Manova L M (馬修)

AI Engineer and Researcher

manomathew1943@gmail.com
+886-958334626
manova-m-509145157

About Myself

DOB :13 March 1996

Nationality : Indian.

Education

04/2021 – 01/2023
Taiwan

M.Sc Aeronautical and Electronic Engineering(Speciality in Artificial intelligence)
National Formosa University
Thesis: MIAQP-PM2.5- Multi-Spectral Image-Based Air Quality Prediction using the Ensemble Learning Method

09/2013 – 05/2017
Chennai, India

B.Tech Aeronautical Engineering
Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology

Skill/Interest

Interest

- Artificial intelligence
- Machine learning
- Prompt Engineer
- Data scientist
- Computer vision
- Embedded system
- Edge Computing
- LLM

AI Framework and Models

- TensorFlow
- PyTorch
- Keras
- YOLO (You Only Look Once)
- Modified YOLO
- Pixhawk
- TensorRT
- ONNX (Open Neural Network Exchange)
- OpenVINO (Open Visual Inference & Neural Network Optimization)
- Hugging Face

Hardware Platforms

- ARM System
- NVIDIA Nano
- Xavier
- ICAM
- Arduino
- Raspberry Pi
- Pixhawk

Mechanical Analysis Software

Ansys, Abacus, Comsol

Finite element analysis for multirotor and amphibious UAV using ANSYS and ABAQUS.

Computational fluid analysis for amphibious UAV using ANSYS Fluent.

Work experience

06/2023 – 05/2024
Taiwan

AI Engineer, Intelligent Recognition Industry Service Research Center

- ✔ Develop or modify AI models, including Yolo, Yolo-GA, and Multi-input models, to optimize efficiency and effectiveness for various tasks and problems.
- ✔ Understand customer objectives and problems thoroughly to propose suitable solutions and suggestions.

01/2019 – 02/2021
Chennai

HAASTOFIX , Funded by NIDHI PRAYAS, Department of Science and Technology (DST), GOVERNMENT OF INDIA

- ✔ Design and Development of Aquatic Drone for Multi Aquatic Applications.
- ✔ To evaluation our AI model with clinical lab test

07/2017 – 02/2021
Chennai

Junior research fellow, Vel Tech Rangarajan Dr Sagunthala R&D Institute of Science and Technology

- ✔ Development of water quality sensors which incorporated with UAV (Indo-Korea Collaboration project).
- ✔ Development algae collecting drone(Funded by Nidhi-Prayas). Thermal analysis for Curing Solid Propellant Slurries and multi-mechanical system.
- ✔ Design the 3D model of amphibious UAV using CATIA. Computational fluid analysis for amphibious UAV using ANSYS Fluent.

Project-1

Thesis : MIAQP-PM2.5- Multi-Spectral Image-Based Air Quality Prediction using the Ensemble Learning Method

Project-1

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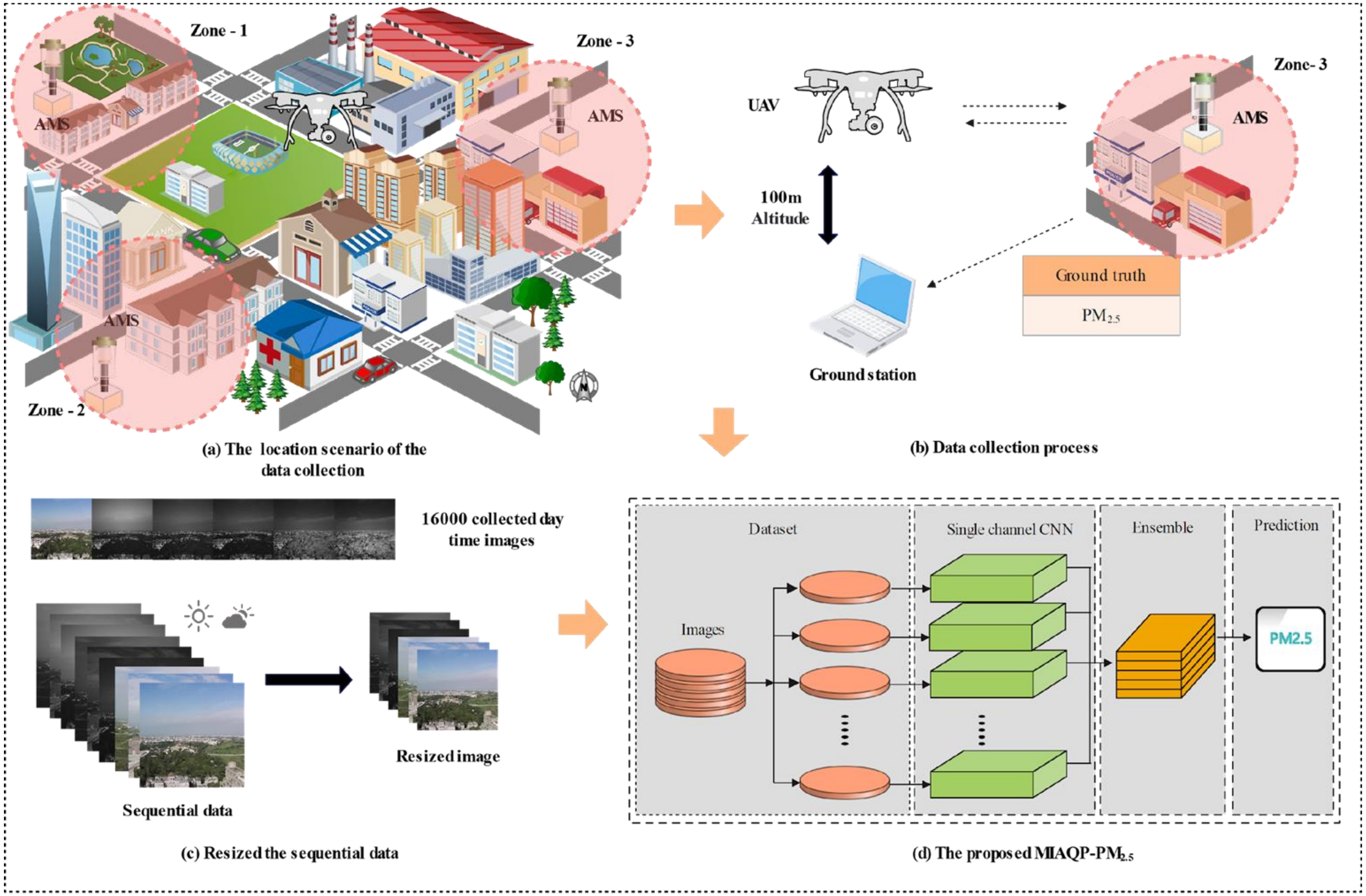
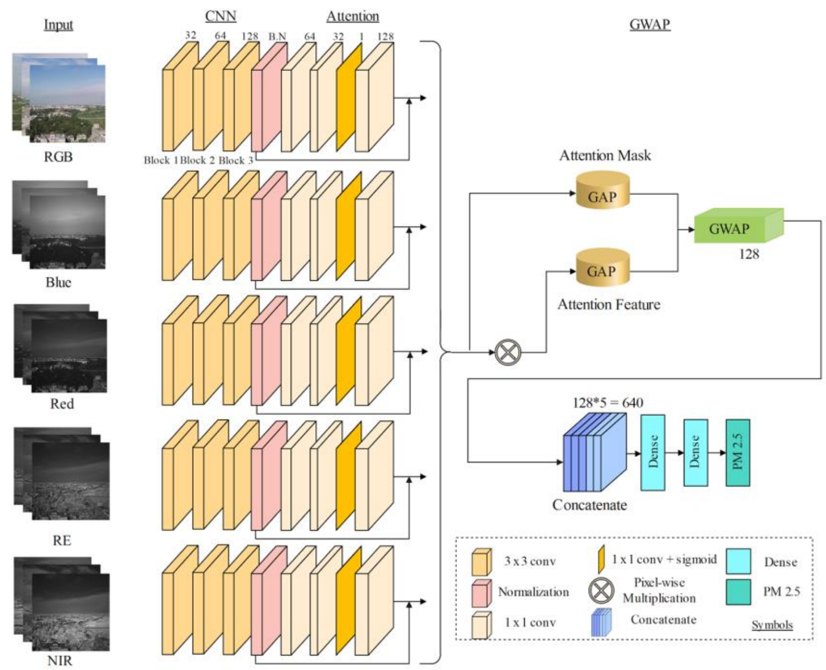


