

Institute of Industrial & Product Engineering

The Institute of Industrial & Product Engineering was founded in 2026, formerly the Mechanical Engineering Teaching and Research Section. It integrates scientific research and teaching, and aims to advance the deepening and engineering application of fundamental theories and cutting-edge technologies while strengthening theoretical education for both undergraduate and graduate students.

The Institute currently comprises 20 faculty members, including 5 professors and 6 associate professors/research professor. It brings together a distinguished team of scholars and has built teaching teams for the National Quality Course in Engineering Drawing and the National Quality Resource Sharing Course. Meanwhile, the Institute undertakes a number of national-level research projects and has successfully carried out technology transfer and industrial application in collaboration with multiple well-known enterprises.

Teaching Programs:

At the undergraduate level, the Institute has long been responsible for delivering foundational mechanical engineering courses across the university, serving students from multiple schools, including Mechanical Engineering, Energy and Power Engineering, Chemical Engineering, and Human Settlements. The undergraduate curriculum offered by the Institute includes courses such as Fundamentals of Mechanical Design, Course Design in Mechanical Design, Intelligent Manufacturing Execution System Technologies, Manufacturing Execution System Technologies, Integrated Experiments in CAD/CAE/CAM/NC, Industrial Design and Practice, Mechanical Engineering Testing Technology, Numerical Control Technology, Modern Robotics Technology, Fundamentals of Mechanical Control Engineering, Fundamentals of Manufacturing Engineering (bilingual), Automotive Design and Manufacturing, Automotive Theory and Construction, Form Design, Industrial Sociology, and Product Design. These include the National Quality Course and National Quality Resource Sharing Course in Engineering Drawing, as well as the National Quality Course and National Quality Resource Sharing Course in Testing Technology of Mechanical Engineering. At the graduate level, the Institute has consistently offered a range of specialized courses, including Intelligent Computational Methods for Manufacturing Engineering, Finite Element Methods and CAE Software Applications, Theory and Technology of Monitoring and Diagnosis, Fundamentals of Modern Control Theory, Modeling, Simulation, and Similarity Principles, Automation Components in Mechatronic Engineering, Robot Control, Modern Control Engineering, Modern Control Engineering (taught entirely in English for international students), Robotics, and Control of Mechatronic Systems.

Teaching Achievements:

The Institute has authored and published more than 50 textbooks and monographs, over 20 of which have received various awards. It has undertaken and completed more than ten teaching reform and research projects. The Mechanical Drawing teaching team has been recognized multiple times as an outstanding teaching team at both the university and provincial levels. Under the guidance of the Institute's faculty, students have achieved remarkable results in competitions such as the National College Student Mechanical Innovation Design Competition, winning more than thirty national first and second prizes, as well as over eighty first and second prizes at the provincial level.

Research Fields:

The Institute encompasses five major research directions and distinctive strengths:

1) Networked Intelligent Manufacturing and Service Systems Engineering—This research direction focuses on equipment/robots, production lines, factories, and their associated supply chains. Leveraging hardware infrastructures

such as embedded Web systems and sensing networks, it integrates a variety of large and small artificial intelligence models and algorithms. Through the development of next-generation industrial intelligent software, it aims to achieve optimized operation, management, and control of manufacturing and service systems driven by the integration of software and hardware within an Industrial Internet environment. The team members include Professor Pingyu Jiang, Associate Research Professor Maolin Yang, Assistant Professor Qingzong Li, Lecturer/Post Doc. Makanda Inno, among others.

2) Lubrication Theory and Bearings — Focusing on military and civilian bearings and their rotor systems, this research area has advanced the design theories and software development for rolling and sliding bearings, rotor dynamics theories / methods and their applications in complex rotating machinery, multi-parameter online non-destructive testing technologies for bearings along with related product development, and comprehensive testing technologies for high-performance bearings. Corresponding analytical software, products, and experimental platforms have also been developed. The team members include Professor Heng Liu, Associate Professor Shemiao Qi, Associate Professor Yi Liu, among others.

