WENBIN XU

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EDUCATION

Shanghai Jiao Tong University **Shanghai, China**

- Undergraduate, Dept. of Mechanical Engineering *Sep. 2015 – Jul. 2019 Expected*
- Major in Mechanical Engineering (**Honor Class**), Minor in Computer & Application
- **GPA** – Overall: **3.86/4.00** (91.33/100), Major: **3.86/4.00** (91.66/100), Ranking: **1/59**
- **Standard Tests** – TOEFL: 104 (R28+L24+S23+W29), GRE: 324 (V154+Q170+AW4.0)

PUBLICATIONS

[1] **W. B. Xu**, X. D. Li, W. D. Xu, L. Gong*, *et al*., "Human-robot Interaction Oriented Human-in-the-loop Real-time Motion Imitation on a Humanoid Tri-Co Robot," *3rd International Conference on Advanced Robotics and Mechatronics (ICARM)*, NUS, Singapore, 2018. **To Appear**

[2] **W. B. Xu**, X. D. Li, L. Gong*, Y. X. Huang, *et al*., "Natural Teaching for Humanoid Robot via Human-in-the-loop Scene-motion Cross-modal Perception," *Industrial Robot.* **Under Review**

[3] **W. B. Xu**, C. J. Liu, C. Q. Zhou, Z. Y. Zhou, H. Mao*, "Scalable Production of Nitrogen-doped Carbons by Pyrolysis of Biomass-derived Carbons in NH_3 Gas," *22nd International Symposium on Analytical and Applied Pyrolysis*, Kyoto, Japan, 2018. **Conference Abstract**

[4] C. Q. Zhou, C. J. Liu, **W. B. Xu**, X. M. Chen, Z. Y. Zhou, H. Mao*, F. Qi, "N-doped Carbon-Silica Composite Confined Pd Nanoparticles for Abatement of Methane Emission from Automobiles," *Topics in Catalysis.* **Under Review**

[5] L. Gong*, X. D. Li, **W. B. Xu**, B. H. Chen, Z. L. Zhao, Y. X. Huang, C. L. Liu, "Naturally teaching a Humanoid Tri-Co Robot in a Real-time Scenario from First Person View, " *Science China - Information Sciences.* **Under Review**

HONORS & AWARDS

- China National Scholarship (**Top 1%**) *2016, 2017, 2018*
- Outstanding Student in School of Mechanical Engineering (**Top 10%**) *2016, 2017*
- Three Good Student of Shanghai Jiao Tong University (**Top 10%**) *Oct. 2016*
- Robomaster 2017, First Prize in Eastern Division (**3/29**) *Jun. 2017*
- Excellent Student Cadre of Shanghai Jiao Tong University (**Top 2%**) *Oct. 2017*
- Tang Lixin Scholarship (**2/422**) *Dec. 2017*

RESEARCH EXPERIENCE

Preparation of Catalysts for Lignocellulosic Biomass Conversion *Jan. 2018 – Present*

Advisor: Assistant Professor Ma Hao, SJTU Combustion and Energy Research Group

- Synthesized Oxygen-rich Carbons (OCs) by hydrothermal treatment of various glucose aqueous solutions.
- Introduced metal ions to OCs by dry impregnation to shift XPS peak from pyridinic-N to pyrrolic-N.
- Treated OCs with NH_3 at lower temperatures than extant methods to prepare 8 wt% N-doped Carbons (NCs).
- Characterized NCs with TGA, BET, SEM and TEM and catalyzed the hydrolysis of biomass to generate glucose.
- Improved catalytic performance with macromolecules by altering the morphology and increasing mesoporosity.

Humanoid Robot 3D Prototyping and Ultra-numerous DOF Control *Oct. 2016 – Jun. 2018*

Advisor: Associate Professor Liang Gong, Institute of Mechatronics, SJTU

- Assembled a life-size humanoid robot with 29 DOFs through 3D printing with modified open-sourced STL files.
- Performed inverse kinematics for given gestures and transferred trajectory arrays to controller through protocols.
- Created URDF files to visualize computed motions on a humanoid model in RVIZ through ROS.
- Developed a real-time mapping algorithm to convert euler angles of human motions into robot joint angles.
- Projected live video from a camera onto VR glasses and captured eye-body-synergic human motion through a set of wearable IMUs to realize real-time imitation of upper limber's motion on a humanoid robot.