➢ To collect environmental image data from three different red zones using an unmanned aerial vehicle (UAV).

Project-1

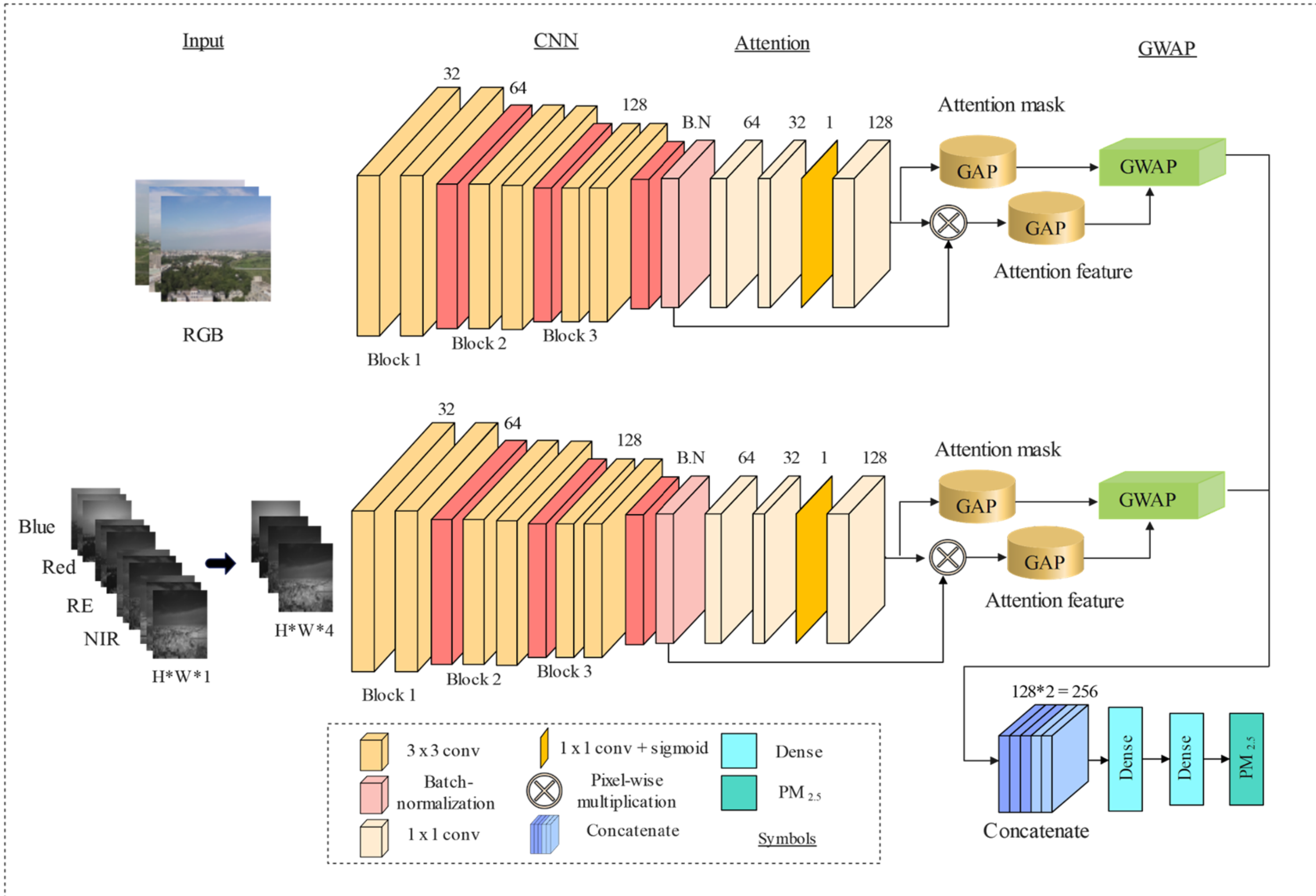
Multi-Spectral Image-Based Air Quality Prediction using the Ensemble Learning Method

- ✔ We proposed a new image-based system called Multi-spectral Image-Based Air Quality Prediction using Ensemble Learning (MIAQP- PM2.5)
- ✔ The training performance - **99.60%, 0.0010%, 0.0316%, 0.0011%, 1.57** (M) of accuracy, MSE, RMSE, MAE, and parameter performance respectively



Project-1

Multi-Spectral Image-Based Air Quality Prediction using the Ensemble Learning Method



- Stack image first single channel ***H x W x 3,*** Second single channel- ***H x W x 4 ,*** Parameters – **0.63 million**

