

Bio of Zhendong Dai

Professor, director and founder of the Institute of Bio-inspired Structure and Surface Engineering (IBSS) at Nanjing University of Aeronautics and Astronautics (NUAA). Fellow of the International Society of Bionic Engineering and the Chinese representative, has received the Contribution Award. He obtained his bachelor's, master's, and doctoral degrees from the CMEE at NUAA in 1983, 1986, and 1999, respectively. He was invited as visiting scientist at the Max Planck Institute for Developmental Biology in Germany from 2000 to 2001, and visiting professor at the School of Life Sciences, University of California, Berkeley in 2019.

He won 2nd prize of Jiangsu Science and Technology Award in 2021, 2nd prize of Natural Science Award in 2018, 2nd prize of Invention Award in 2012, received the Government Special Allowance from the State Council in 2016. He has published six monographs and over 400 papers, which have been cited more than 5,000 times, with an H-index of 41. He founded Nanjing Bio-inspired Intelligent Technology Co., Ltd in 2012, dedicated to technology transfer and enterprise incubation.

Measuring 6D reaction forces in humanoid robot: From human locomotion dynamics to the performance of humanoid robot

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Abstract. All motions of any object result in the force acting on the object, measuring the force acting on the object is an important way to understand the motion, to improve robot's performance. We have developed six-dimensional force sensor and integrated it into different arrays such as floor, stair and slope respectively. We measured the reaction force when human and humanoid robot walking on those substrates. The results show clearly that start point of stance phase of one feet is corresponding to the maximum driving force acted on the another feet and the end point of stance phase of one feet is corresponding to the maximum braking force of another feet, whenever the substrate is floor, step and slope. But the reaction force of humanoid robot are very much different from that of humans. We believe the behavioral and mechanical characteristics of normal human movement and compared them with those of corresponding humanoid robots to identify the reasons for the insufficient stability of humanoid robot movement and provide design inspiration for improving the stability and reliability of robot movement

Keywords: Six-dimensional reaction force measuring array, reaction force characteristics, quantitative balance ability.