NAOYA MURAMATSU

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RESEARCH EXPERIENCE

PhD Research May 2021 – Present
Supervisors: Dr. Amir Patel University of Cape Town

- Developed WildPose, a novel long-range 3D motion capture system for wildlife, using multi-sensor computer vision and deep learning techniques to enable markerless pose estimation of animals in their natural habitats
- Designed and implemented embedded systems for WildPose, integrating cameras, sensors, and processing units for efficient data capture and transmission in the field
- Improved 3D markerless pose estimation of wild animals by integrating data from low-cost cameras, demonstrating enhanced accuracy and robustness in challenging field conditions
- Co-created AcinoSet, the first 3D pose estimation dataset of cheetahs in the wild, providing a valuable benchmark for developing and evaluating animal pose estimation models
- Collaborated with an interdisciplinary team spanning computer science, electrical engineering, mechanical engineering, and wildlife biology to advance the state-of-the-art in wildlife monitoring technologies

MSc Research April 2018 – March 2021
Supervisors: Dr. Yoichi Ochiai, Dr. Hai-Tao Yu and Tetsuji Satoh University of Tsukuba

- Developed a novel method for combining spiking neural networks with conventional neural networks to enhance image classification performance per energy consumption
- Created DeepHolo, a system that recognizes 3D objects using a binary-weighted computer-generated hologram, enabling efficient and robust 3D object recognition from 2D imagesnetworks can guide crowdsourced clothing design

RELEVANT RESEARCH SKILLS

Extensive experience in electrical system design for robotics, including legged robots and control circuitry

Proficient in FPGA circuit design using Verilog HDL

Substantial field work experience, including wildlife tracking, sensor installation, and hardware deployment

Strong background in developing 3D reconstruction and pose estimation algorithms using traditional and deep learning approaches

Skilled in integrating diverse sensors (e.g., cameras, LiDAR) for robust data collection in challenging environments

Experienced in managing and analyzing large-scale datasets to ensure data quality for downstream research

Proficient in collaborating with interdisciplinary teams and communicating technical concepts to diverse stakeholders

Proven project management skills, including planning, budgeting, and delivering projects on time

Demonstrated leadership abilities in guiding and mentoring junior team members to achieve research goals

AWARDS

Paper selected for cover of *Journal of Experimental Biology* (March 2025 issue) *2025*
Incoming International Student Scholarship from University Cape Town (35,000 ZAR) *2024*
Electrical Engineering P/G Scholarship from University of Cape Town (100,000 ZAR) *2024*
Incoming International Student Scholarship from University Cape Town (35,000 ZAR) *2023*
Electrical Engineering P/G Scholarship from University of Cape Town (6,000 ZAR) *2023*
Microsoft Research PhD Fellowship Africa (15,000 USD) *2022*
Incoming International Student Scholarship from University Cape Town (35,000 ZAR) *2022*
Electrical Engineering P/G Scholarship from University of Cape Town (47,000 ZAR) *2022*
Super Creator, awarded by Information-technology Promotion Agency, Japan (2,304,000 JPY) *2019*
President's Award for Students in University of Tsukuba *2018*
Student Presentation Award at DEIM 2017 *2017*
Third Prize, RoboCupJunior Soccer 2015 (Hokushinetsu Block) *2015*

EDUCATION

University of Cape Town *May 2021 – February 2025 (expected)*
PhD in Engineering

University of Tsukuba *April 2018 – March 2021*
MSc in Information Science

University of Tsukuba *April 2016 – March 2018*
BSc in Library and Information Science

National Institute of Technology, Nagano College *April 2011 – March 2016*
Foundation Degree

WORK EXPERIENCE

Frogiraffe, Inc. *2018 – Present*
Founder and CEO

- As a freelance engineer and technology consultant, supported the design of new business models and developed computer vision systems for six companies in Japan and the US
- Projects included a business card scanner for smartphones and a human pose estimator

Pixie Dust Technologies, Inc. *2017 – 2019*
Software Engineer Intern

- Proposed a 3D data platform of building construction to Kajima Corporation and developed the prototype
- Collaborated with two teammates to secure a 500 million yen, five-year research contract from Kajima
- Developed a prototype smart brooch for the pre-presentation of the 2025 World Exposition in Osaka, Japan

Fixstars Corporation *2016*
Software Engineer Intern

- Developed a semantic segmentation model to run on an 8-bit microcomputer for a self-driving car system

ADDITIONAL SKILLS & COURSES

Coding Interview Preparation (Coursera), Meta *2024*
Operations Research (1): Models and Applications (Coursera), National Taiwan University *2022*
Kinematics: Describing the Motions of Spacecraft (Coursera), University of Colorado Boulder *2022*
Motion Planning for Self-Driving Cars (Coursera), University of Toronto *2021*
Robotics: Mobility (Coursera), University of Pennsylvania *2021*

Julia Scientific Programming (Coursera), University of Cape Town *2021*
State Estimation and Localization for Self-Driving Cars (Coursera), University of Toronto *2021*
Visual Perception for Self-Driving Cars (Coursera), University of Toronto *2021*