Project-1

Thesis : MIAQP-PM2.5- Multi-Spectral Image-Based Air Quality Prediction using the Ensemble Learning Method

Training performance – Comparison with traditional and existing method

Method	Image	Accuracy (%)	MSE (%)	RMSE (%)	MAE (%)	Parameters (M)	Training Time (hrs)
VGG16	RGB	89. 44	0.0047	0.0685	0.0094	14	3.75
ResNet50		88.90	0.0105	0.1024	0.0309	23	2.08
DenseNet 121		73.87	0.0161	0.1270	0.0387	7	2.75
Xception		87.93	0.0099	0.0990	0.0287	20	1.91
DCWCN [2]		93.76	0.0024	0.0491	0.0051	6.4	2.41
VN8 [18]		90.18	0.0042	0.0652	0.0088	9	3.00
MIAQP-PM2.5 (ours)	**(RGB, NIR, RE, B,R)**	**99.60**	**0.0010**	**0.0316**	**0.0023**	**1.57**	**4.50**

- The accuracy is **10.20%, 10.74%, 25.83%,** and **11.71%** higher than the **VGG16, ResNet50, DenseNet 121, Xception** respectively in traditional method.
- The accuracy is **6.2%** and **10.4%** higher than the **DCWCN** and **VH8** method.

Project-1

Thesis : MIAQP-PM2.5- Multi-Spectral Image-Based Air Quality Prediction using the Ensemble Learning Method

Project-1

Thesis : MIAQP-PM2.5- Multi-Spectral Image-Based Air Quality Prediction using the Ensemble Learning Method

Publications:

- **Multi-Spectral Image-Based Air Quality Prediction using the Ensemble Learning Method**: CVGIP 2022: The 35th IPPR Conference on Computer Vision, Graphics, and Image Processing · Aug 18, 2022
- **Ensemble Learning-based Air Quality Prediction for DronesEnsemble Learning-based Air Quality Prediction for Drones:** Proceedings of the 7th Annual Conference on Engineering and Information Technology (ACEAIT), Japan. · Jul 1, 2023
- **Enhancing Air Quality Prediction with Ensemble Learning Using Aerial Multi-spectral Camera : IEEE Internet of things journal , under review**

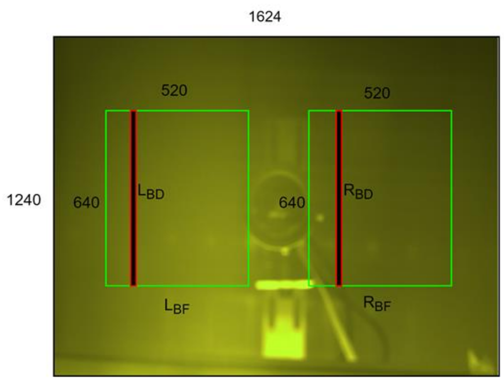
Project-2

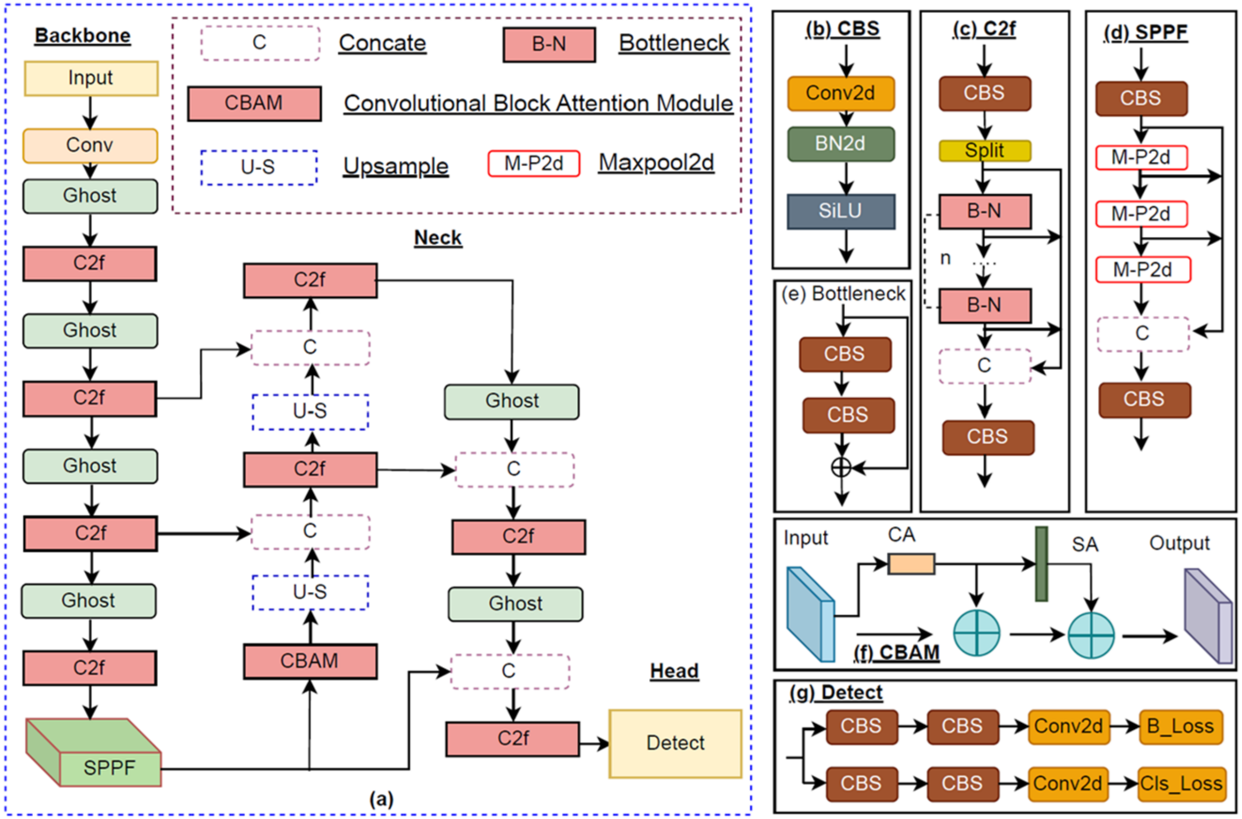
Vertical-Line Mura Defect Detection using VLM-YOLOGA for TFT-LCDs

Project

Vertical-Line Mura Defect Detection using VLM-YOLOGA for TFT-LCDs

- Our study addresses the ongoing challenge faced by TFT-LCD screen manufacturers in using artificial intelligence (AI) technology to effectively detect tiny defects, specifically LV1 anomalies.
- Our approach, centered on the innovative VLM-YOLOGA algorithm based on YOLOv8, has proven to be highly effective in quickly and accurately identifying V-line mura defects in LCD images.

