# WENBIN XU

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## EDUCATION

**Shanghai Jiao Tong University (SJTU)** *Shanghai, China*

- **B.S.** in Mechanical Engineering (**Honor Class**) *Sept. 2015 – June 2019 Expected*
- **GPA –** Overall: **91.26/100**, Major: **91.66/100**, Ranking: **1/59**
- **Standard Tests –** TOEFL: 104 (R28+L24+S23+W29), GRE: 324 (V154+Q170+AW4.0)

## PUBLICATIONS

[1] C. Q. Zhou, **W. B. Xu**, C. J. Liu, 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*. **Accepted**

[2] **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**

[3] **W. B. Xu**, X. D. Li, W. D. Xu, L. Gong*, Y. X. Huang, Z. L. Zhao, L. J. Zhao, B. H. Chen, H. Z. Yang, L. Cao, C. L. Liu, Natural Teaching for Humanoid Robot via Human-in-the-loop Scene-motion Cross-modal Perception, *Industrial Robot: An International Journal*. **Accepted**

[4] **W. B. Xu**, X. D. Li, L. Gong*, Y. X. Huang, Z. Y. Zheng, Z. L. Zhao, L. J. Zhao, B. H. Chen, H. Z. Yang, L. Cao, C. L. Liu, 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**

[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*. **Accepted**

## HONORS & AWARDS

- China National Scholarship (**Top 1%, Three Times,** 8,000 CNY Each Year) *2016, 2017, 2018*
- Tang Lixin Scholarship (**Top 2/422, Twice,** 10,000 CNY Each Year) *2017, 2018*
- Excellent Student Cadre of Shanghai Jiao Tong University (**Top 2%**) *Oct. 2017*
- First Prize of Robomaster 2017 Robotics Competition in Eastern Division (**Top 3/29**) *June 2017*
- Merit Student of Shanghai Jiao Tong University (**Top 10%**) *Oct. 2016*
- Outstanding Student in School of Mechanical Engineering (**Top 10%, Twice**) *2016, 2017*

## RESEARCH EXPERIENCES

**Synthesis and Catalytic Application of N-doped Carbons for Biomass Hydrolysis** *Jan. 2018 – Present*

***Advisor**: Dr. Hao Ma and Prof. Fei Qi, SJTU Combustion and Energy Research Group*

- Synthesized hydrothermally treated carbons (HTC) from aqueous glucose solution under various conditions.
- Introduced metal ions to HTC by dry impregnation to shift XPS peak from pyridinic-N to pyrrolic-N.
- Treated HTC with $NH_3$ at lower temperature than extant methods to prepare 8 wt% N-doped carbons (NCs).
- Characterized NCs with TGA, BET, TEM and catalyzed the hydrolysis of biomass to produce glucose.
- Adopted as-synthesized NCs as catalyst support for complete conversion of 5,000 ppm methane at 350 ℃.
- Decreased sizes of HTC to the nano scale through addition of buffer solution and organic compounds.
- Increased carbon mesoporosity by doping copper salts to generate oxygen radicals in methane oxidation.

**Humanoid Robot 3D Prototyping and Ultra-numerous DOF Control** *May 2016 – June 2018*

***Advisor**: Assoc. Prof. Liang Gong, Institute of Mechatronics*

- Assembled a life-size humanoid robot with 29 DOFs through 3D printing and modifications on STL files.
- Performed inverse kinematics for given gestures and sent 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.

## SELECTED PROJECTS

**Path Planning & Control of Rotorcraft | Leader** (95/100, Class 1st/24, Total 2nd/89) *Mar. – June 2018*
***Advisor**: Assoc. Prof. Ye Ding, Robotics Institute* ***Course**: Application of MATLAB in Engineering*

- Generated optimal spatial trajectories based on non-uniform B-Spline method with min 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 the system in Matlab and AirSim to reach desired motion, i.e. flipping and crossing narrow frames.

**Design & Simulation of Industrial Robot | Leader** (95/100, Class 1st/27, Total 1st/83) *May – June 2018*
***Advisor**: Prof. Zhenhua Xiong, Robotics Institute* ***Course**: Robotics*

- Performed kinematic and dynamic simulation of six-axis ABB-IRB1600 in Solidworks and Adams.
- Assembled 3D models with motors and reducers selected by simulation results and designed transmissions.

**Arm Rehabilitation Exoskeleton | Leader** (88/100, Class 4th/26) *Sept. 2017 – Jan. 2018*
***Advisor**: Assoc. Prof. Peter Shull, Robotics Institute* ***Course**: Design and Manufacture II*

- Designed 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 by parsing trajectory arrays computed by inverse kinematics.
- Developed a user-friendly graphical interface for motion visualization and sending commands.

**Bionic Crab-like Robot | Leader** (98/100, Class 1st/27, Total 1st/433) *Mar. – June 2017*
***Advisor**: Prof. Peizhong Yang, Manufacturing Institute* ***Course**: Design and Manufacture I*

- Designed bionic crab-like robot with 12 legs composed of multiple four-bar linkages driven by a tiny motor.
- Adopted 3D printing and laser cutting techniques to manufacture and assemble a prototype.

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

**Smartphone-based Flight Control System | Leader** (Rated A+, Top 18 out of 170) *Oct. 2015 – May 2016*
***Advisor**: Dr. Junqi Wu, School of Aeronautics* ***National Undergraduate Innovation Program***

- Assembled a single-rotor platform, a rotatable quadrotor platform and homemade UAVs by laser cutting.
- Developed a 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 and position.
- Realized the automatic following on a quadrotor according to GPS obtained from manipulator's smartphone.

## EXTRA-CURRICULAR ACTIVITIES

**A+ Club (Consists of Top 1% of 1200 Students in School of ME) | Chairman** *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 with 3,000+ downloads.

**Student Association of Science & Technology in ME | Minister** *June 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 team members, prepared for necessities and received 400+ graduates and honored guests.

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

- Provided soft drinks for 38,000 marathoners at 40 kilometers, inspired them and distributed supplies.

## SKILLS

**Characterization –** BET, GPLC/HPLC, SEM, TEM, TGA, TOFMS, XPS
**Facility –** Centrifuge, Fixed Bed Reactor, Glove Box, Muffle Furnaces, Rotary Evaporator, Vacuum Freeze Dryer
**Application –** Abaqus, Adams, AirSim, AutoCAD, CasaXPS, Labview, MATLAB, ROS, Solidworks, Origin, UG
**Programming Language –** C/C++, Python, Java, HTML