Matthew Westbrook

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EXPERIENCE

Software Engineer - Behavior and Motion Planning June 2021 - Present
Virgin Hyperloop

- Software engineer developing a new mode of autonomous transit.
- Work in machine intelligence and analytics team to develop command and control software.
- Created motion planning and behavior algorithms for the autonomous pod operation.

Production Engineer May 2018 - June 2021
Beswick Engineering

- Production software engineer for miniature pneumatics company.
- Automated test stand for quality control processes.
- Developed deep learning validation for manufactured parts.
- Integrate APIs into ERP software to automate order validation, sales order creation, packing/shipping, and invoicing.

Healthcare Specialist (Medic) June 2012 - June 2020
Army National Guard

- Provided medical support for infantry unit.
- Gained leadership skills and experience working under stress and time constraints.

Engineering Intern May 2017 - August 2017
General Electric Aviation

- Program robotic manipulators to automate manufacturing processes.
- Mentored opportunity to learn the business and operations aspect of an engineering company.

PUBLICATIONS

Matthew Westbrook and Wheeler Ruml, "Anytime Kinodynamic Motion Planning using Region-Guided Search," *Proceedings of the IEEE/RSJ Conference on Intelligent Robots and Systems (IROS)*, 2020.

EDUCATION

M.S. Mechanical Engineering 2018 - 2020
University of New Hampshire (GPA 3.83/4.00)
Thesis on shared control for mobile robot obstacle avoidance.

B.S. Mechanical Engineering 2014 - 2018
University of New Hampshire (GPA 3.23/4.00)

RELEVANT COURSES

Engineering Computing
Planning for Robots
Introduction to Artificial Intelligence
Algorithms
Introduction to Mobile Robots
Non-linear Controls
Robust and Optimal Controls
Advanced Controls I/II
Differential Equations
Multi-Dimensional Calculus
Experimental Systems and Analysis

TECHNOLOGY SKILLS

Programming: C, C++, Python,
VB, SQL, Matlab

Artificial Intelligence: Heuristic graph search (A*, D*, lattice, beam, etc.),
Sampling based planning (RRT, BIT*, etc.),
Real-time planning, Any-time planning, Trajectory optimization,
Reinforcement learning, Deep learning.

Robotics: ROS, Gazebo, Computer vision,
Raspberry Pi, Micro-controllers, Matlab/Simulink,
Quad-rotors, Non-holonomic systems, Manipulators,
Probabilistic robotics, Filtering, SLAM,
Robust and optimal systems, Non-linear systems.

Web : HTML, CSS, XML,
Javascript, React, Django

Other : Unreal Engine, Solidworks, Blender,
LabView, Tensorflow

PROJECTS

UNH Lunacats: Graduate Advisor, Former Team Lead 2017 - 2020
Design and build robot for NASA Robotic Mining Competition (RMC).

- Electro-mechanical design for robot operating in a harsh environment.
- SLAM with LiDAR and visual recognition.
- Awarded best systems engineering paper in 2019.

Mechatronics Lab Research 2018 - 2020
Research on control for mobile robot swarms.

- Particle swarm algorithms for robot coordination.
- Controllers for complex dynamic systems with disturbance and saturation.
- Theory and implementation intensive.

Intro. to AI: Final Project 2018
Mixed elements of BIT* and RRT^x for efficient real-time planning algorithm that converges to optimal.

- Improved performance from RRT^x.
- Can react to dynamic obstacles.