3) Robotic Intelligent Control and Precision Laser Processing of Complex Components — In the area of robotic intelligent control, research is driven by the demands of industry and enterprises for automation and intelligent production. It focuses on addressing practical issues in system integration and technology development of robots in industrial applications, such as refueling robots, fruit-picking robots, and robotic grinding systems. The research primarily involves machine vision, intelligent control, and related technologies. In the area of precision laser processing of complex components, the focus is on laser machining of film cooling holes on complex blades used in aero-engines and gas turbines. Research topics include the machining characteristics of deep micro-holes with large aspect ratios and high geometric accuracy under thermal barrier coatings, as well as laser parameter regulation and process optimization. The team members include Associate Professor Xia Dong, Lecturer Nuogang Sun, among others.

4) Intelligent Computational Design and Optimization—This research area addresses fundamental challenges in product design. Building upon refined foundational theories of product design methodology, it integrates product shape generation, Kansei Engineering, multi-physics engineering analysis, and topology optimization with advanced artificial intelligence models and algorithms. The objective is to establish intelligent and optimized design methodologies and their key enabling technologies, as well as to develop corresponding intelligent design software that facilitates computer-supported interactive intelligent design. The team members include Professor Pingyu Jiang, Associate Research Professor Maolin Yang, and others.

5) Industrial Design and Human-Computer Interaction for Complex Equipment — This research focuses on complex equipment (e.g., industrial machine tools, heavy-duty vehicles) and their associated digital twin systems. Centered on "Cognitive Digital Twins" and industrial HCI, it integrates Kansei Engineering, multi-modal physiological sensing, and AIGC-driven "human-in-the-loop" algorithms. The objective is to establish ergonomically optimized and culturally resonant Product Identity (PI) methodologies and immersive UI/UX solutions. Furthermore, it aims to develop multi-modal cognitive testing platforms and interactive intelligent design software. Team members include Associate Professors Xiaoman Lin, Yu Zhang, Zengyao Yang, and Lecturer Meng Li.

Research Achievements:

The Institute has achieved significant accomplishments in scientific research. It has undertaken more than 120 research projects, including National Natural Science Foundation projects, "863 Program" projects, national key special programs, Doctoral Fund projects of the Ministry of Education, international collaborative projects, provincial-level research programs, and industry-sponsored projects. The Institute's faculty have published over 800 high-quality

research papers in leading domestic and international journals, and have applied for and been granted more than 70 invention patents and software copyrights. Numerous research outcomes have received awards at the national as well as provincial and ministerial levels.

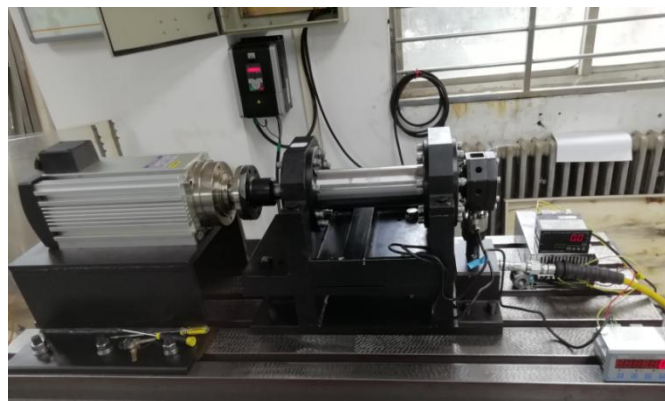
Laboratory Facilities and Equipment:



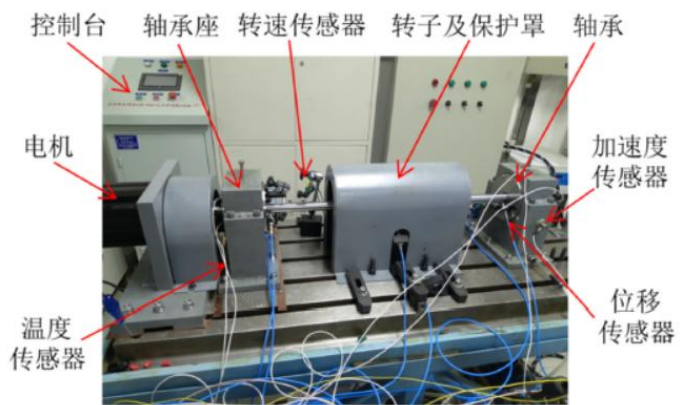
Comprehensive Test Platform for Performance Evaluation and Failure Validation of Sliding Bearings



China's First High-Speed Rolling Bearing Test Rig with DN Values Exceeding 3 Million



