Brett Pennington

Engineering Leader – Robotics & AI

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EXPERIENCE

Sr Manager, Safe AI | *Cruise* | San Francisco, CA | 1/25 - Current

- Built a foundation model for human-likeness metrics for open loop trajectory evaluation.
- Prototyped a novel inference mechanism for trajectory diffusion that provides stronger faster sampling with stronger guarantees.
- Established and led the Safe AI team which is responsible for online safety case assurance and long-tail data & eval strategies.
- Cultivated AI best practices with Cruise learnings and published standards such as ISO 8800.

Senior Staff Research Scientist | *Cruise* | San Francisco, CA | 6/23 - 12/24

- Led end-to-end re-architecture of L4 stack for better intersection performance.
- Designed the solution above as machine learning with guardrails to provide guarantees while maintaining state of the art humanlike planning.
- Reduced optimizer solve times by 40% with data-driven feedback on feasibility and convergence.
- Drove simulation based test design, systems metrics, and results analysis to reduce flaky testing, pinpoint failure modes, and highlight improvements.
- Landed an overhaul of planner sequencing to reduce AV stack latency by 90ms p95.

Manager, Planning and Prediction | *Rivian* | Palo Alto, CA | 1/21-6/23

- Grew, supervised, and supported a team of up to 11 engineers; ranging from junior to senior staff engineers.
- Architected prediction, planning, and trajectory optimization for L3 autonomy.
- Introduced reinforcement learning (RL) for improved behavior planning in complex traffic scenarios.
- Led team responsible for writing a planning stack for next generation features, finishing the prototype one year ahead of schedule and later shipping to production.
- Co-lead the safety critical design of the ADAS application logic for L3+ autonomy.
- Designed and wrote a C++, real-time framework for extending application logic to improve development time and reduce bugs.
- Collaborated across 13,000 person organization to reduce duplicate work, define team objectives and identify opportunities for future.

Staff Engineer, Planning | *Rivian* | Palo Alto, CA | 7/20 -1/21

- Wrote an offline, non-convex solver for optimal paths on off-road terrain in python.
- Designed a path toolbox to store the optimal paths and load them in a dense, space-efficient representation in Matlab, Python, and C.
- Introduced TDD and modular software practices.
- Implemented online algorithms in C for fast multi-dimensional KNN lookups.

Member, Working Group on AV Decision Making | *IEEE SA* | 10/20-6/23

- Reviewed for the 2846 white paper “Literature Review on Kinematic Properties of Road Users for Use on Safety-Related Models for Automated Driving Systems”.
- Contributed to 3321 “Recommended Practice for the Application of Assumptions on Reasonably Foreseeable Behavior of Other Road Users”.

Controls Engineer | *Boston Dynamics* | Waltham, MA | 7/18 - 6/20

- Applied optimal control techniques for multi-objective and multi-bodied systems.
- Implemented MPC/Planning for linear/non-linear systems.
- Developed proprioceptive sensing algorithms for workspace compliance and improved balancing of floating base robots.
- Introduced TDD and modular software practices for robotic systems.
- Designed a planner for de-palletizing with Handle and Stretch.

Lead, Robotics | *Automata Tech* | London, UK | 4/17 - 7/18

- Built custom kinematics, controls & motion planning libraries in C and modern C++.
- Designed collision detection systems in embedded MISRA compliant C with low bandwidth constraints.
- Introduced Agile practices: Grew a team from 5 individuals into 3 cross-functional teams with 15 members in 9 months.

Software Engineer | *Cubic Transportation Systems* | London, UK | 4/16 - 4/17

- Maintained code running the London Transit (Oyster Card) environment along other global metropolitan transit systems (SF Clipper, new NYC Metrocard, Sydney Opal).
- Correlated high-speed, time-sensitive data streams in critical systems handling payments for +6 million users daily in less than 0.3 seconds each.
- Delivered client-focused results quickly while adhering to sound development practices and refactoring a large and historic database along the way.

Research Engineer | *CAVT University of Alabama* | Tuscaloosa, AL | 1/11 - 12/15

- Designed and synchronized embedded systems to enhance our testing ecosystem
- Programmed and modeled safety-critical high performance systems
- Built adaptive and dependable systems in critical testing environments
- Researched diesel engine controls to advance sustainability and performance

EDUCATION

Ph.D. Mechanical Engineering, University of Alabama | 1/11 - 12/15

Advanced Controls Systems, Optimal Control, and Computational Analysis

B.S. Mechanical Engineering, University of Alabama | 8/06 - 12/10

Thermodynamics, Physics, and Mechanical Systems