Daniel Omeiza

Post-Doctoral Researcher, Oxford Robotics Institute, University of Oxford

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RESEARCH INTERESTS

Fields: Explainable AI, Machine Learning, Knowledge Representation, Autonomous Driving, Human Factors
Programming Languages: Python (including PyTorch framework), C++, Java, Javascript, TypeScript, R

EDUCATION

University of Oxford   Oct. 2019 – Nov. 2022
Doctor of Philosophy in Computer Science   *Advisors: Dr. Lars Kunze & Prof. Marina Jirotka*

Carnegie Mellon University   Aug. 2017 – Jun. 2019
Master of Science in Information Technology   *Advisor: Prof. David Vernon*

University of Ilorin   Sept. 2011 – Aug. 2015
Bachelor of Science in Computer Science (First Class Honors)   *Advisor: Dr. Kayode Adewole*

RESEARCH EXPERIENCES

Post Doctoral Research Assistant   Jan. 2023 – Present
Oxford Robotics Institute   *University of Oxford, UK*

- Managing a research project where I am developing and implementing quantitative metrics for estimating Responsible AI Index for autonomous driving agents in collaboration with AWS.
- Extending Carla Leaderboard platform and incorporating the developed Responsible AI Index as an additional dimension to performance assessment.
- Developed an automated commentary driving system that has been exhibited in one of the largest motorcar sports festivals in the world—Goodwood Festival of Speed.
- Co-supervising masters students and collaborating with software engineers.
- Teaching Artificial Intelligence and Software Engineering Courses.

Graduate Research Assistant   Oct. 2019 – Sept. 2022
Cognitive Robotics Group   *University of Oxford, UK*

- Investigated & developed transparent explainer models for complex AI agents.
- Investigated driver and passenger behaviour through driving simulator studies using Carla.
- Supported existing projects and contributed to the groups' code base.
- Co-advised master's students.

Research Intern   Sep. 2018 – Dec. 2018
IBM Research, one of the 5 IBM Great Minds Winners from EMEA   *Nairobi, Kenya*

- Investigated new and efficient algorithms for detecting and explaining anomalous patterns in datasets and neural network activations.
- Developed a novel technique (Smooth Grad-CAM++) to provide visual explanations for anomalous patterns in deep neural network.

Graduate Research Assistant   Jan. 2019 – May 2019
Carnegie Mellon University   *Kigali, Rwanda*

- Conducted research around applied machine learning. I developed an efficient machine learning approach for large-scale urban land-use forecasting in sub-Saharan Africa, which was featured in popular podcasts, e.g., DataSkeptics.

Professional Software Engineering Experiences

Co–founder and AI Lead
N6 Labs

Feb. 2022 – Nov. 2022
Remote

- As a co-founding member and AI Lead for N6 Labs' Tilly Intelligence startup, I led AI product and engineering efforts from ideation to launch. Assisted in securing a pre-seed investment funding of about $400K through the South Park Commons Founders' Fellowship.

Digital Communication and Technology Lead
Weidenfeld Hoffmann Trust

Jun. 2021 – Apr. 2022
Oxford, UK

- Setup a better IT infrastructure; developed an efficient digital communication pipeline which led to improved internal and external engagements.

Software Engineering Intern
Oltranz

Jun. 2018 – Aug. 2018
Kigali, Rwanda

- Developed efficient API monitoring systems for multiple microservices in the company.

Software Engineer
SimplePay (now ThankUCash)

May 2017 – Jul. 2017
Lagos, Nigeria

- Developed two payment dashboards for payment applications that managed data from over 50,000 users.

Grants, Scholarships & Award

Grants
- ACM SIGCOMM Grant — Apr. 2021
- Black in AI Travel Grant — Dec. 2019
- Black in AI Travel Grant — Dec. 2018

Scholarships
- UK's Engineering and Physical Sciences Research Council (EPSRC) RoboTIPS Fund — Oct. 2019 – Nov. 2022
- Mandela Institute for Development Studies Scholarship — Aug. 2017 – Jun. 2019
- MTN Foundation Science & Technology Scholarship — Sept. 2013 – Aug. 2015

Award
- 2023 MIT TR Innovators 35 Under 35 Finalist — 2023
- Best Student Paper: Privacy Papers for Policymakers Award by the Future of Privacy Forum — Jan. 2022
- Jeremiah Mpagazehe Rising Researcher Award — Jun. 2019

