



CAPSTONE THESIS DEFENSE

# Warehouse Inventory Management System

"PRECISE INVENTORY, TRUSTED QUALITY"

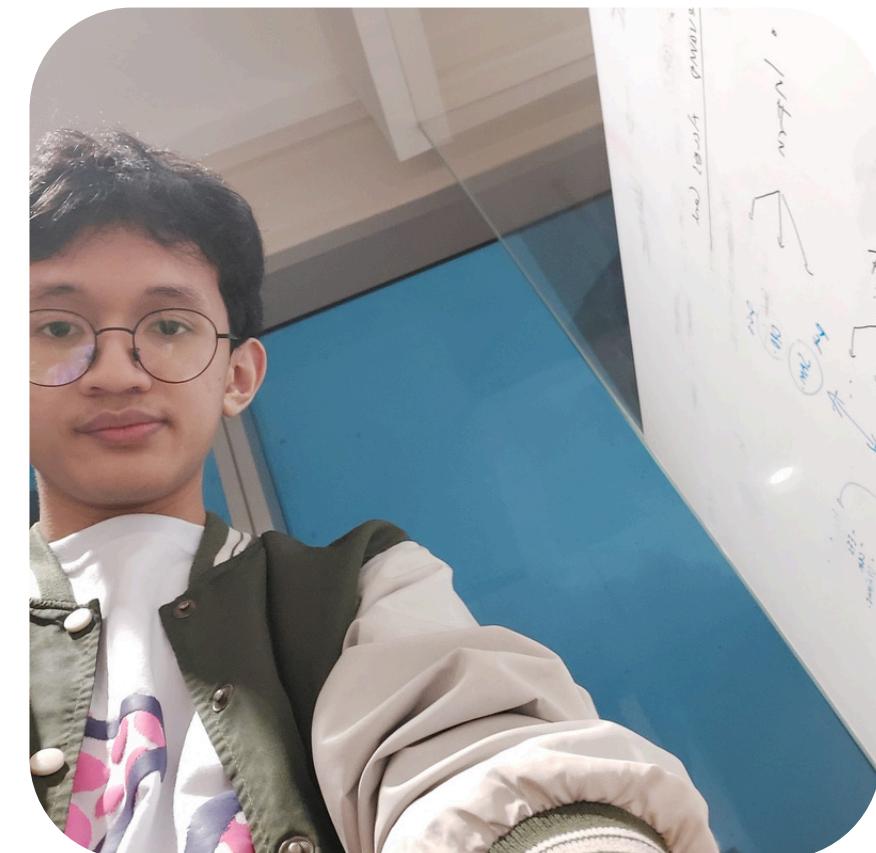
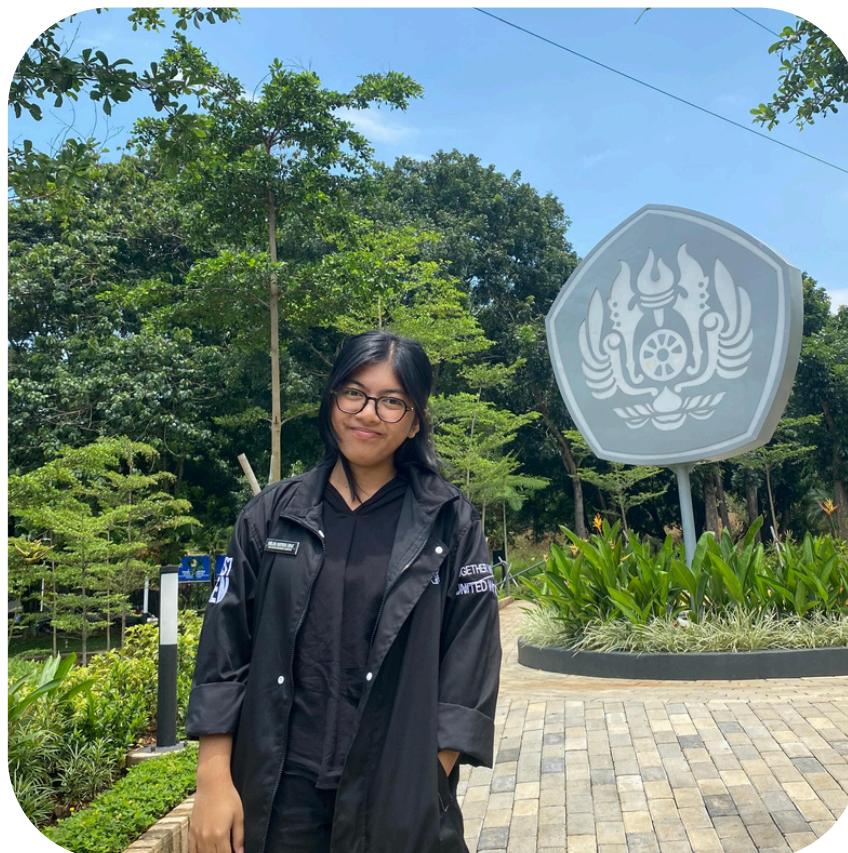
Study Program:  
Informatics