Experimental Platform for Ultrasonic Testing Technology of Rolling Bearings



Rotor-Bearing System Dynamics Test Rig



CMF Design Lab



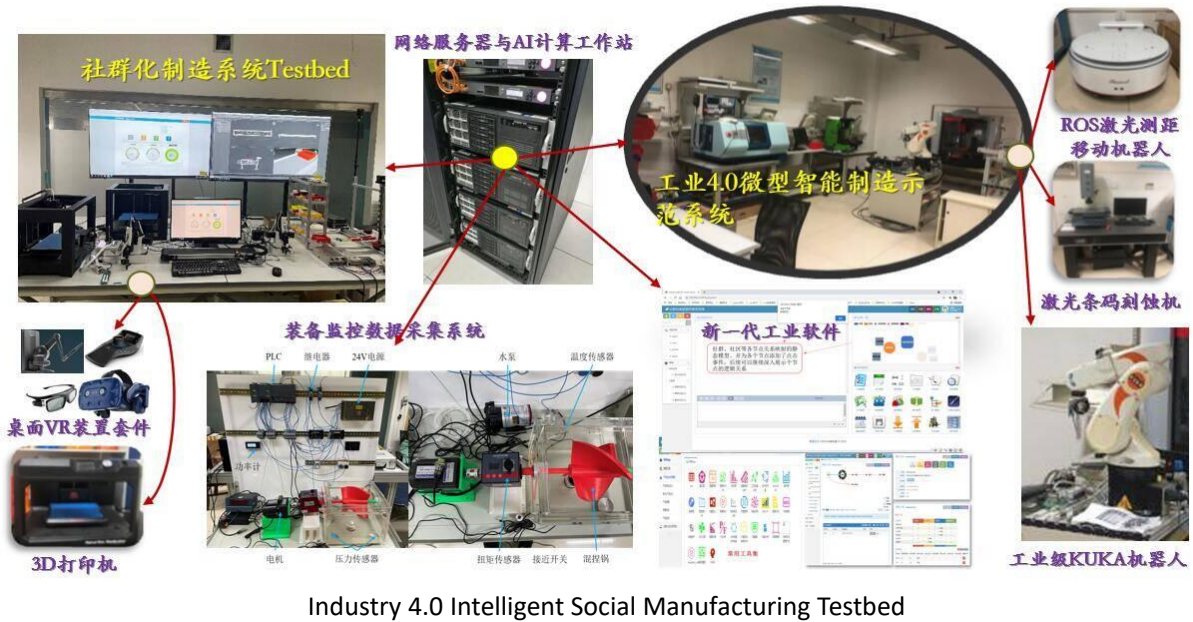
Virtual Reality Lab



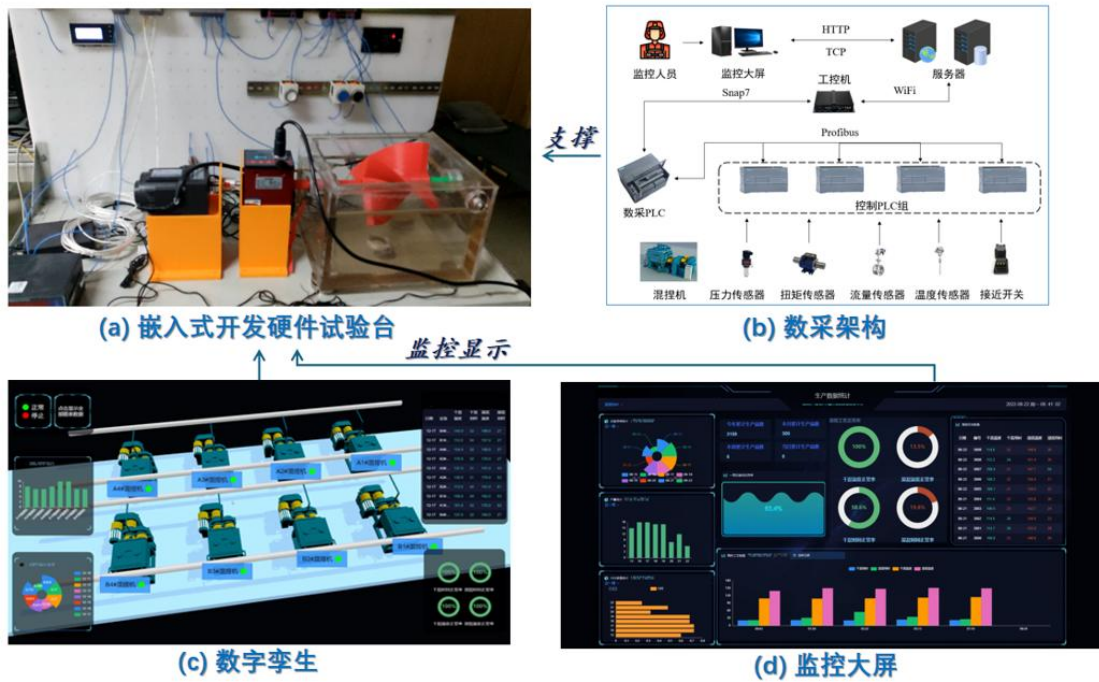
Serial and Parallel Harvesting Robots



Dual-Arm Apple Harvesting Robot



Industry 4.0 Intelligent Social Manufacturing Testbed



Embedded Web System and Digital Twin Testbed



High-Performance Deep Learning Computing Server/Workstation Cluster

International Collaboration and Exchange:

The Institute places strong emphasis on international collaboration and exchange in both teaching and research. It actively supports and sponsors graduate students to participate in domestic and international academic conferences, as well as overseas programs for pedagogical training and academic exchange. The Institute also regularly invites experts and

scholars from overseas universities and industry to visit and engage in academic activities.

Long-term academic collaboration and exchange have been established with institutions including Cardiff University and Brunel University in the United Kingdom; Ruhr University Bochum and Chemnitz University of Technology in Germany; the University of Calgary and the University of Alberta in Canada; the University of Vaasa in Finland; and Nanyang Technological University in Singapore.



Spring 2025: Doctoral Candidate Tianshuo Zang (Prof. Jiang' team) Visiting the University of Twente (Netherlands) for Academic Exchange and Participating in the CIRP International Conference on Manufacturing Systems.