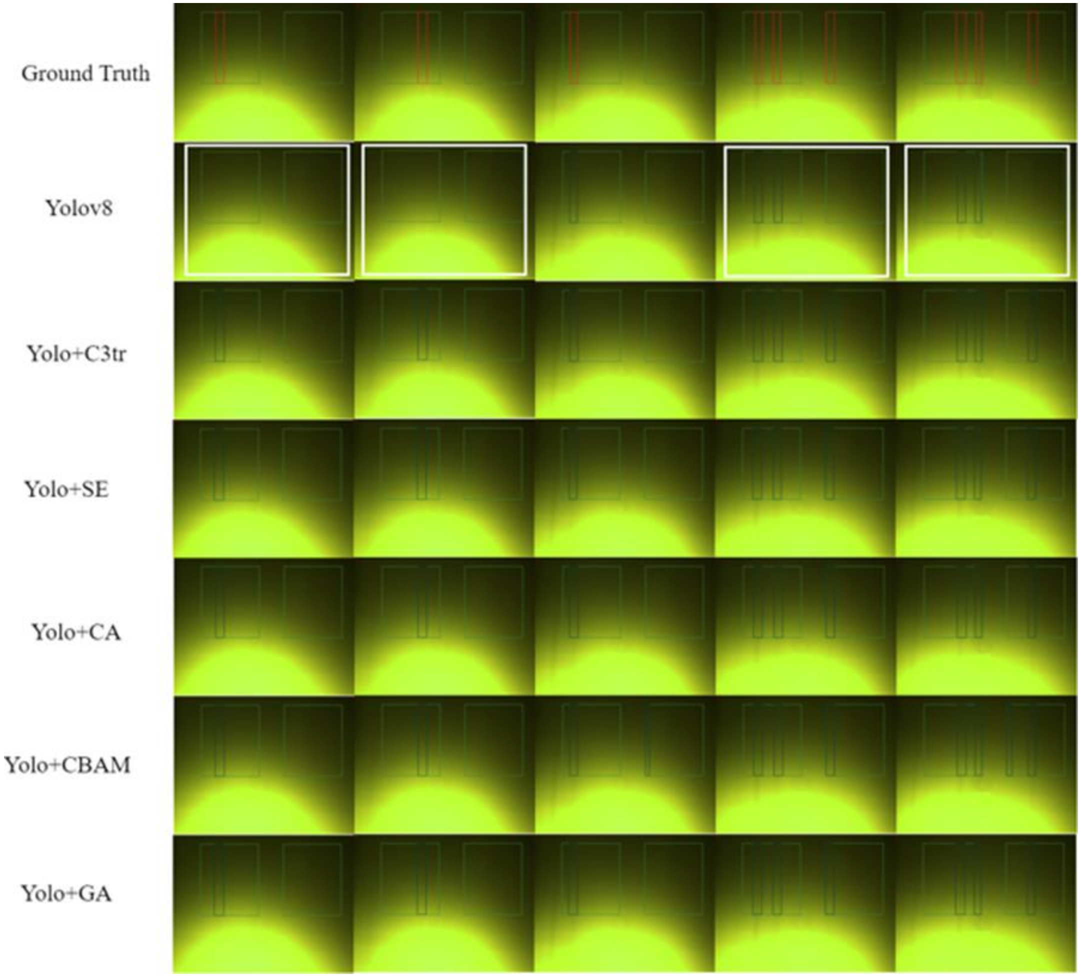


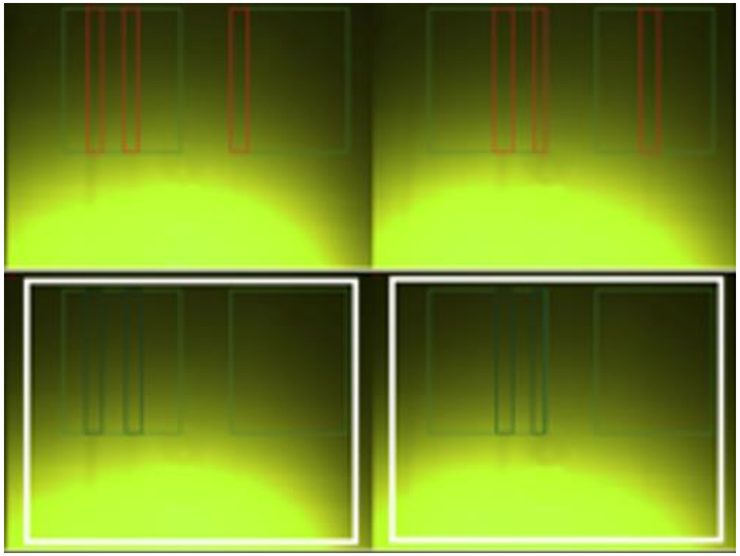


Project

Vertical-Line Mura Defect Detection using VLM-YOLOGA for TFT-LCDs

- ✔ YOLOv8 exhibits four instances of missed detections, highlighted by White boxes





Project

Vertical-Line Mura Defect Detection using VLM-YOLOGA for TFT-LCDs

- ✓ YOLOv8 exhibits four instances of missed detections, highlighted by White boxes

Detection Methods	P (%)	R (%)	F1-S (%)	mAP@0.5 (%)	mAP@ 0.5:0.95 (%)
YOLOv8n	0.935	0.901	0.917	0.970	0.926
Yolov8n+C3TR	0.997	0.999	0.997	0.995	0.980
Yolov8n+SE	0.997	0.998	0.997	0.995	0.982
Yolov8n+CA	0.998	0.999	0.997	0.995	0.983
Yolov8n+CBAM	0.998	0.999	0.997	0.995	0.979
Yolo-GA(Ours)	0.998	0.999	0.997	0.995	0.984

Detection Methods	Params (MB)	Inference Time(ms)	FPS	Size (MB)
YOLOv8n	3.2	5.690	175	5.94
Yolov8n+C3TR	3.2	6.849	145	6.53
Yolov8n+SE	3.0	5.443	183	5.95
Yolov8n+CA	3.0	5.049	198	6.07
Yolov8n+CBAM	3.0	5.829	171	6.07
Yolo-GA (Ours)	2.7	5.089	196	5.55

