Cao, Yue

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Education

University of Kentucky, Lexington, KY, USA	**Ph.D**. Candidate in Electrical Engineering	Jan 2023 – Present
Tianjin University, Tianjin, China	**Master** of Engineering in Materials Processing Engineering (Recommended Admission)	Sep 2018 – Jun 2021
Tianjin University, Tianjin, China	**Bachelor** of Engineering in Material Forming and Control Engineering	Sep 2014 – Jun 2018

Work Experience

Calmcar Co., Ltd., Tianjin, China	**Autonomous Driving Engineer** Develop path planning and vehicle body control algorithms.	Jul 2022 – Dec 2022
Weichai Power Co., Ltd., Weifang, Shandong, China	**Motor Control Engineer** Developed motor control algorithms and embedded software for powertrain systems.	Aug 2021 – Jul 2022

Research Interests

- **Intelligent Sensing and Control of Welding Processes** – Integrating multi-source sensing data with unsupervised and generative learning to model dynamic welding behaviors, and developing adaptive control strategies via imitation and reinforcement learning to enhance process stability and efficiency.
- **Human–Robot Interaction Systems for Welding** – Combining robotic precision with human intuition through VR-based platforms to enable collaborative operation modes and intelligent welding systems that learn and transfer human expertise.
- **Novel Arc-Based Additive Manufacturing Processes** – Investigating Double-Electrode Gas Metal Arc Welding (DE-GMAW) to achieve decoupled control of heat input and material deposition, using data-driven modeling for precise regulation of thermal and material dynamics.

Skills

Core Strength: Building intelligent manufacturing systems capable of real-time decision-making through the integration of algorithms, robotic execution, and physical processes.

- **Manufacturing Processes**: Arc welding expertise, including Gas Tungsten Arc Welding (GTAW) and Gas Metal Arc Welding (GMAW)
- **AI & Deep Learning**: Supervised learning, generative modeling, reinforcement and imitation learning
- **Control Theory**: PID, Model Predictive Control (MPC), adaptive control
- **Robotics & Automation**: Collaborative robot control, human motion capture, human–robot interaction
- **Virtual/Augmented Reality**: VR/AR environment development using Unity for immersive human–machine interaction

- **Programming & Software**: Python, MATLAB/Simulink, C/C++, C#, Unity

Research Publications (First Author)

1. Cao, Y., Ye, Q., & Zhang, Y. (2025). Synthesizing Weld Pool Dynamics via VAE-GAN to Enhance Human Control Performance. ***Journal of Manufacturing Processes.***
2. Cao, Y., Chen, H., & Zhang, Y. (2025). Monitoring of DE-GMAW process in human–robot collaboration. ***Welding in the World***.
3. Cao, Y., & Zhang, Y. (2025). Control of DE-GMAW through human–robot collaboration. ***Welding in the World***.
4. Cao, Y., Guo, S., & Zhang, Y. (2025). Robotizing GTAW through learning human response. ***Welding in the World***.
5. Cao, Y., Zhou, Q., Yuan, W., Ye, Q., Popa, D., & Zhang, Y. (2024). Human–robot Collaborative Assembly and Welding: A review and analysis of the state of the art. ***Journal of Manufacturing Processes***, 131, 1388–1403. Elsevier.
6. Cao, Y., Wang, Z., Hu, S., & Wang, T. (2023). Adaptive predictive control of backside weld width in pulsed gas metal arc welding using electrical characteristic signals as feedback. ***IEEE Transactions on Control Systems Technology***, 31(6), 2879–2886. IEEE.
7. Cao, Y., Wang, Z., Hu, S., & Wang, W. (2021). Modeling of weld penetration control system in GMAW-P using NARMAX methods. ***Journal of Manufacturing Processes***, 65, 512–524. Elsevier.
8. Cao, Y., Ye, Q. & Zhang, Y. (2025). Application of Generative Adversarial Networks (GANs) in Intelligent Welding Manufacturing. ***Welding in the World***. (**Under Review**)
9. Cao, Y., Ma, N., Ye, Q. & Zhang, Y. (2025). Human Adaptive Control of Arc Welding Process through Generative AI Enhanced Human-Robot Collaboration. ***IEEE Robotics and Automation Letter.*** **(Under Review)**
10. Cao, Y., Lin, H. & Zhang, Y. Robust Monitoring of Arc Welding Processes: A Generalizable Framework with DVAE and Particle Filter. ***Journal of Manufacturing Processes.*** **(Under Review)**

Awards

- Awarded the **2024 American Welding Society A. F. Davis Silver Medal** for contributions to welding process stability monitoring and control.
- Awarded the **2025 International Institute of Welding Henry Granjon Award** for innovative research on human–robot collaboration and intelligent welding of complex processes. Read the full news article

Conference Presentations

1. Yue Cao, Giulio Mattera, and Yuming Zhang. Addressing Label Inaccuracy in WAAM Anomaly Detection via Iterative Label Refinement and Unsupervised Feature Learning (AWS Professional Program at FABTECH 2025). 2025.9.08-11, Chicago, USA (Oral presentation)
2. Yue Cao, Yuming Zhang. Unsupervised Weld Penetration Prediction for Visual Monitoring Via Guided Variational Autoencoder (AWS Professional Program at FABTECH 2025). 2025.9.08-11, Chicago, USA (Oral presentation)
3. Yue Cao, Yuming Zhang. Learning Human Knowledge for Robotizing Double-Electrode Gas Metal Arc Welding via Generative Modeling and Imitation Learning (AWS Professional Program at FABTECH 2025). 2025.9.08-11, Chicago, USA (Oral presentation)
4. Yue Cao, Edison Mucllari, Yuming Zhang and Qiang Ye. Weld Penetration Prediction using GAN with Inaccurate Labels (AWS Professional Program at FABTECH 2024). 2024.10.15-17, Orlando, USA (Oral presentation)
5. Tianpu Li, Yue Cao and Yuming Zhang. Critical Weld Pool Information Detection in GMAW using LSTM U-net. (AWS Professional Program at FABTECH 2024). 2024.10.15-17, Orlando, USA (Oral presentation)
6. Yue Cao, Yuming Zhang. Human Robot Collaboration for DE-GMAW (AWS Professional Program at FABTECH 2024). 2024.10.15-17, Orlando, USA (Oral presentation)