Jonathan Spraggett

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GitHub: https://github.com/manx52
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Education

Bachelor of Applied Science in Engineering Science — University of Toronto
Major in Robotics with a minor in Artificial Intelligence
Courses: Mobile Robotics & Perception, Robot Modeling & Control, Probabilistic Reasoning & Learning

Selected Experience

2019 Aug - Current

Robotic Software Team Lead (Github, Website) — University of Toronto Robosoccer Team

- Managing a team of 20-30 talented members for the Robocup's humanoid kid-size competition with faculty advisors are Prof. Jonathan Kelly and Prof. D' Eleuterio.
- Used an ICP algorithm to get visual odometry from camera transformations of field lines detected using OpenCV, ROS and used it in a UKF to get optimal robot localization in a soccer field
- Used Yolov5 to detect key objects such as balls, robots, field markers, and goal posts. Generated a diverse dataset in simulation to improve real-world performance. Successfully transferred the model to a real-life setting, resulting in improved accuracy on the soccer field.
- Designed and implemented a Finite State Machine (FSM) based Artificial Intelligence (AI) system for strategic decision-making in soccer games
- Attended the 2021 Robocup league humanoid kid-sized virtual and Robocup 2022 in Bangkok, Thailand. Placing 5th

2020 June - 2022 Dec

Software Developer — Quanta Technology, LLC

- Optimized sorting and searching algorithm (from $O(n^2)$ to $O(nlogn)$)), and utilized a suitable data structure, resulting in a 50% reduction in execution time.
- Implemented A* algorithm for optimizing topological searches on power grids.
- Designed and implemented database schema with relationships for substations, lines, etc. Successfully imported 50M entries using SQL.

2022 Sept - 2023 May

Reinforcement Learning for Soccer Skills Research Thesis (Github) — UTRA

- Designed and implemented an innovative approach for training humanoid robots, utilizing Deep RL, PPO algorithm, and AMP technique. Trained a neural network in a simulated environment to perform various tasks such as walking, jumping, and kicking, resulting in improved stability, accuracy, and performance.
  Supervisor: Professor Michael Guerzhoy .

2023 Jan - 2023 May

Autonomous Drone for Nuclear Safety Inspections Capstone (Github) — UTIAS

- Designed and developed a cutting-edge drone for nuclear safety inspections. Equipped with CV object detection (YoloV5), the drone can read critical data from radiated zones, while its visual SLAM enables accurate localization, RRT* allows for obstacle-free path planning and precise way-point motion planning for navigation through these zones.
  Supervisor: Professor Jonathan Kelly.

2021 Jul - 2021 Sept

Machine Learning Undergraduate Researcher (Paper) — UofT

- Developed an entropy-based metric to quantify model-dataset complexity for computer vision models and applied it to track CO_2 emissions from the CV community using Python, TensorFlow, OpenCV, and Numpy.
  Supervisor: Professor Mahdi S. Hosseini.

Technical Skills

Programming Languages: Python, C/C++, , C#, SQL, LaTeX
Software: ROS, Docker, Django, OpenCV, Tensorflow, Pytorch, Git, Linux, Android

Projects

2020 **Team Lead**(Video) APS360

- Developed CNN-based model using Python, TensorFlow, and OpenCV to classify musical notes from spectrogram images with 90% accuracy. Tasks included dataset preparation, model development, and real-time application implementation. Utilized data augmentation, regularization, and hyperparameter optimization for improved performance

Awards

2020 **Best Unconnected Hack**(Website) MakeUofT

- Designed and created an innovative autonomous flower pot that uses computer vision and environmental sensors to track and move toward optimal sunlight and water location

2018 **Winner**(Video) TOHacks

- Programmed an android app using IBM Watson API to deliver a satisfying user experience for connecting top applicants with top companies