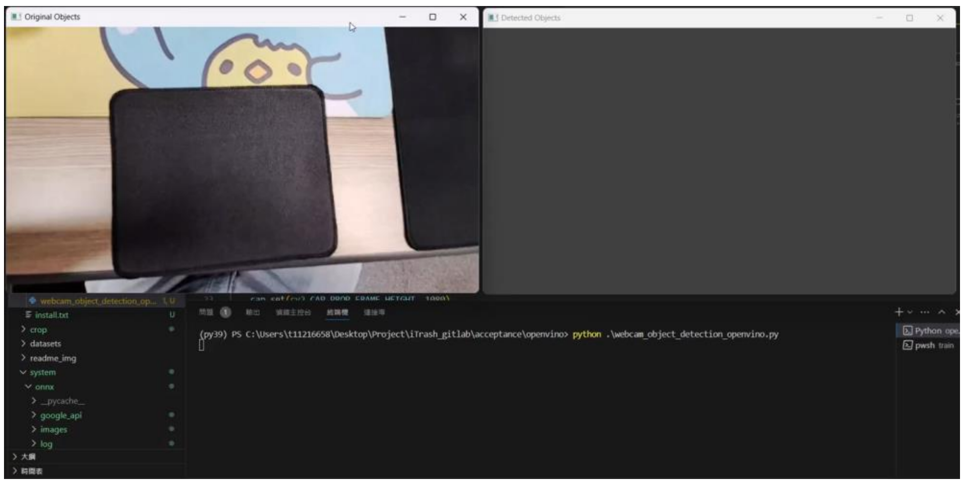
Project-3

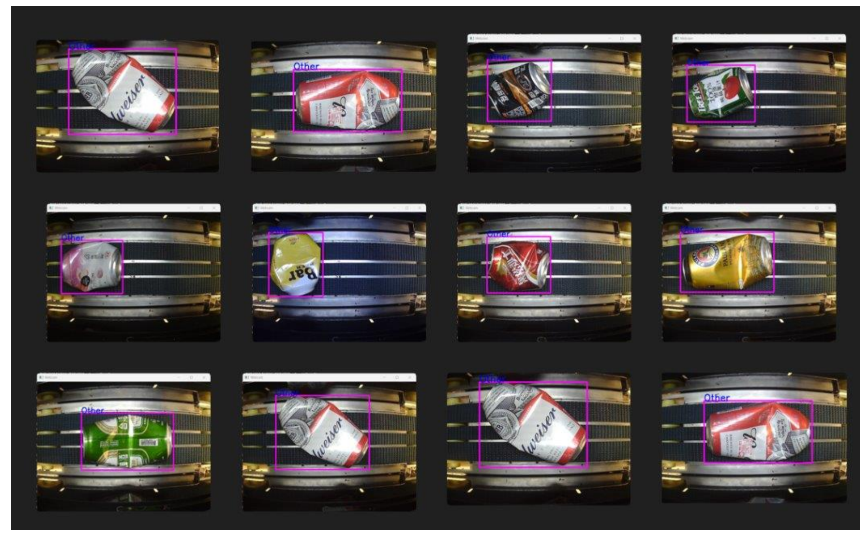
iTrash Recycling Detection

Project-3

iTrash Recycling Detection

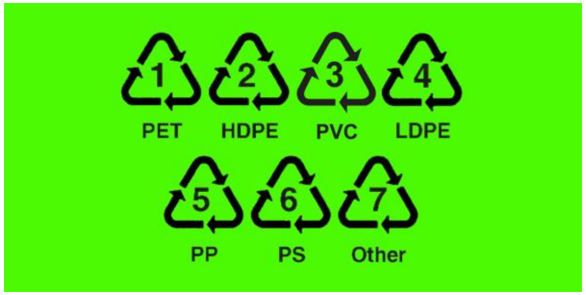
- ✔ The development of a cutting-edge AI model aimed at revolutionizing recycling waste machine detection. Leveraging the YOLOv8 architecture, we meticulously optimized every aspect to surpass the accuracy of existing.
- ✔ Itrash company want to predict only PET and battery to accept the machine..

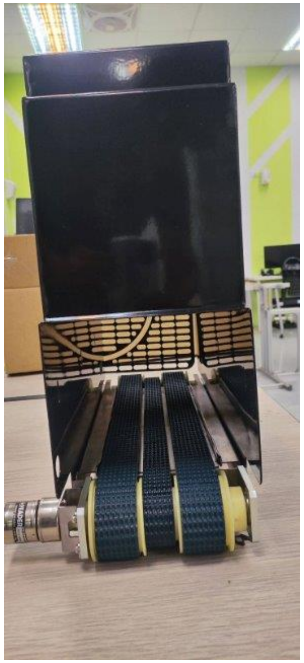




Project-3

iTrash Recycling Detection





Environment Conditions:

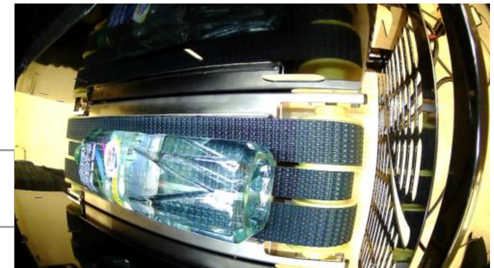
Too Dark

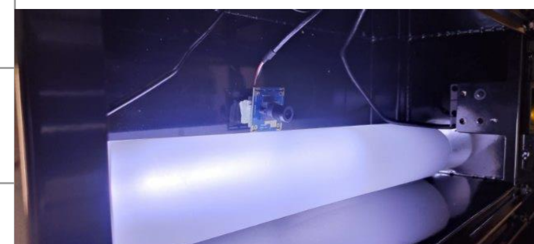
Problems:

1. **Camera Placement (Field of View)**
2. **Light Placement (Reflection)**
3. **Machine Placement (Indoor and Outdoor)**
4. **Pet Identification (Out of 7 Classes)**
5. **Battery Size**
6. **Other (Predicted as Other)**

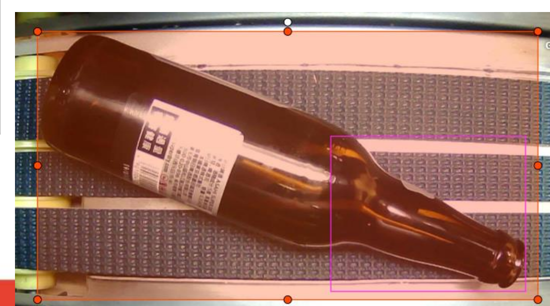
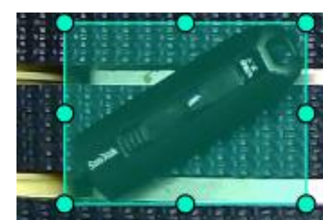
Project-3