Teaching & Research Mentoring

Instructor
- Summer Course: AI and ML: Theory and Practice, *University of Oxford* — Jun. – Jul. 2023
- CS Undergraduate course: Ethics and Responsible Innovation, *University of Oxford* — Feb. 2020
- CS Masters Course: Design Patterns, *University of Oxford* — Feb. 2020
- CS & Engineering Masters Course: Academic Skills, *Carnegie Mellon University, Africa* — Jul. 2019 – Aug. 2019

Research Mentoring
- Select Erasmus Mundus Masters Graduate students at Universite de Lorraine — Oct. 2020 – Present
- Select Undergraduate students at the Federal University of Technology, Akure, the University of Kigali, and the Federal University of Petroleum Resource, Effurun — Sept. 2017 – Present

Academic Services

Organising Committees

- Co-organiser, IEEE IV 2023 Workshop on Socially Interactive Autonomous Mobility (SIAM) — Jun. 2023
- Co-organiser, NeurIPS 2022 Workshop on Machine Learning for Autonomous Driving (ML4AD) — Dec. 2022
- Co-organiser, ICML 2022 Workshop on Artificial Intelligence for Autonomous Driving (AI4AD) — Jul. 2022
- Co-organiser, IJCAI 2022 Workshop on Artificial Intelligence for Autonomous Driving (AI4AD) — Jul. 2022
- Co-organiser, HRI 2022 Workshop on Fairness and Transparency — Mar. 2022
- Co-organiser, NeurIPS 2021 Workshop on Machine Learning for Autonomous Driving (ML4AD) — Dec. 2021
- Co-organiser, IJCAI 2021 workshop on Artificial Intelligence for Autonomous Driving (AI4AD) — Aug. 2021
- Student Volunteer, IJCAI 2021 Conference — Aug. 2021
- Lead-organiser, CHI 2021 workshop on Trustworthy and Explainable Autonomous Physical Systems — May 2021
- Programme Committee, AI in Africa for Sustainable and Development Goals Workshop — Nov. 2021
- Co-organiser, NeurIPS 2020 Workshop on Machine Learning for Autonomous Driving (ML4AD) — Dec. 2020
- Programme Committee, AI in Africa for Sustainable and Development Goals Workshop — Nov. 2020
- Student volunteer, NeurIPS Black in AI Workshop — Dec. 2019
- Student volunteer, NeurIPS Black in AI Workshop — Dec. 2018

Invited Talks

- NeurIPS Workshop on Progress and Challenges in Building Trustworthy Embodied AI — Dec. 2022
- IV 2022 Workshop on Human Factors in Intelligent Vehicles — Jun. 2022
- IV 2022 Workshop on Naturalistic Driving Data Analytics (NDDA) — Jun. 2022
- UK Robotics & Autonomous Systems Network Talk Series — Feb. 2022
- IEEE ARSO 2021 Workshop on Ethics and Responsible Design in Robotics — Jul. 2021

Paper Review

- International Conference on Intelligent Robots and Systems (IROS)
- Robotics: Science and Systems Conference (RSS)
- IEEE Intelligent Vehicles
- Transportation Research, Part C
- International Conference on Advanced Robotics and Its Social Impacts (ARSO)
- Cognitive Systems Research Journal
- CHI Conference on Human Factors in Computing

University Activities

- Member, HCC Symposium Organising Committee — Jun. 2020
- Volunteering member, RoboTIPS Project — Oct. 2019 – 2022
- Member, Explainable AI (XAI) Reading Group — Oct. 2020 – Present
- Member, Cognitive Robotics Group (CRG) Reading group — Oct. 2020 – Present

Publications

Conference and Journal Papers

1. Generating Corner Case Traffic Scenarios using GNN-based Scene Graph Learning
   George Drayson, Efimia Panagiotaki, **Daniel Omeiza**, Lars Kunze
   Submitted to the 2023 Conference on Robot Learning (CoRL)

2. Effects of Explanation Specificity on Passengers in Autonomous Driving
   Daniel Omeiza, Raunak Bhattacharyya, Nick Hawes, Marina Jirotka, Lars Kunze
   Submitted to the 2023 Intelligent Transport Systems Conference (ITSC)

3. Explainable Action Prediction through Self-Supervision on Scene Graphs
   Pawit Kochakarn, Daniele De Martini, **Daniel Omeiza**, Lars Kunze
   2023 International Conference on Robotics and Automation (ICRA)
   PDF

4. Textual Explanations for Automated Commentary Driving
   Marc Alexander Kühn, **Daniel Omeiza**, Lars Kunze
   2023 IEEE Intelligent Vehicles Symposium (IV)
   PDF

