Continuing Professional Development 1, 2000ACC - Principles of Business Accounting, 240SAM - Supply Chain and Operations Management, A203IAE - Making Money On-Line, 211MKT - Buyer Behaviour, 220SAM - Continuing Professional Development 2, 247SAM - Exploring Business Strategy, 251FIN - Introduction to Financial Services, 344SAM - Project Management, 361SAM - Contemporary Business Strategy, A320DEL - Absolute Beginners' German 3, 320SSL - Continuing Professional Development 3, 348SAM - Managing Change, 352SAM - Business Dissertation, 353FIN - International Finance

Publications

Jan 2024 - Present **Autonomous Catheterization with Open-source Simulator and Expert Trajectory**

arXiv preprint arXiv:2401.09059

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. The work accelerates research in autonomous catheterization by providing a cost-effective and accessible tool for real-time performance testing and algorithm development.

Nov 2023 - Present

3D Guidewire Shape Reconstruction from Monoplane Fluoroscopic Images

arXiv preprint arXiv:2311.11209

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 - Present

Cathsim: An open-source simulator for autonomous cannulation

arXiv preprint arXiv:2208.01455

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.

Apr 2023 - Present

Translating Simulation Images to X-ray Images via Multi-Scale Semantic Matching

arXiv preprint arXiv:2304.07693

A new method is proposed to convert endovascular simulator images to X-ray-like images, emphasizing structural integrity through multi-scale semantic matching, outperforming existing techniques and accompanied by a new benchmark dataset and open-source code.

Apr 2023 - Present

Unsupervised Adversarial Domain Adaptation for Sim-to-Real Transfer of Tactile Images

IEEE Transactions on Instrumentation and Measurement

ACTNet, an unsupervised adversarial network, is proposed for tactile image transfer, using correlative attention and task-related constraints to enhance sim-to-real transfer, achieving 92.85% accuracy in real-world classification without real labels.

May 2022 - Present

Reducing tactile sim2real domain gaps via deep texture generation networks

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

Sep 2020 - Sep 2021

President of Data Science and Artificial Intelligence (DSAI) Society — University of Liverpool

Established the society

- Organized Data Science networking and training events;
- Set aims and objectives in order to improve the society while securing the commitment of others;
- Built the committee for the society, advertised roles and advocated conflicts

Sep 2020 - Sep 2021

Course Representative — University of Liverpool

Representative of Data Science and Artificial Intelligence MSc students

- Gathered information from the students by asking open questions to better understand the views in order to improve the course
- Participated in meetings throughout the year, supported the opinions of the students and raised and complains to the department as well as offered tentative solutions to the issues.

Interests

Sports: Bouldering, Gymnastic Rings, Hiking
Technology: Artificial Intelligence, Blockchain, Cybersecurity