CNN for Wafer Back and Edge ADC

EG3611A Industrial Attachment Final Presentation

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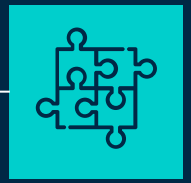
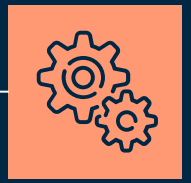


01

RECAP OF PART 1

Using CNN for Wafer Edges only



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NEW PROJECT REQUIREMENTS

Wafer Backside and System Architecture

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BACKSIDE ADC

More Classes but Same Concept

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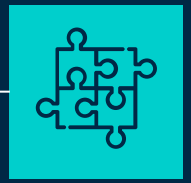

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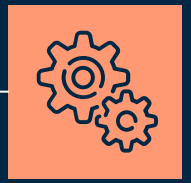
SYSTEM DESIGN

Data Flow, System Flow and Coding it all out



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CHALLENGES & LEARNINGS

Planning, Scaling, Integrating

06

REFLECTION & CONCLUSION

Of this 4-month Machine Learning Internship

RECAP OF PART 1

01

Using CNN for Wafer Edges only

Wafer Edge ADC

- Defects can occur on the backside or edges (both my focus), and frontside
- "Defects" flagged by the machines are often false positives
- To gather wafer edge images and train a machine learning (ML) model
- Goal: predict if there is chipping, or "aok" (all-OK)

NEW PROJECT REQUIREMENTS

02

Wafer Backside and System Architecture

New Problems Breakdown

- Backside ADC
- ADC System Design and Architecture
  - Data Flow and Folder Structure
  - Parsing KLA Files
  - Bundling into a System
  - Building a Graphical User Interface (GUI)

BACKSIDE ADC

03

More Classes but Same Concept

Wafer Backside ADC

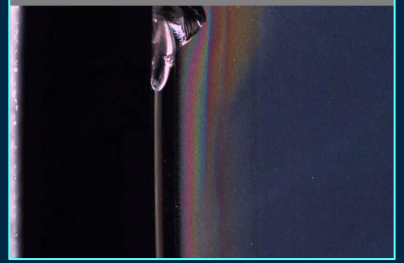
- 5 classes instead of 2
- Same problems still exist: unbalanced and limited data
- New problems: some classes look similar or vague
- Solved similarly with pre-trained CNN models

	test_correct	test_total	test_acc
2Dec2021-1339	3027	3124	96.90%
8Dec2021-1501	3024	3124	96.80%
22Dec2021-1753	3035	3124	97.15%