Flight Control System Based on Sensors and CPU in Smartphone *Oct. 2015 – Oct. 2016*

Advisor: Assistant Professor Junqi Wu, School of Aeronautics and Astronautics, SJTU

- Developed self-balancing algorithm of single-rotor based on PID and extended it to quadrotor platform.
- Simulated quadrotor motion in Gazebo and AirSim using modified source code PX4 and an offboard API.
- Enabled Raspberry Pi to communicate with Pixhawk through Mavros to control rotor's attitude & position.
- Realized the automatic following on a quadrotor according to GPS obtained from manipulator's smartphone.

SELECTED PROJECT

Trajectory Planning and Control of a Rotorcraft | Project Leader *Mar. 2018 – Jun. 2018*

Advisor: Associate Professor Ye Ding, Robotics Institute, SJTU

- Generated optimal spatial trajectories based on non-uniform B-Spline method with minimum flight time objective.
- Derived intermediate attitudes according to quaternions at given points through spherical interpolation methods.
- Formulated dynamic models of various rotors and designed geometric tracking and attitude tracking controllers.
- Simulated whole system in Matlab and AirSim to achieve desired motion, i.e. flipping and crossing narrow frames.

Design and Simulation of a six-axis Industrial Arm | Project Leader *May. 2018 – Jun. 2018*

Advisor: Professor Zhenhua Xiong, Robotics Institute, SJTU

- Performed kinematic and dynamic simulation of ABB-IRB1600 in SOLIDWORKS and Adams.
- Assembled a 3D model with servo motors and reducers selected by simulation results and designed transmissions.

Arm Rehabilitation Exoskeleton | Project Leader *Sep. 2017 – Jan. 2018*

Advisor: Associate Professor Peter Shull, Robotics Institute, SJTU

- Designed a 5-DOF exoskeleton with 3 at shoulder, 1 at elbow and 1 at waist based on six-bar linkage mechanism.
- Performed corresponding motion on exoskeleton according to trajectory arrays computed by inverse kinematics.

Bionic Crab-like Robot | Project Leader *Mar. 2017 – Jun. 2017*

Advisor: Professor Peizhong Yang, Institute of Intelligent Manufacturing, SJTU

- Designed a bionic crab-like robot with numerous four bar linkages acting like legs driven by only one tiny motor.
- Adopted 3D printing and laser cutting techniques to manufacture and assemble a prototype.

Honorable Mention, 2017 Mathematical Contest in Modeling (Top 30%) | Team Leader *Feb. 2017*

- Led a team to optimize parameters of toll plaza with cellular automata algorithm to avoid traffic congestions.
- Responsible for research summary, mathematical modeling and data visualization with Matlab and python.

EXTRACURRICULAR ACTIVITIES

A+ Club (Consists of Top 1% of 1200 Students in School of ME) **President** *Mar. 2017 – May. 2018*

- Organized weekly one-to-one academic assistance aimed at fellow students with GPA lower than 2.0/4.3.
- Invited seniors and instructors to deliver lectures on different topics to share personal experiences.
- Summarized the contents of core courses into review materials, which have been downloaded over 3,000 times.

Student Association of Science & Technology in ME **Minister** *Jun. 2016 – Nov. 2017*

- Organized Freshman Competition of Innovative Mechanical Design and science & technology lectures.
- Cooperated with various high-tech enterprises, i.e. FANUC, to raise funds for competitions and activities.

Graduation Party of School of Mechanical Engineering **Volunteer** *2016, 2017*

- Assigned work for group members, prepared for necessities and received graduates and honored guests.

Shanghai International Marathon **Volunteer** *Oct. 2016*

- Provided water and soft drinks for marathoners at forty kilometers, inspired them and distributed supplies.

TECHNICAL SKILLS

Programming Languages – C/C++, Python, Java

Applications – Abaqus, Adams, AirSim, AutoCAD, CasaXPS, Labview, Matlab, ROS, Solidworks, Origin, UG

Characterization – BET, GPLC/HPLC, SEM, TEM, TGA, TOFMS, XPS