Sanjeew Kanagaraj

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WORK EXPERIENCE

Epropulsion   *June 2023 - Present*
Robotics Engineer

- Led the ADAS team in designing and developing **patented advanced driver assistance algorithms** including **virtual anchor, heading hold, and 360° joystick control**; currently deployed on a wide variety of vessels in **15+ countries**
- Redesigned and optimised firmware architecture written using **ROS2, C++ and Python**, boosting **runtime efficiency by 40%** and reducing **memory usage by 30%**
- Developed a prototype of an **autonomous navigation system for boats with minimal hardware**, using a combination of traditional methods and reinforcement learning techniques **achieving path accuracy of over 80%**
- Created **custom CI/CD pipelines with integrated Gazebo simulation** for automated software testing and deployment, **achieving 80% test coverage and reducing manual testing time by over 50%**

Rice Robotics   *April 2021 - March 2023*
Robotics Engineer

- Developed multimedia pipelines to enable **teleoperation, 4K video streaming, recording, two-way intercom** and **deep learning inference** using **Gstreamer, AsyncIO, Python** and **Typescript**, reducing processing and memory requirements **by up to 80%**
- Led the training and optimisation of computer vision models to perform various tasks including **mask, gate** and **intruder detection**, achieving **over 90% accuracy** on edge using **PyTorch, ONNX, OpenVINO** and **Google Cloud**
- **Improved self docking success rate** by implementing a 'graceful' controller for parking at firmware level using **C++** and **ROS**

Robot Data   *Sept 2020 - April 2021*
Software Engineering Intern

- Developed computer vision models for real world use cases using **Tensorflow** and **PyTorch**; optimised and deployed inference on edge devices using **Docker, TensorRT** and **Nvidia DeepStream SDK**
- Trained U-Net and PraNet image segementation models to detect tumors in ultrasound scans, **achieving DICE accuracy of 92%**

Hanson Robotics   *June 2020 - Sept 2020*
Robotics Engineering Intern

- Co-authored paper titled **A Neuro-Symbolic Humanlike Arm Controller for Sophia the Robot**, researching the use of Convolution Neural Networks coupled with symbolic AI for object grasping (https://arxiv.org/abs/2010.13983)
- Implemented AI behavior tree algorithms and integrated with the Hanson Robotics SDK **reducing interaction delay by 50%**

EDUCATION

University of Hong Kong   *September 2017 - May 2021*
Bachelor of Engineering, Computer Engineering

Courses: *Computer vision, Machine Learning, AI and Robotics, OOP, Operating Systems, Data Structures, Networking, Digital system design*

SKILLS

Languages: C++, C, Python, Bash, Java
Frameworks: ROS2, PyTorch, Transformers, OpenCV2, ONNX, TensorRT, Django, Docker, RayLib

PROJECTS AND RESEARCH

- **Times-New-RPG:** 2D RPG with time-loop-based plot built from scratch. Game bosses trained using reinforcement learning algorithms for continuous improvement against players. *Stack: RayLib, C++*
- **NewsCrunch:** Summarisation and classification of daily news scraped from reputable outlets, using a combination of extractive summarisation and custom trained LLM based abstractive summarisation *Stack: Django, PyTorch, Transformers, PostgreSQL*
- **Federated Learning in Robots:** Continuous improvement of human robot interaction on the NAO robot using a novel Federated Learning framework to retrain a Seq2Seq chatbot and face detection model *Stack: PyTorch, Networks, OpenCV*
- **PointpillarsNet:** Research into implementation and optimization of PointPillars point cloud object detection model on FPGA boards, conducted under the supervision of Dr. Ngai Wong *Stack: PyTorch, VitisAI*

AWARDS

- HKU Foundation Scholarship covering tuition upon admission
- Awarded HKU engineering faculty best Final Year project presentation
- Awarded a grant by the Gallant Ho Experiential Learning Fund to lead an interdisciplinary team researching marine conservation methods in partnership with the University of the Philippines
- Funding to conduct research on marine robotics at the HKU Innovation Wing