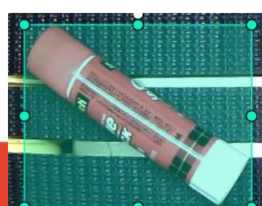
iTrash Recycling Detection






Problem	**Solution**
Camera Placement (Field of View)	Using different mm lens and conducting placement tests
Light Placement (Reflection)	Using diffusion sheets and panels to reduce light reflection
Machine Placement (Indoor and Outdoor)	Simulating sunlight and dark environment tests to determine optimal conditions
Pet Identification (Out of 7 Classes)	Creating two labeling techniques
Battery Size	Prediction optimizer condition
Other (Predicted as Other)	Condition for Non-Categorized Classes: Glass Bottle, Non-PET, and Can |




Project-3

iTrash Recycling Detection

Model	MAP50-95	Improved (%)
yolov8	0.825	-
yoloGA	0.859	4.038

Predict

Ground Truth	PET	Non-PET	Glass Bottle	Battery	Other
PET	251	8	0	0	0
Non-PET	0	134	1	0	0
Glass Bottle	0	0	94	0	1
Battery	0	0	0	242	6
Other	0	1	0	0	368

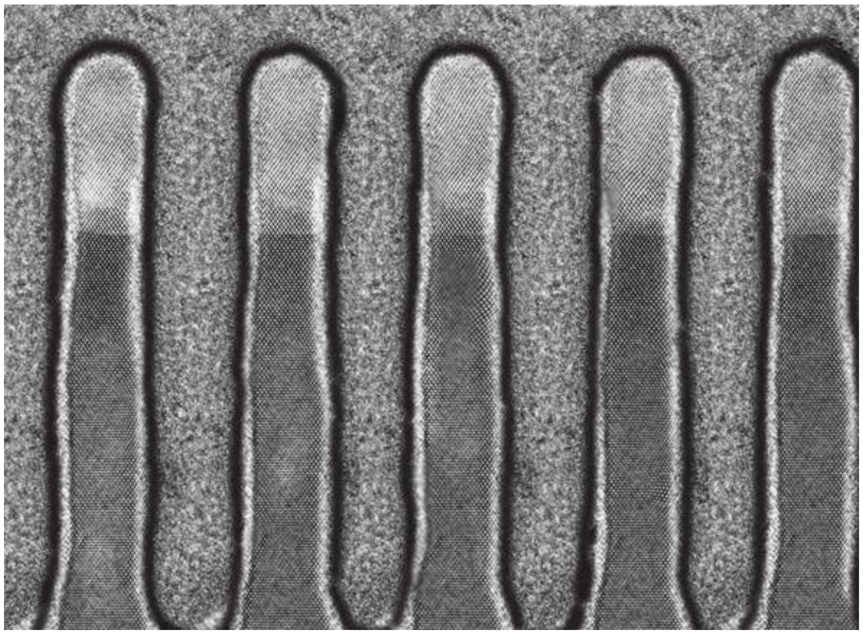
Project-4

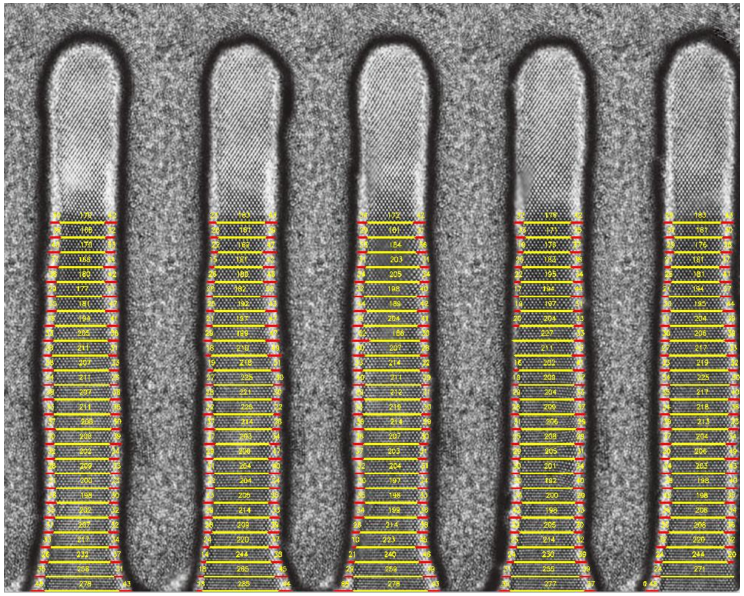
MA-tek Image measurement

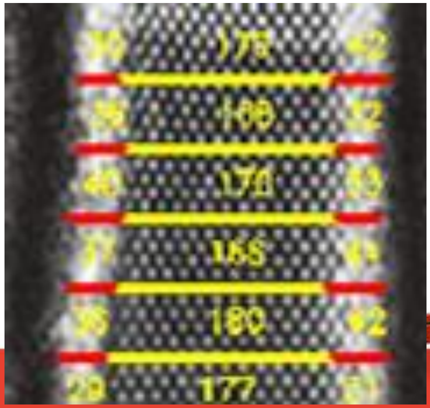
Project-4

MA-tek Image measurement

- To measurement in the 3-nm node spike outer and inner width length using open cv method (Pixel Wise Masking Solution).



