Newcastle, NSW

Austin Bagnall

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I am a machine learning engineer and I primarily work on AI systems or improving algorithms, but also have the capability to comfortably work as a full-stack developer.

Work Experience

Machine Learning Engineer — **Orica Digital Solutions** — **Dec 2024–Present**
'Measurements & Domain' Team — Newcastle, NSW

- Built a synthetic data generation pipeline end-to-end that takes synthetic stereoscopic images that are passed through a masking algorithm before being used downstream to help train computer vision models.
- Reverse engineered SOTA computer vision post-processing tool, Slicing-Aided Hyper Inferencing (SAHI) to use in rock fragmentation detection.
- Implemented a lightweight synthetic LiDAR system suitable for .blend files, the purpose of this tool was to aid in a feature matching computer vision model.

NUBots — **NUBots / University of Newcastle** — **Aug 2025–Present**
Outreach + Vision Teams — Newcastle, NSW

- Helped lead several demonstrations for both domestic and international schools and universities (UNSW + Guizhou University, as well as a demonstration for the AROSE event at Newcastle Museum).
- Re-working the previous segmentation+semantic vision detection model.

Education and Certifications

- **H. Software Engineering,** University of Newcastle, Newcastle — **TBD**
- **B. Software Engineering,** University of Newcastle, Newcastle. — **2024–Present**

Technologies and Languages

- Languages: Python, Java, C++, GDScript, Kotlin
- Technologies: OpenCV, TensorFlow, Docker, Gymnasium, SprintBoot, Blender, Godot, Unity

Projects

- **'MarioCV' -** Using the 'gym-super-mario-bros' extension of Gymnasium I built an epsilon greedy RL policy that received information from a vectorised sprite detection system.

  This was a massive improvement over previous RL policies that relied only on raw global coordinate data and how that may be affected by the action space. This also led to issues where the MarioAgent would get stuck between pipes or would wait out the timer, as this was the 'safest' thing to do in order to gain 'passive positive reinforcement'.

  Crucially, the sprite detection with a vector based analysis eliminated both of these issues by understanding the spatial relationship between the Agent and 'points of interest' in the observation space.

- **'GPSTracker' -** A geofencing tracker combining real-time location monitoring using a highly sensitive tilt sensor for danger zone prediction and a smart notification system that would first attempt to use WiFi before defaulting to using an embedded SIM card as a notification deployment system. This project was demonstrated at Orica's Hackathon #3 and placed 4th out of 9 teams.

- **‘Game Development’ -** I enjoy implementing AI systems and considering non-linear level design philosophies.

  On AI systems, I have implemented Hierarchical Finite State Machines, to Behavioural Trees, and even a rudimentary implementation of Goal-Oriented Action Planning; a novel approach to recursively tokenise a phrase to elicit a series of ‘goals’ to form a ‘plan’. Ideally, several sub-goals form a goal, with emergent responsiveness to external factors being the key benefit compared to the previously mentioned AI systems.

  I’ve also implemented 2D level generation in the form of a ‘drunk’ walker algorithm; where first a starting room is placed, with additional rooms being placed in valid locations, ascertained each time a subsequent room is added until the ``number_of_rooms_remaining`` or ``number_of_valid_room_locations_remaining`` return 0.

  WIth this procedural level generation in mind, my approach to all level design comes from a ‘non-linear’ perspective with the intention of rewarding player exploration and other intrinsically motivated processes.

Interests

- I am an avid cinephile and love watching movies. I particularly like comedies, and action/adventures. I have so many in the back catalogue but will never say no to adding more to the list!
- I enjoy listening to music, there’s not many genres I don’t listen to and love adding new songs to my playlists.
- I love food. I will find something to love in every cuisine and really enjoy cooking for others.
- I’ve recently got into painting minis, specifically for D&D
- I really enjoy playing table top games like D&D or Werewolf, but also card games like Exploding Kittens or Uno.