

ZHENHUA YU

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Education

Imperial College London (PhD in Robotics)

2019.02 – Now

Supervisor: Prof. Thrishantha Nanayakkara (Head of Morph Lab)

London, UK

Prof. Peter Childs (Fellow of the Royal Academy of Engineering, Head of the Dyson School of Design Engineering)

Thesis title: Tapered Whisker Reservoir Computing System for Mobile Robot Environment Perception

Harbin Institute of Technology (MSc in Aerospace Engineering)

2016.09 – 2018.07

Supervisor: Prof. Shunli Li and Prof. Pini Gurfil

Harbin, China

Thesis title: Sampling-Based Pose Motion Planning for Spacecraft Autonomous Close Proximity

Nanjing University of Science and Technology (BSc in Optoelectronic Information Engineering)

2012.09-2016.06

Supervisor: Prof. Hua Shen

Nanjing, China

Thesis title: The Research of Digital Image Processing System Based on High-speed DSP DM6446

Technical University of Munich (Visiting PhD student)

2021.10

Bachelor of Science in Computer Science

Munich, Germany

Full Scholarship TUM Global Incentive Fund

Airbus and University of Toulouse(Visiting PhD student)

2019.06-2019.07

Full Scholarship provided by Airbus and French Ministry of Education

Toulouse, France

Israel Institute of Technology (Exchange Mater student)

2018.06- 2018.08

Supervisor: Prof. Pini Gurfil

Haifa, Israel

Full Scholarship provided by the The Council for Higher Education in Israel

Research Interests

- Robotics; Reservoir Computation; Whisker Sensor Design;
- Tactile/Vision fusion; Environment Perception; Morphological Computation

Scholarships & Awards

Scholarships

- Imperial-James Dyson Foundation PhD Scholarship - 2019 £75000
- Hong Kong Outstanding Youth PEIXIN Scholarship - 2019 \$75000
- Airbus Scholarship and French Ministry of Education Scholarship - 2019 €3500
- The Council for Higher Education in Israel Scholarship - 2018 \$4500
- Technical University of Munich Global Incentive Fund - 2021 €1000

Publications

Journal Papers

- **Zhenhua Yu**, Sadati, S. H., Helmut Hauser, Peter Childs, Thrishantha Nanayakkara. “A Semi-Supervised Reservoir Computing System Based on Tapered Whisker for Mobile Robot Terrain Identification and Roughness Estimation”. in IEEE Robotics and Automation Letters (RA-L), 2022.
- **Zhenhua Yu.**, S. Perera, H. Hauser, P. R. N. Childs and T. Nanayakkara. “A Tapered Whisker-Based Physical Reservoir Computing System for Mobile Robot Terrain Identification in Unstructured Environments,” in IEEE Robotics and Automation Letters (RA-L), vol. 7, no. 2, pp. 3608-3615, April 2022.
- Suo, M., Zhu, B., An, R., Sun, H., Xu, S., **Zhenhua Yu.** “Data-driven fault diagnosis of satellite power system using fuzzy Bayes risk and SVM”. aerospace science and technology, 84, 1092-1105, 2019
- Zhou, D., **Zhenhua Yu.**, Zhang, Y, Li, S. “Translational and rotational motion planning for spacecraft close proximity using sampling-based methods”. Proceedings of the Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering, 233(10), 3680-3699, 2019
- Chen, Y., He, Z., Zhou, D., **Zhenhua Yu**, Li, S. “Integrated guidance and control for microsatellite real-time automated proximity operations”. Acta Astronautica, 148, 175-185. 2018.

Conference Papers

- **Zhenhua Yu**, Shehara Perera, Helmut Hauser, Peter Childs, Thrishantha Nanayakkara . “A Tapered Whisker-Based Physical Reservoir Computing System for Mobile Robot Terrain Identification in Unstructured Environments”. IEEE International Conference on Robotics and Automation (ICRA 2022).

- **Zhenhua Yu.**, Sadati, S. H., H. Hauser, Childs, P., Nanayakkara, T. “A Semi-Supervised Reservoir Computing System Based on Tapered Whisker for Mobile Robot Terrain Identification and Roughness Estimation ”. In 2022 IEEE 5th International Conference on Soft Robotics (RoboSoft 2022). IEEE. April,2022.
- **Zhenhua Yu.**, Sadati, S. H., Wegiriya, H., Childs, P., Nanayakkara, T. “A Method to use Nonlinear Dynamics in a Whisker Sensor for Terrain Identification by Mobile Robots”. In 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2021) (pp. 8437-8443). IEEE. August,2021.
- Zhou, D., **Zhenhua Yu.**, Zhang, Y., Li, S. “Rapidly Sampling-Based Trajectory Planning for Spacecraft Proximity”. In 2018 9th International Conference on Mechanical and Aerospace Engineering (ICMAE) (pp. 116-120). IEEE. July,2018.
- Zhu, B., Zhang, Z., Suo, M., **Zhenhua Yu.**, Li, S. “Sampled-data H control for attitude stabilization and vibration suppression of flexible spacecrafts”. In 2017 36th Chinese Control Conference (CCC) (pp. 6376-6381). IEEE. July,2017.

Projects

Whiskered Tactile/Vision Syncretic Based Robots Environment Perception	2019.03 - Now
<i>Morph Lab, Dyson School Design Engineering, Imperial College London</i>	<i>London, UK</i>

- This work was partly supported by EU Horizon 2020 research and innovation programme under grant agreements 101016970 (Natural Intelligence for Robotic Monitoring of Habitats),
- This work was also partly supported by the EPSRC MOTION under Grant EP/N03211X/2, Grant EP/N029003/1, and Grant EP/N03208X/1.
- This work was also partly supported UK Engineering and Physical Sciences Research Council (EPSRC) RoboPatient project under Grant EP/T00603X/1.

Dynamics Modeling and Motion Control for Autonomous Space Robots	2016.11 - 2018.06
<i>Space In-orbit Service Laboratory, Harbin Institute of Technology</i>	<i>Harbin, China</i>

- Research Program for China Aerospace Science and Technology Corporation.

Dynamics Modeling and Motion Control for Autonomous Space Robots	2016.07 - 2017.09
<i>Space In-orbit Service Laboratory, Harbin Institute of Technology</i>	<i>Harbin, China</i>

- Research Program for China Aerospace Science and Technology Corporation.

Review Service - Research Papers

IEEE Robotics and Automation Letters (RA-L)

IEEE International Conference on Robotics and Automation (ICRA 2022)

IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2021, 2022)

Teaching Experience

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|------------------------------------------------|-------------------------|
| • DESE50004 - Gizmo: Physical Computing Design | Spring Term 2021 - 2022 |
| • DESE50003 - Gizmo: Physical Computing | Autumn Term 2021 - 2022 |
| • DESE60007/96014 - Mars Settlement Design | Spring Term 2020 - 2021 |