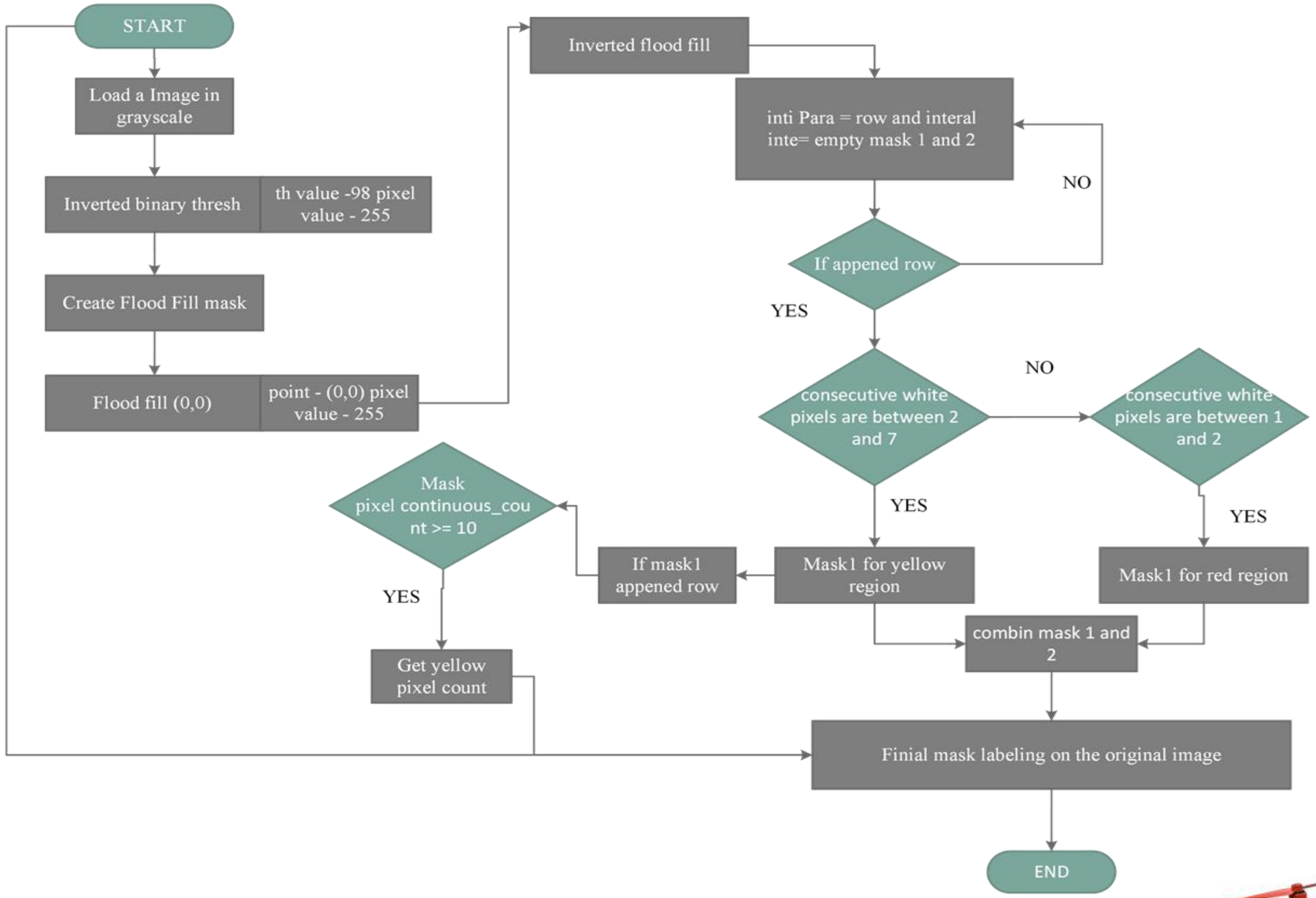




Project-4

MA-tek Image measurement

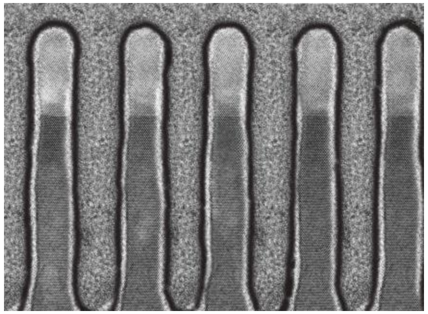
- To measurement in the 3-nm node spike outer and inner width length using open cv method (Pixel Wise Masking Solution).

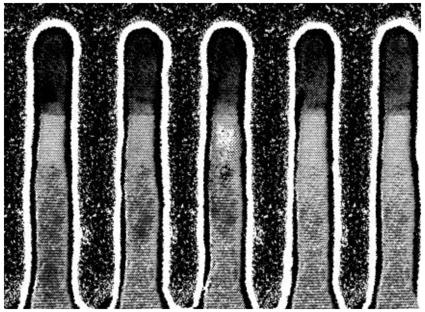


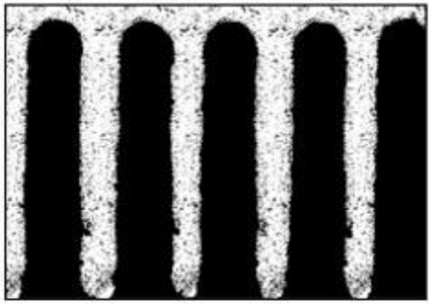
Project-4

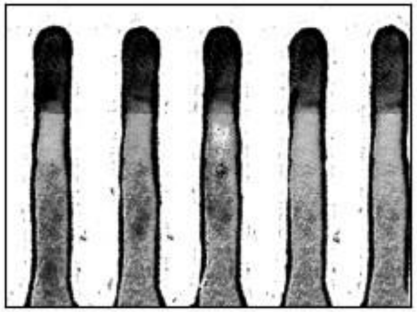
MA-tek Image measurement

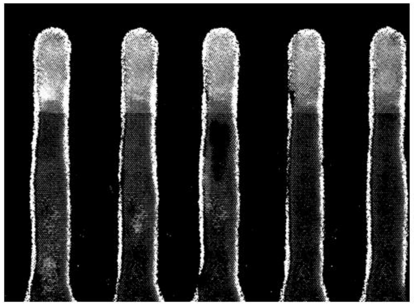
✔ To measurement in the 3-nm node spike outer and inner width length using open cv method (Pixel Wise Masking Solution).

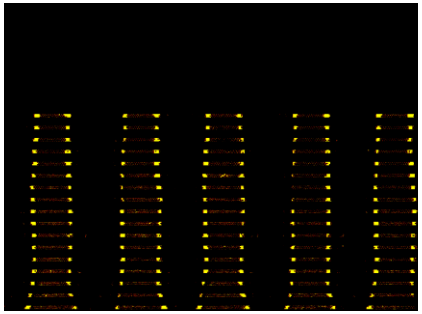

Original image - (grayscale)

