Sanjeew Kanagaraj

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WORK EXPERIENCE

Epropulsion
June 2023 - Present

Robotics Engineer

- Acted as lead of the control systems team, heading the design and deployment of **adavanced driver assistance algorithms** with pending patents for **virtual anchor, heading hold and 360 joystick control** for a wide variety of marine vessels.
- Implemented architecture and optimisation of embedded firmware written using **ROS2, C++ and Python**, improving **run time efficiency by 40% and memory utilisation by 30%**
- Developed prototype of **autonomous navigation system for boats with minimal hardware**, using a combination of traditional methods and reinforcement learning techniques **achieving path accuracy of over 80%**

Rice Robotics
April 2021 - March 2023

Robotics Engineer

- 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**
- 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 upto 80%**
- **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**; optimized 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 to enable complex behavior patterns on Sophia, integrating with the Hanson Robotics SDK Improved Sophia's human-robot interaction heuristics and **reduced 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, PyTorch, Transformers, ONNX, Django, Docker, RayLib

PROJECTS AND RESEARCH

- **Times-New-RPG:** 2D RPG with time loop based plot built from scratch. Game boss trained using reinforcement learning for continuous improvement. *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