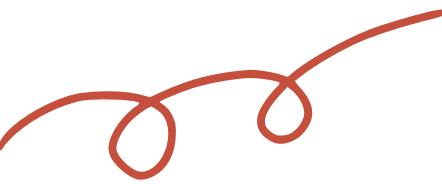


# Team Member



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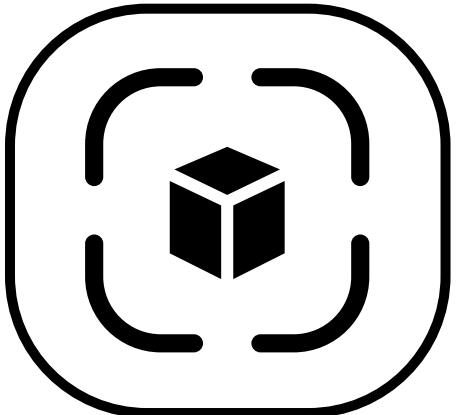


# Background

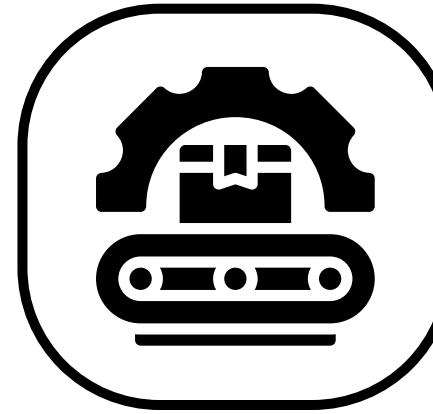


PT. Akebono Brake Indonesia faces inefficiencies in its manual inventory management system, causing errors in stock records, production delays, and missed deadlines. These issues disrupt customer operations and erode trust. Implementing an automated inventory system will improve accuracy, streamline workflows, and ensure timely deliveries, enhancing customer satisfaction and operational efficiency.