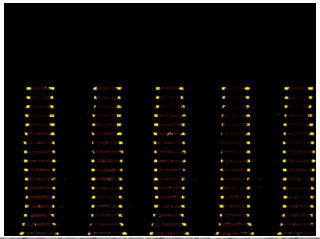

Inverted binary threshold

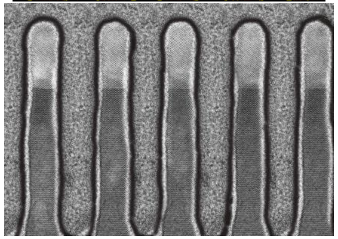

Mask image

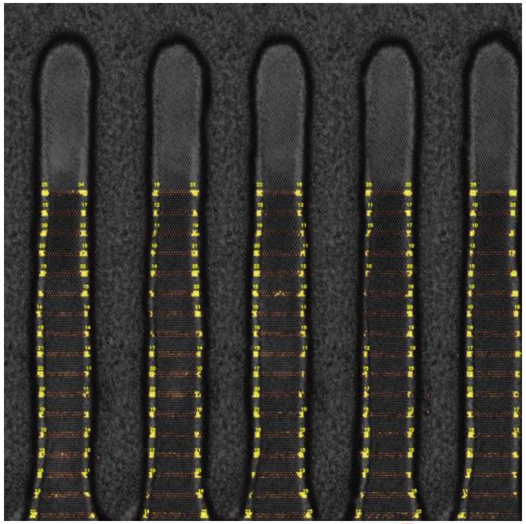

Floor fill


Floor fill- inv


Pixel mask labeling







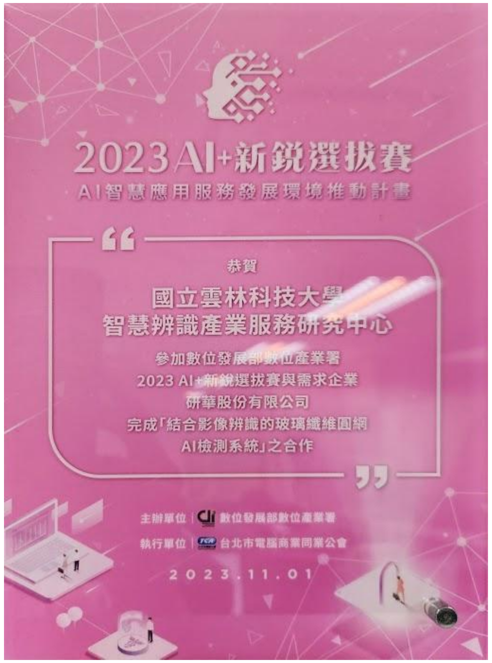
Project-5

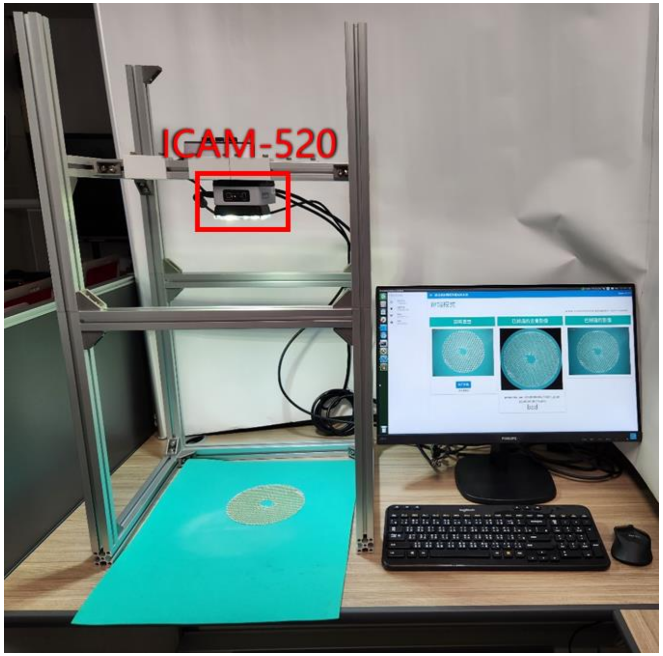
Fiberglass prediction

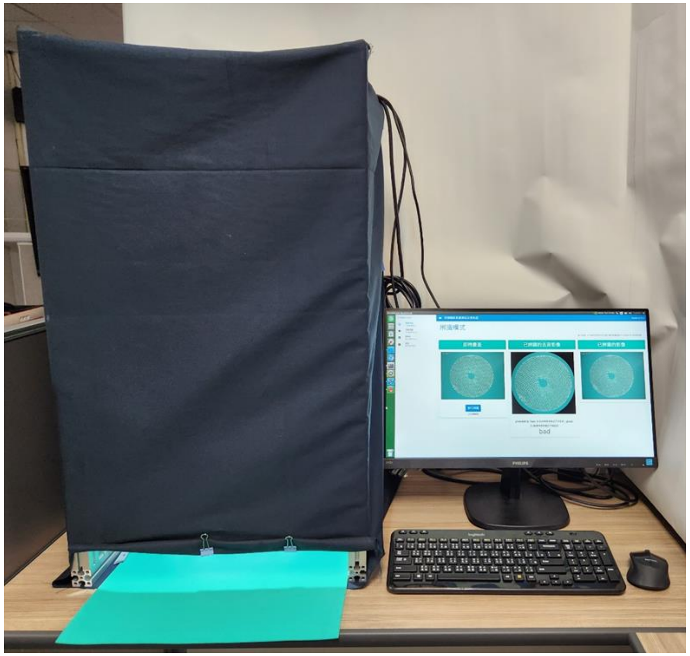
Project-5

Fiberglass prediction

- ✔ Unique AI technology uses ellipse fitting to capture the contour of the grinding wheel, detect shape defects (deformation, poor appearance, missing corners, cracks), and then uses the MobileNetV3 algorithm to detect resin overflow defects on the surface of the grinding wheel.







Other Publication (Google scholar)

1. Design of uncrewed amphibious aerial vehicle for in-situ water quality assessment International Conference on Integrated Water Resources Management: Prospects and Challenges (ICIWRM 2022)
2. Multi-Spectral Image-Based Air Quality Prediction using the Ensemble Learning Method CVGIP 2022: The 35th IPPR Conference on Computer Vision, Graphics, and Image Processing
3. Design and Development of Aquatic Drone Journal of Marine Engineering & Technology, Taylor and Francis,Under Review
4. Structural Analysis of Classifier Car Employing with Different Materials to Analysis Weight and Strength International Symposium on Novel and Sustainable Technology

Submitted:

1.Enhancing Air Quality Prediction with Ensemble Learning Using Aerial Multi-spectral Camera, IEEE internet of things journal, Under review
2.Fiberglass Mesh Classification with Deep Learning Approach: submitted
3.Vertical-Line Mura Defect Inspection/Detection using VLM-YOLOGA for (Thin Film Transistor Liquid Crystal Display)TFT-LCDs : waiting for submit


THANK YOU