

# Zhankun Luo

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## EDUCATION

<b>Purdue University West Lafayette</b> <i>Ph.D. in Electrical and Computer Engineering GPA 3.95/4</i>	West Lafayette, IN <i>Aug 2021 – Present</i>
<b>Purdue University Northwest</b> <i>Master in Electrical and Computer Engineering GPA 3.96/4</i>	Hammond, IN <i>Aug 2019 – May 2021</i>
<b>Beijing Institute of Technology</b> <i>Bachelor in Telecommunication Engineering GPA 85/100</i>	Beijing, China <i>Sept 2015 – Jun 2019</i>

## TECHNICAL SKILLS

**Programming:** Python, C/C++, Java, SQL, C#, MATLAB, Assembly, Bash, LaTeX, Git, Cmake, Tableau, Unity  
**Frameworks:** PyTorch, TensorFlow, Keras  
**Libraries:** OpenCV, NumPy, Scipy, Matplotlib, scikit-learn, pandas, eigen3, Sophus  
**OS:** Linux, Windows, MacOS  
**Developer Tools:** PyCharm, VS Code, Colab, Visual Studio, IntelliJ, Eclipse, KDevelop, Qt, Android Studio, Nsight

## WORK EXPERIENCE

<b>Teaching Assistant</b> <i>ECE Department, Purdue University West Lafayette</i> <ul style="list-style-type: none"><li>Lab assistant for ECE20001 Electrical Engineering Fundamentals I: guide the lab, answer students' questions and help them with their homework</li></ul>	West Lafayette, IN <i>May 2022 – Present</i>
<b>Research Assistant</b> <i>Video and Image Processing Laboratory (VIPER), Purdue University West Lafayette</i> <ul style="list-style-type: none"><li>Advised by Prof. Edward J. Delp and Prof. Fengqing M. Zhu on projects: "Image Based Plant Phenotyping: The PhenoSorg Project", and "Technology Assisted Dietary Assessment (TADA)"</li></ul>	West Lafayette, IN <i>Aug 2021 – May 2022</i>
<b>Research Assistant</b> <i>Center for Innovation through Visualization and Simulation (CIVS), Purdue University Northwest</i> <ul style="list-style-type: none"><li>Advised by Prof. Chenn Zhou on project "Smart Ladle: AI-Based Tool for Optimizing Casting Temperature"</li></ul>	Hammond, IN <i>Feb 2020 – May 2021</i>

## PROJECT

<b>Image Based Plant Phenotyping: The PhenoSorg Project</b> <i>Video and Image Processing Laboratory (VIPER), Purdue University West Lafayette</i> <ul style="list-style-type: none"><li>Generated 1 thousand synthetic high-resolution UAV RGB images with panicle labels by using image-to-image translation GANs with a ground truth dataset of 400 real UAV RGB images</li><li>Improved mean average precision with Intersection over Union from 0.5 to 0.95 (mAP[.5, .95]) for panicle detection task from 72% to 79%, and reduced Mean Absolute Percent Error (MAPE) for panicle counting task from 11.6% to 7.2%</li><li>Worked on creating labels for panicles in PhenoRover RGB images to test our approach on data</li></ul>	West Lafayette, IN <i>Jan 2022 – May 2022</i>
<b>Technology Assisted Dietary Assessment (TADA)</b> <i>Video and Image Processing Laboratory (VIPER), Purdue University West Lafayette</i> <ul style="list-style-type: none"><li>Investigated reliable and effective methods for Fine-Grained Visual Classification (FGVC)</li><li>Re-implemented a hierarchy-based embedding method for encoding of categories to decrease average hierarchical distance at top 1 by 3%, and that at top 5 by 10% on our VIPER-FoodNet dataset with 82 food categories, 15 thousand images</li><li>Worked on improving the hierarchical method by incorporating the nutrient and visual information of food</li></ul>	West Lafayette, IN <i>Aug 2021 – May 2022</i>
<b>Smart Ladle: AI-Based Tool for Optimizing Casting Temperature</b> <i>Center for Innovation through Visualization and Simulation (CIVS), Purdue University Northwest</i> <ul style="list-style-type: none"><li>Developed a machine learning application using DNN, lightGBM to provide steel casting temperature predictions</li><li>Reduced Root Mean Square Error (RMSE) of predicted casting temperature to 3 degrees Fahrenheit</li><li>Collaborated application with SQL database and GUI using Unity (C#) to display predictions and parameters</li><li>Tested and deployed this tool at Steel Dynamics Inc (SDI) Butler Division, awarded AIST 2022 Hunt-Kelly Outstanding Paper Award – third place (AIME) and AIST 2021 Digitalization Applications Technology Best Paper Award</li></ul>	Hammond, IN <i>Feb 2020 – May 2021</i>
<b>Structured Light Vision Systems</b> <i>Department of Electrical and Computer Engineering, Purdue University Northwest</i> <ul style="list-style-type: none"><li>Developed a framework for object height measurement using a structured light system with multiple cameras and multiple laser emitters whose Mean Absolute Percent Error (MAPE) reached 4%</li><li>Proposed a Multi-level RANSAC method to tackle intersections of multiple lasers which decreased MAPE by 20%</li></ul>	Hammond, IN <i>Sept 2019 – May 2021</i>

