

# Zetian Zhang

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## Education

### Ph.D. in Aerospace Engineering

WORCESTER POLYTECHNIC INSTITUTE (WPI)

GPA: 3.93/4.0 **Research Focus:** Intelligent Motion Planning

Sept. 2013 - Present

Worcester, MA, USA

### M.S. in Mechanical Engineering

WORCESTER POLYTECHNIC INSTITUTE (WPI)

GPA: 4/4.0 **Research Focus:** Computational Fluid Dynamics

Aug. 2011 - May 2013

Worcester, MA, USA

### B.S. in Energy and Thermal Engineering

UNIVERSITY OF SHANGHAI FOR SCIENCE AND TECHNOLOGY

GPA: 3.41/4.0

Sept. 2007 - Jun. 2011

Shanghai, China

### B.S. in Computer Science

UNIVERSITY OF SHANGHAI FOR SCIENCE AND TECHNOLOGY

GPA: 3.14/4.0

Sept. 2007 - Jun. 2011

Shanghai, China

## Research & Projects

### Hierarchical Motion Planning for UAVs

DEVELOP A TECHNIQUE FOR UAVS ROUTE GUIDANCE TO FULFILL A TASK

2015 - Present

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 constraints, 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 Motion Planning

DEVELOP A INCREMENTAL SAMPLING BASED MOTION PLANNING ALGORITHM FOR UAVS TO FULFILL A TASK

Nov. 2016 - Present

WPI

- Plan a task for UAVs instead of point to point path search
- Inspired from RRT\*, the solution converges to optimal

### Path Repair Algorithm for Motion Planning

DEVELOP A INCREMENTAL PATH PLANNING ALGORITHM

Nov. 2014 - 2015

WPI

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

### Object Detection

DEVELOP AN ALGORITHM TO RECOGNIZE CERTIAN ITEMS

Aug. 2014 - Dec. 2014

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

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- 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

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### ACADEMIA

2014 - **Research Assistant**, Worcester Polytechnic Institute *Worcester, MA*  
2013-2014 **Teaching Assistant**, Worcester Polytechnic Institute *Worcester, MA*

### INTERNSHIP

2013 **Intern**, CoolChip Technologies Inc. *Boston, MA*  
2011 **Intern**, Shanghai Steam Turbine Factory *Shanghai, China*

## Skills

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**Programming Languages** MATLAB, C/C++, Python  
**Software & Frameworks** Linux, OpenCV, V-REP, OMPL