# Chaoxiang Ye

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## EDUCATION

**2020.09–2022.07**          **Southern University of Science and Technology**          **Shenzhen, China**
- **M.Eng** in Materials and Chemicals, College of Engineering
- **Research Area:** Tactile Perception, Robotics, Deep Learning          **Supervisor:** Zhengkun Yi
- **GPA:** 89.5/100          **Rank:** 10%
- **Major Course:** Mathematical Statistics, Machine Learning, Finite Element Analysis, Advanced Manufacturing Foundation, etc.

**2015.09–2019.07**          **Dalian University of  Technology**          **Dalian, China**
- **B.Eng** in Ocean Technology, School of Ocean Science and Technology
- **Research Area:** Ocean Sensing
- **GPA:** 74.5/100
- **Major Course:** Signal Processing Technology, MATLAB Application, Sensor Design, Process Control Foundation and Application, Mechanical Principle, Electrotechnics and Electronics, etc.

## PROJECT EXPERIENCE

**2020.09–**          **Gesture recognition based on wearable devices and deep learning**          **Graduation Project**
- Gesture recognition technology based on wearable devices has broad application prospects. Specifically, it can be used in virtual reality, medical, service, industrial, etc. We are designing an epidermal-iontronic sensing (EIS)-based sensor, which significantly improves the sensitivity and signal-to-noise ratio of the equipment. In addition, we proposed an MCSAE and ESAE with better generalization performance on the dataset collected by Subramanian et al., which increased the accuracy of the test set from 89.6% to 96.5%. As the first author, I am writing two articles, one of which is to be submitted to IEEE TIM, and the other is undecided. In the future, the designed sensors and proposed algorithms will be combined to achieve higher accuracy of gesture recognition.

**2021.02-2021.09   An ordinal classification algorithm for tactile hardness recognition   RA-L & ICRA 2022**
- Although deep learning algorithms are widely used in hardness recognition, existing algorithms have the disadvantages of ignoring the ordinal inter-class relationships and poor generalization performance. To solve the above two problems, we introduce a new CSAE architecture with unsupervised regularizers, that has better generalization performance than CNN. Furthermore, we use the IEMD loss function to replace the cross-entropy loss function to consider the ordinal information between the hardnesses levels. Finally, we propose SCSAE-IEMD that uses the IEMD loss function layer by layer to further improve the ordinal classification performance. To veryfy the performance of the proposed method, we use a real robot to collect a tactile hardness dataset on silicone samples of three different shapes. Experimental results show that compared with state-of-the-art methods, the proposed method achieves better performance in terms of accuracy and quadratic weighted kappa on the tactile hardness dataset. As the first author, the paper was submitted to RA-L with ICRA 2022.

**2020.09-2020.12   UBTECH project: Face recognition and alarm based on YanShee robot          Team leader**
- We use the camera function of the YanShee robot to capture the face and save the screenshot. Next, we apply the LDA algorithm for face recognition. The robot alarm when a stranger's face is detected.
- Responsible for the robot assembly, environment construction, code writing, and presentation.

**2020.09-2020.12   Detection and tracking of 2D objects for self-driving applications          Team leader**
- We record videos of pedestrians and vehicles on the campus of Southern University of Science and Technology. We apply the Yolov3 to complete the task of 2D detection and tracking.
- Responsible for video recording, code writing, and presentation.

**2020.06-2020.10** **Cognitive-motion rehabilitation medical robot application design** **Member**

● We construct an experimental test system integrating rehabilitation training and monitoring relies on Pepper Robot. Additionally, we verify in patients with cognitive-motor impairment. Experimental results show that our proposed system performs well in the rehabilitation training of patients and can be used in clinical rehabilitation auxiliary treatment in the future.

● Responsible for the coding of mapping and autonomous navigation in this project and complete the final report of this part.

## PUBLICATION

[1] **Chaoxiang Ye**, Senlin Fang, Zhengkun Yi, "Stacked Convolutional Supervised Auto-encoder Based on Improved Earth Mover's Distance Loss for Tactile Hardness Recognition", **submitted to** IEEE International Conference on Robotics and Automation (ICRA), 2022.

[2] Tingting Mi, Dashun Que, Senlin Fang, Zhenning Zhou, **Chaoxiang Ye**, Chengliang Liu, Zhengkun Yi, Xinyu Wu. "Tactile Grasp Stability Classification Based on Graph Convolutional Networks." IEEE International Conference on Real-time Computing and Robotics (RCAR). (**accepted**)

[3] Yu Zhang, Yanan Diao, Shengyun Liang, **Chaoxiang Ye**, Yanxia Zhou, Guoru Zhao. "Cognitive-motion Rehabilitation Medical Robot Application Design." Information and Control, 2021. (**accepted**) (in Chinese)

## PATENTS

[1] Image processing method, robotic, and computer readable storage medium.

[2] Hardness recognition method, device, electronic equipment, and storage medium.

## Expert Skills

- ● **Languages**
  - Chinese: mother tongue
  - English: proficiency (CET6)
- ● **Programming Languages**
  - Python, MATLAB, C
- ● **Robotics and Sensors**
  - Barrett Hand, WAM Arm, UR5, Pepper, YanShee
- ● **Deep Learning Framework**
  - Keras, PyTorch, TensorFlow
- ● **Others**
  - Linux, LaTeX, COMSOL