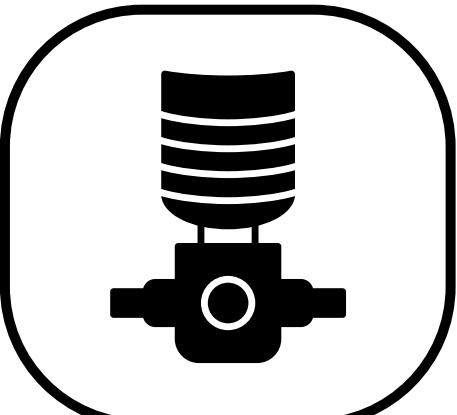
# Feature



YOLOv11 Object Detection  
for Item Identification



Conveyor System  
with Automated Item Handling

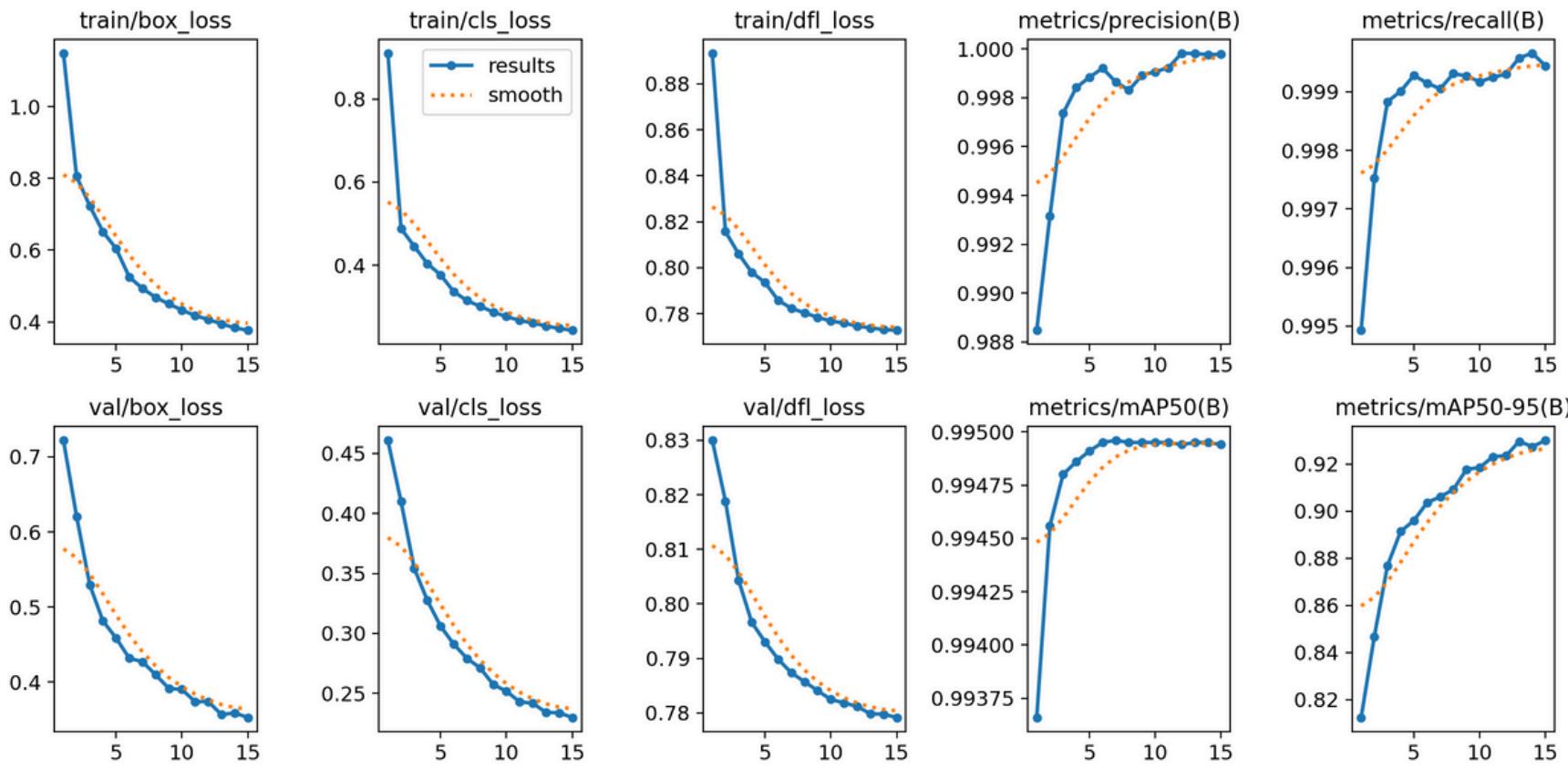


Load Cell Sensors  
for Accurate Weight Measurement

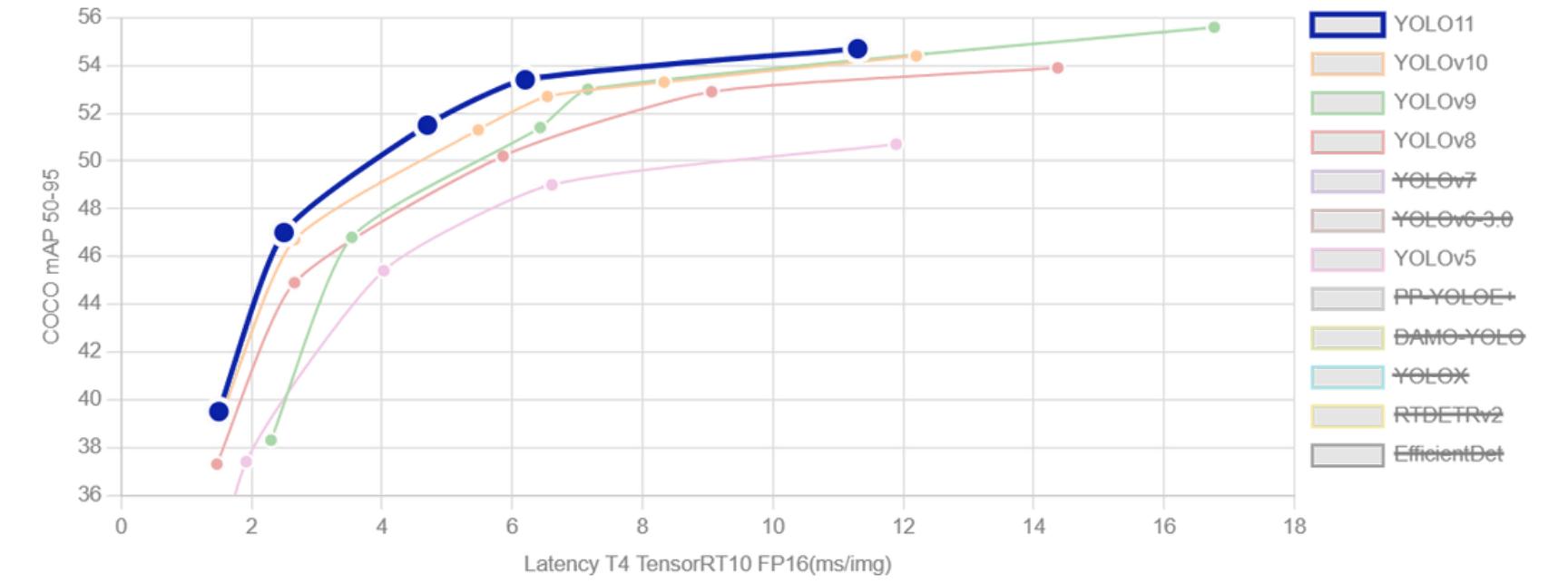


Automatic Labeling with  
QR Code Scanner

# Why YOLOv11 ?



Model Metrics with Stochastic Gradient Descent (SGD) Optimizer, 15 epochs, and 12K Image Datasets



Source: Ultralytics YOLOv11 Documentation

# How about Load Cell ?

- ✓ → Yes
- → Depends
- ✗ → Yes

Sensor Type	Accurate	Static Measurement	Fast Response	Cost	Use Case
Load Cell	✓	✓	✓	Medium	Industry, Weight Scales
Strain Gauge (RAW)	✓	✓	○	Low	Custom Mechanical
Piezoelectric	✓	✗	✓	Medium	Dynamic Forces
Capacitive	○	✓	✓	Medium	Robotics
FSR (Force Sensor)	✗	○	✓	Low	Lightweight Prototyping
Hydraulic/Pneumatic	✓	✓	○	High	Heavy Machinery