5. From Spoken Thoughts to Automated Driving Commentary: Predicting and Explaining Intelligent Vehicles' Actions
   Daniel Omeiza, Helena Webb, Marina Jirotka, and Lars Kunze
   In the Proceedings of the 2022 IEEE Intelligent Vehicles Symposium (IV)
   PDF

6. Effects of Explanation Granularity and Autonomous Vehicles' Perception System Errors on Passengers' Perceived Safety
   Daniel Omeiza, Raunak Bhattacharyya, Marina Jirotka, Lars Kunze
   Submission for Transportation Research Part F Journal

7. Context-based Image Explanations for Deep Neural Networks
   Sule Anjomshoae, **Daniel Omeiza**, and Lili Jiang
   Journal of Image and Vision Computing, 2021
   PDF

8. Assessing and Explaining Collision Risk in Dynamic Environments for Autonomous Driving Safety
   Richa Nahata, **Daniel Omeiza**, Rhys Howard, Lars Kunze
   In Proceedings of the IEEE 2021 International Conference on Intelligent Transportation Systems (ITSC)
   PDF

9. Towards Accountability: Providing Intelligible Explanations in Autonomous Driving
   Daniel Omeiza, Helena Webb, Marina Jirotka, Lars Kunze
   In Proceedings of the IEEE 2021 Intelligent Vehicles Symposium (IV)
   PDF

10. Explanations in Autonomous Driving: A Survey
    Daniel Omeiza, Helena Webb, Marina Jirotka, Lars Kunze
    In the IEEE Transactions on Intelligent Transportation Systems (T-ITS)
    PDF

11. *Why Not Explain?* Effects of Explanations on Human Perceptions of Autonomous Driving
    Daniel Omeiza, Helena Webb, Konrad Kollnig, Marina Jirotka, Lars Kunze
    In Proceedings of the IEEE 2021 International Conference on Advanced Robotics and Its Social Impacts (ARSO)
    PDF

12. Towards Explainable and Trustworthy Autonomous Physical Systems
    Daniel Omeiza, Sule Anjomshoae, Konrad Kollnig, Oana-Maria Camburu, Kary Främling, Lars Kunze
    In the Proceedings of the CHI 2021 Conference on Human Factors in Computing Systems
    PDF

13. Fairness and Transparency in Human-Robot Interaction
    Houston Claure, Mai Lee Chang, Seyun Kim, **Daniel Omeiza**, Martim Brandão, Min Kyung Lee, Malte Jung
    In the Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction (HRI)
    PDF

14. A Fait Accompli? An Empirical Study into the Absence of Consent to Third-Party Tracking in Android Apps
    Konrad Kollnig, Reuben Binns, Pierre Dewitte, Max Van Kleek, Ge Wang, **Daniel Omeiza**, Helena Webb, Nigel Shadbolt
    In the Proceedings of the 2021 Symposium on Usable Privacy and Security
    PDF

15. Realizing the Potential of AI in Africa: It All Turns on Trust

Charity Delmus Alupo, **Daniel Omeiza**, David Vernon
In Towards Trustworthy Artificial Intelligent Systems. Springer, Cham.
[PDF]

Workshop Papers

16. Towards Explainable and Trustworthy Collaborative Robots through Embodied Question Answering
    Lars Kunze, Omer Gunes, Dylan Hillier, Matthew Munks, Helena Webb, Pericle Salvini, **Daniel Omeiza**, and Marina Jirotka
    Presented in the ICRA 2022 Workshop on the Collaborative Robots and the Work of the Future
    [PDF]

17. A Step Towards Exposing Bias in Trained Deep Convolutional Neural Network Models
    Daniel Omeiza
    Presented at the NeurIPS Workshop on Machine Learning for Developing World, 2019
    [arXiv:1912.02094]

18. Deep Convolutional Neural Network for Plant Seedlings Classification
    Daniel Nkemelu, **Daniel Omeiza**, Nancy Lubalo
    Presented at the NeurIPS Black in AI workshop, 2018
    [arXiv:11811.08404]

Manuscripts and Pre-Prints

19. Smooth Grad-Cam++: An Enhanced Inference Level Visualization Technique for Deep Convolutional Neural Network Models
    Daniel Omeiza, Skyler Speakman, Celia Cintas, Komminist Weldermariam
    [arXiv:1908.01224]

20. Efficient Machine Learning for Large-Scale Urban Land-Use Forecasting in Sub-Saharan Africa
    Daniel Omeiza
    [arXiv:1908.00340]

21. EEG-based Communication with a Predictive Text Algorithm
    Daniel Omeiza, kayode Adewole, Daniel Nkemelu
    [arXiv:1812.05945]