Zetian **Zhang**

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Education

Ph.D. in Aerospace Engineering
Dec. 2017

Worcester Polytechnic Institute (WPI) — *Worcester, MA, USA*

GPA: 3.93/4.0 **Research Focus:** Intelligent Motion Planning **Advisor:** Prof. Raghvendra V. Cowlagi

Master of Science. in Mechanical Engineering
May 2013

Worcester Polytechnic Institute (WPI) — *Worcester, MA, USA*

GPA: 4/4.0 **Research Focus:** Computational Fluid Dynamics **Advisor:** Prof. Nikolaos A. Gatsonis

Bachelor of Science in Energy and Thermal Engineering
Jun. 2011

University of Shanghai for Science and Technology — *Shanghai, China*

GPA: 3.41/4.0

Bachelor of Science in Computer Science
Jun. 2011

University of Shanghai for Science and Technology — *Shanghai, China*

GPA: 3.14/4.0

Research & Projects

Hierarchical Motion Planning for UAVs
2015 - Present

Develop a technique for UAVs route guidance to fulfill a task — *WPI*

- Plan a task for UAVs instead of point to point path search, e.g. ”perform persistent surveillance in region A until a target is found, then visit region B, never fly in region C, and finally return to base”
- Incorporates kinematic/dynamic contraints, use Dubins’ car model in simulation
- Apply A* like algorithm search in discretized system
- Extend to multiple vehicles case
- Extend to dynamic environment case, e.g. there are moving obstacles/regions of interest in environment
- Prototype the algorithm with MATLAB, re-implement with C++

Sampling-based Algorithm for Path Planning
Nov. 2016 - Present

Developed a incremental sampling based motion planning algorithm for UAVs to fulfill a task — *WPI*

- Plan a task for UAVs instead of point to point path search
- Inspired from rapidly-exploring random tree algorithm, the solution converges to optimal
- Extend to multiple vehicles case

Path Repair Algorithm for Motion Planning
Nov. 2014 - 2015

Develop a incremental path planning algorithm — *WPI*

- Developed an incremental path planning algorithm with dynamical feasibility guarantees for vehicles
- The algorithm returns a feasible solution at intermediate iterations and coverge to an optimal solution
- Replanning with environment changes

Object Detection
Aug. 2014 - Dec. 2014

Develop an algorithm to recognize certian items — *WPI*

- Combined algorithm including feature matching, color detection, edge detection and noise reduction algorithm to detect an object in real time
- Experimented with several local feature detection algorithms such as SIFT, SURF

Publications

- **Zetian Zhang**, Raghvendra V. Cowlagi. A Fast Sampling-based Optimal Route-Planning Algorithm to Satisfy Linear Temporal Logic Specifications. *Guidance, Navigation, and Control Conference, 2018*
- Jie Fang, **Zetian Zhang**, Raghvendra V. Cowlagi. Decentralized Route-Planning to Satisfy Global Linear Temporal Logic Specifications on Multiple Aircraft. *Guidance, Navigation, and Control Conference, 2018*
- Raghvendra V. Cowlagi, **Zetian Zhang**. Route Guidance for Satisfying Temporal Logic Specifications on Aircraft Motion. *Journal of Guidance, Control, and Dynamics, 2016*
- **Zetian Zhang**, Raghvendra V. Cowlagi. Motion-planning with Global Temporal Logic Specifications for Multiple Nonholonomic Robotic Vehicles. *American Control Conference (ACC), 2016*
- Raghvendra V. Cowlagi, **Zetian Zhang**. Motion-planning with Temporal Logic Specifications for a Nonholonomic Vehicle Kinematic Model *American Control Conference (ACC), 2016*
- **Zetian Zhang**, Raghvendra V. Cowlagi. Incremental Path Repair in Hierarchical Motion-Planning with Dynamical Feasibility Guarantees for Mobile Robotic Vehicles *Control Conference (ECC), 2015 European.*

Experience

Academia

Teaching Assistant
2013 - 2014

Worcester Polytechnic Institute — *Worcester, MA*

- Assisted courses including Statics, Control Theory, Optimal Control, Dynamics, etc.

Worcester Polytechnic Institute
2014 - Present

Research Assistant — *Worcester, MA*

- Advised by Prof. Raghvendra V. Cowlagi
- Research focus on motion planning and control for autonomous vehicles
- Integrated of algorithms from artificial intelligence and optimal control theory

Worcester Polytechnic Institute
2012 - 2013

Research Assistant — *Worcester, MA*

- Advised by Prof. Nikolaos A. Gatsonis
- Research focus on computational fluids dynamics
- Applied direct simulation Monte Carlo method to solve the Boltzmann equation

Internship

CoolChip Technologies Inc.
2014

Research Intern — *Boston, MA*

- Mentored by Dr. Lino Gonzalez
- Participated in the design and test of a cooling system for CPU of Xbox

Shanghai Steam Turbine Factory
2011

Intern — *Shanghai, China*

- Participated in the turbine blade design

Skills

Programming Languages MATLAB, C/C++, Python
Software & Frameworks Linux, OpenCV, V-REP, ROS, Pytorch, SolidWorks