# **Then What Does The Conveyor System and QR Code do?**

**Automatic**

**Camera**

**Logging**

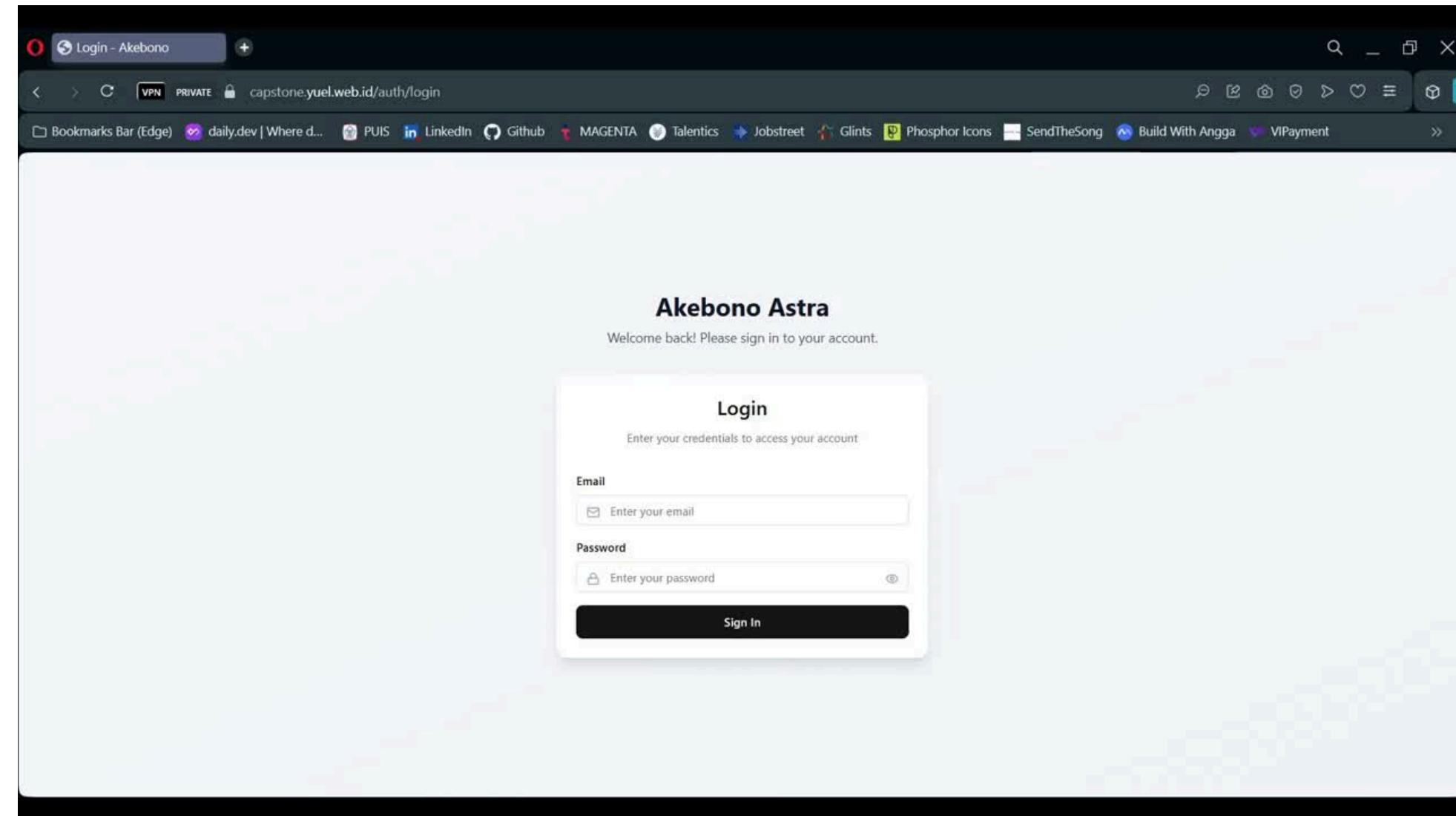
**Labeling**

# Tools and Technologies

Warehouse Inventory Management System utilized several tools for develop this system.

Artificial Intelligence Object Detection	Internet of Things Component	Dashboard Website
YOLOv11 Algorithm	Load Cell Sensor	Next.JS Framework (Frontend)
FastAPI Framework	Arduino Mega	AdonisJS Framework (Backend)
WebSockets Protocol Library	MQTT Message Protocol	Axios Library (HTTP)
OpenCV Library	Large Breadboard	TailwindCSS Framework (Styling)
RTSP Protocol Camera	ESP32	
Custom Dataset (Roboflow Platform)		

# Application Demo



# Conclusion

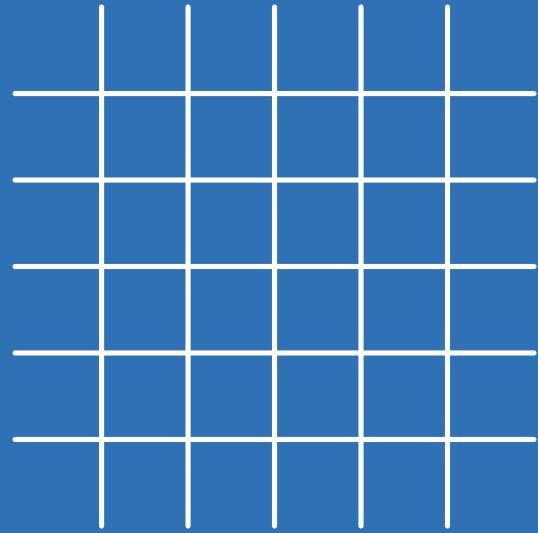
Based on the result after testing and do some more simulation with the partner we believe that we have increase efficiency using conveyor and label scanner, but we still need to improve our speed of conveyor and speed of scanner

50%+

90%+

The YOLOv11 implementation shows great results provided by the result metrics and project tests that product detection has an average of 90%+ confidence.

We are optimistic that this result provide that the productivity of warehouse can increases by cutting out manual and human processes. In other hand, this innovation digitalization with integration of each system that shows on dashboard website can provide solve issue human error by makes the process less human intervention and productive operation.



President  
University



# Thank You !

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**Capstone Advisor**

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**Study Program**

CIT - Informatics