PAPER REVIEW

IEEE Robotics and Automation Letters *2024*
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) *2024*
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) *2022*
ACM Augmented Human International Conference (AH) *2018*

REFEREES

Dr Amir Patel, University of Cape Town, +27 21 650 2803, amir.patel@uct.ac.za
Dr Yoichi Ochiai, University of Tsukuba, +81 80 3006 2604, wizard@slis.tsukuba.ac.jp

PUBLICATIONS

Journals

- **Naoya Muramatsu**, Sangyun Shin, Andrew Markham, Amir Patel, "WildPose: A Long-Range 3D Wildlife Motion Capture System," *Journal of Experimental Biology*, 2025. doi: `10.1242/jeb.249987`
- Stacey Shield, **Naoya Muramatsu**, Zico da Silva, Amir Patel, "Chasing the Cheetah: How field biomechanics has evolved to keep up with the fastest land animal," *Journal of Experimental Biology*, 2023. doi: `10.1242/jeb.245122`
- **Naoya Muramatsu**, Hai-Tao Yu, Tetsuji Satoh, "Combining Spiking Neural Networks with Artificial Neural Networks for Enhanced Image Classification," *IEICE Transactions on Information and Systems*, 2023. doi: `10.1587/transinf.2021EDP7237`

Refereed Conference

- Zico da Silva, **Naoya Muramatsu**, Zuhayr Parkar, Fred Nicolls, Amir Patel, "Monocular 3D Reconstruction of Cheetahs in the Wild," in Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2024).
- **Naoya Muramatsu**, Sangyun Shin, Andrew Markham, Amir Patel, "WildPose: A Long-range 3D Motion Cpture System for Wildlife," in the IEEE/CVF Conference on Computer Vision and Pattern Recognition 2024 (CVPR 2024 CV4Animals Workshop).
- **Naoya Muramatsu***, Zico da Silva*, Daniel Joska, Fred Nicolls, Amir Patel, "Improving 3D Markerless Pose Estimation of Animals in the Wild using Low-Cost Cameras," in Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2022) (*co-first authors).
- Daniel Joska, Liam Clark, **Naoya Muramatsu**, Ricky Jericevich, Fred Nicolls, Alexander Mathis, Mackenzie Mathis, Amir Patel, "AcinoSet: A 3D Pose Estimation Dataset and Baseline Models for Cheetahs in the Wild," in Proc. IEEE International Conference on Robotics and Automation (ICRA 2021).
- Chun Wei Ooi, **Naoya Muramatsu**, Yoichi Ochiai, "Eholo glass: Electroholography glass. A lensless approach to holographic augmented reality near-eye display," in Technical Briefs of 11th ACM SIGGRAPH Asia (SA 2018).
- Natsumi Kato*, Hiroyuki Osone*, Daitetsu Sato, **Naoya Muramatsu**, Yoichi Ochiai, "DeepWear: a Case Study of Collaborative Design between Human and Artificial Intelligence," in Proc. 12th ACM Twelfth International Conference on Tangible, Embedded, and Embodied Interaction (TEI 2018). (* co-first authors)
- Natsumi Kato, Hiroyuki Osone, Daitetsu Sato, **Naoya Muramatsu**, Yoichi Ochiai, "Crowd Sourcing Clothes Design Directed by Adversarial Neural Networks," in Adjunct Proc. 31st Neural Information Processing Systems (NIPS 2017 Workshop).

- **Naoya Muramatsu**, Chun Wei Ooi, Yuta Itoh, Yoichi Ochiai, "DeepHolo: Recognizing 3D Objects using a Binary-weighted Computer-Generated Hologram," in Technical Briefs of 10th ACM SIGGRAPH Asia (SA 2017).
- Mose Sakashita, Yuta Sato, Ayaka Ebisu, Keisuke Kawahara, Satoshi Hashizume, **Naoya Muramatsu**, Yoichi Ochiai, "Haptic Marionette: Wrist Control Technology Combined with Electrical Muscle Stimulation and Hanger Reflex," in Adjunct Proc. 10th ACM SIGGRAPH Asia (SA 2017 Posters).
- **Naoya Muramatsu**, Ooi Chun Wei, Takashi Miyazaki, "Development of High Performance Filter for Indoor Positioning System," in Proc. 5th IIAE International Conference on Intelligent Systems and Image Processing 2017 (ICISIP 2017).
- **Naoya Muramatsu**, Kazuki Ohshima, Ryota Kawamura, Ooi Chun Wei, Yuta Sato, Yoichi Ochiai, "Sonoliards: Rendering Audible Sound Spots by Reflecting the Ultrasound Beams," in Adjunct Proc. 30th ACM User Interface Software and Technology (UIST 2017 Adjunct).

Non-refereed Conference

- **Naoya Muramatsu**, Sangyun Shin, Andrew Markham, Amir Patel, "WildPose: A Long-range 3D Motion Cpture System for Wildlife," in the Society for Integrative and Comparative Biology annual meeting (SICB 2024).
- **Naoya Muramatsu**, Hai-Tao Yu, "Combining Spiking Neural Network and Artificial Neural Network for Enhanced Image Classification," in Proc. 13th Data Engineering and Information Management (DEIM 2021).