## Parking Occupancy Detection Using Computer Vision

Hammond, IN

Department of Electrical and Computer Engineering, Purdue University Northwest

Sept 2018 – May 2019

- Developed a software in Python (PyTorch) based on CNN to identify and count occupied parking spaces, whose accuracy reached 90%, precision was 96% on videos of parking spaces
- Incorporated the mutual information method for image registration and the affine transformation to eliminate the impact caused by camera shake and enhance the robustness of detection

## Automated Fetal Brain Segmentation Using Deep Convolutional Neural Network

Hammond, IN

Department of Electrical and Computer Engineering, Purdue University Northwest

Sept 2018 – Jan 2019

- Labeled 6.7 thousand fetal brain slice images from coronal, transverse, and sagittal MRI scans from 30 to 33 weeks to be used for autonomous fetus brain registration
- Re-implemented FPN, U-Net, WGAN architectures, and focal loss for automatic fetal brain segmentation

## Math Modeling Contests

Beijing, China

Beijing Institute of Technology

Mar 2016 – Jan 2017

- Re-implemented SVM, K-means, Markov chain, LDA, PCA, ARIMA, multi-variable regression with Python, MATLAB
- Led a team to win the second prize of Contemporary Undergraduate Mathematical Contest in Modeling (CUMCM) in Sep 2016, the Honorable Mentioned prize of the Interdisciplinary Contest in Modeling (ICM) in Jan 2017

## PUBLICATIONS

- [1] E. Cai, **Z. Luo**, S. Baireddy, J. Guo, C. Yang, and E. J. Delp. “**High-Resolution UAV Image Generation for Sorghum Panicle Detection**,” Proceedings of *the IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Workshop on Agriculture-Vision*, June 2022.
- [2] N. J. Walla, **Z. Luo**, B. Chen, Y. Krotov, and C. Q. Zhou. “**Smart Ladle: AI-Based Tool for Optimizing Caster Temperature**,” Proceedings of *the Iron & Steel Technology Conference (AISTech)*, May 2021.
- [3] **Z. Luo**. “**Structured Light Vision Systems Using a Robust Laser Stripe Segmentation Method**,” Master thesis. Purdue University Graduate School, May, 2021.
- [4] **Z. Luo**, Y. Zhang, and L. Tan. “**Multi-Level Random Sample Consensus Method for Improving Structured Light Vision Systems**,” Proceedings of *2020 11th IEEE Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON)*, Oct 2020.
- [5] Y. Zhang, **Z. Luo**, J. Hou, L. Tan, and X. Guo. “**Computer Vision Techniques for Improving Structured Light Vision Systems**,” Proceedings of *2020 IEEE International Conference on Electro Information Technology (EIT)*, Aug 2020.

## AWARDS AND HONORS

AIST 2022 Hunt-Kelly Outstanding Paper Award – third place (AIME)	2022
AIST 2021 Digitalization Applications Technology Best Paper Award	2021
Innovative Practice Outstanding Student (5%)	2019
National third prize of Energy Saving and Emission Reduction Social Practice and Technology Competition	2017
Honorable Mentioned prize of the Interdisciplinary Contest in Modeling (ICM)	2017
Second prize of Contemporary Undergraduate Mathematical Contest in Modeling (CUMCM)	2016
The Second Prize of the People’s Scholarship	2015 – 2017

## PROFESSIONAL SOCIETY

Reviewer for the IEEE International Conference on Multimedia and Expo (ICME 2022)  
Reviewer for the Annual Conference on Vision and Intelligent Systems (CVIS 2021)  
Reviewer for *Plant Methods* (online journal for the plant research community)  
Member of IEEE Young Professionals, IEEE Signal Processing Society, and IEEE Computer Society  
Member of Association for Iron & Steel Technology (AIST), and Material Advantage

## POSITION OF RESPONSIBILITIES

Mentor for senior design projects, CIVS and Department of ECE, Purdue University Northwest 2019 – 2021

- Instructed 3 students on 3D reconstruction, guided them to conduct experiments with monocular vision
- Taught 5 students models for sequential predictions, answered questions about data filtering and data pre-processing

Executive member, Team of generating charge by graphene oxide moisture, Beijing Institute of Technology 2017

- Led a team to win National prize in Energy Saving & Emission Reduction Social Practice & Technology Competition

Host, Science lecture competition, Beijing Institute of Technology 2015 – 2016

- Contacted and coordinated with participants and judges, organized a science lecture competitions for 3600+ students