Spring 2025: Doctoral Candidate Laiyi Li (Prof. Jiang' team) Visiting the University of Twente (Netherlands) for Academic Exchange and Participating in the CRIP International Conference on Manufacturing Systems.



April 2025: Master's students attending the EECR International Conference.



Post Doc./Lecturer Inno Utilizing VR Equipment for Teleoperation in a Digital Twin Factory.



Winter 2024: Professor Pingyu Jiang and Associate Research Professor Maolin Yang Visiting the University of Vaasa and Noswing Ltd. in Finland.



Winter 2023: Professor Yin Liu from Cardiff University, UK, visits Jiang and Yang.



Summer 2020: Maolin Yang Visits Coventry University, UK, Supported by the CSC (China Scholarship Council).



May 2007: Associate Professor Xia Dong conducting academic exchange at the National University of Singapore.



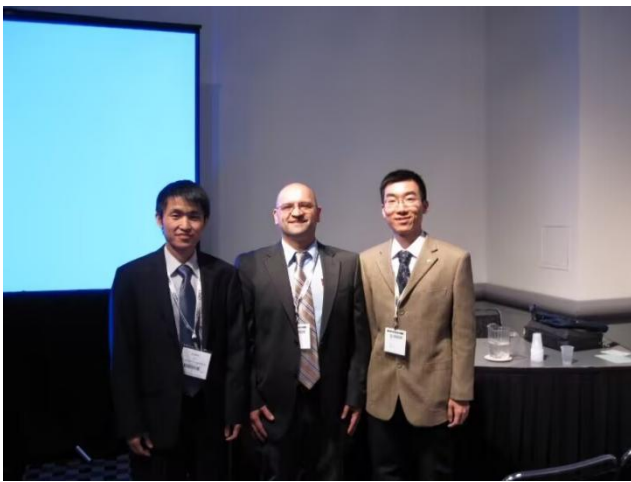
April 2025: Associate Professor Xia Dong delivering an invited talk at the EECR International Conference.



2024: Faculty delegation including Heng Liu, Shemiao Qi, and Yi Liu attending an international conference.



2012: Doctoral student Yi Liu presenting at the ASME International Conference.



2011–2012: Doctoral student Kaibo Lü conducting academic visit at Wilkes University, USA.



Organizing the thesis defense for international students.

Contact Us

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