Wafer Backside 5 Classes

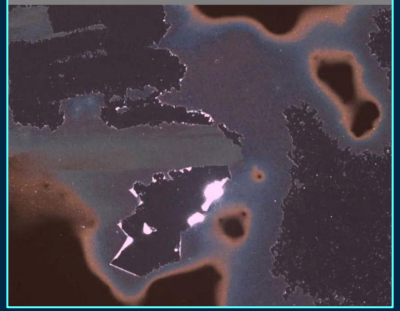
[0] AOK

[1] CHIPPING



[2] SCRATCH

[3] STAIN



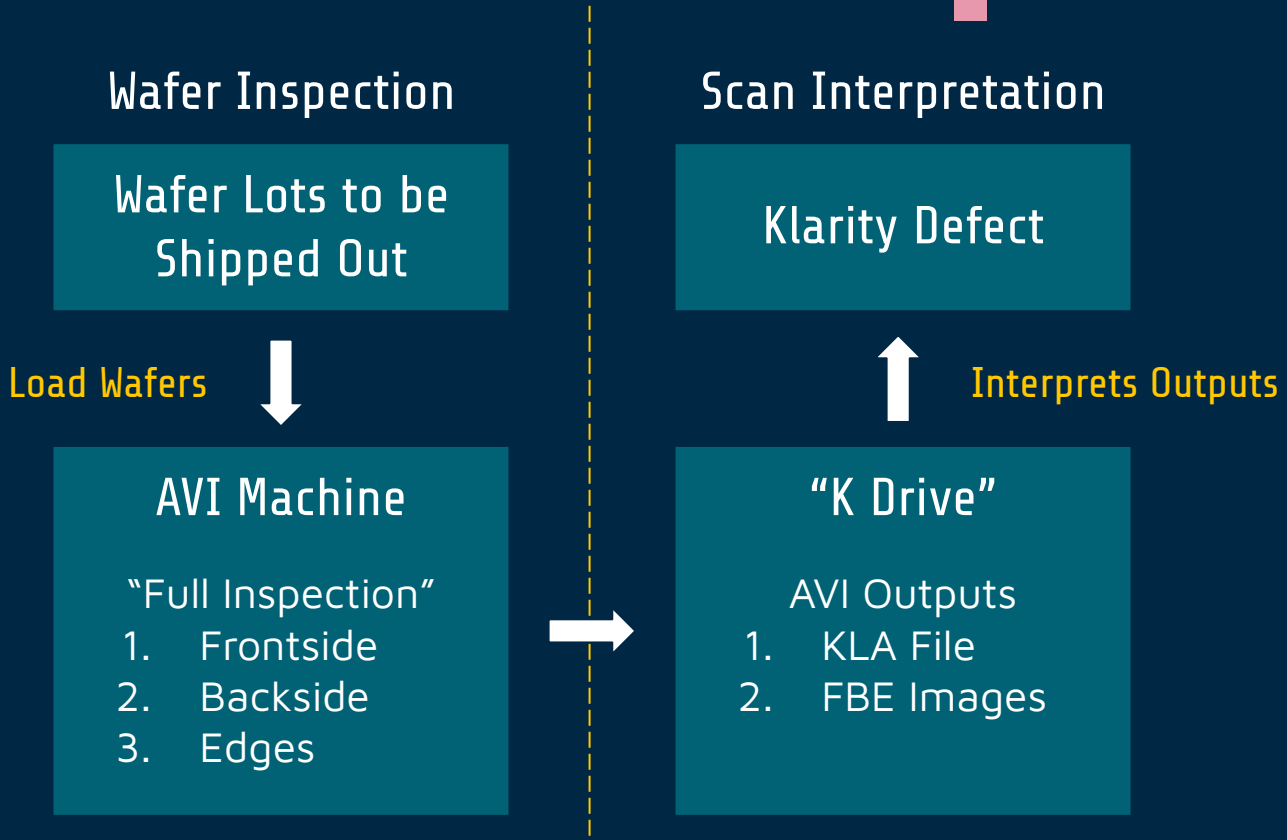
[4] WHITEDOT

SYSTEM DESIGN

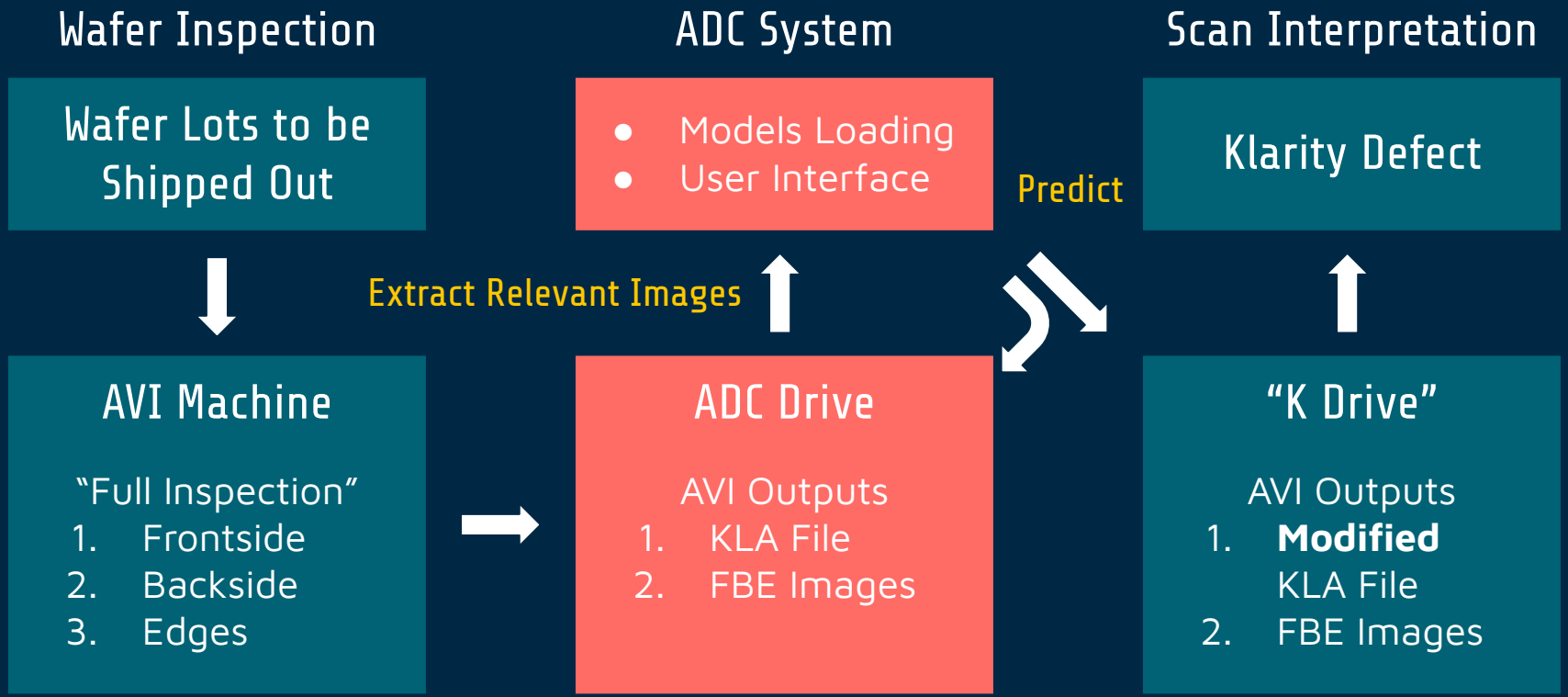
04

Data Flow, System Flow and
Coding it all out

Data Flow: Current State



Data Flow: Future State with ADCS



ADC System Flow

1. KLA files and images from AVI are fed into ADC drive
2. ADCS continuously polls ADC drive for KLA files
3. If KLA files found, start **Model Inference**; else, poll again after some time
    a. Reads oldest KLA file and stores relevant information
    b. Checks if filenames referenced in KLA file can be found
    c. Feed FS/BS/EN images into their respective models
    d. FBE models classify images and modify CLASSNUMBERs in KLA file
    e. Results also saved to CSV files for future reference
    f. Move and copy KLA file and images to correct drives
4. Repeat

CHALLENGES AND LEARNINGS

05

Planning, Scaling, Integrating

Challenges	Learnings
Planning and architecting the system	Note down all potential logic holes
Coding for readability and extensibility	OOP and DRY programming concepts
Usability and user interfaces	Start from simple CLI then to GUI
This entire journey	Being independent and trusting myself

REFLECTION & CONCLUSION

06

Of this 4-month Machine Learning Internship

MAIN TAKEAWAY

DON'T BE AFRAID OF WHAT I DON'T KNOW

THANK YOU :)

Q&A