



Delta APU

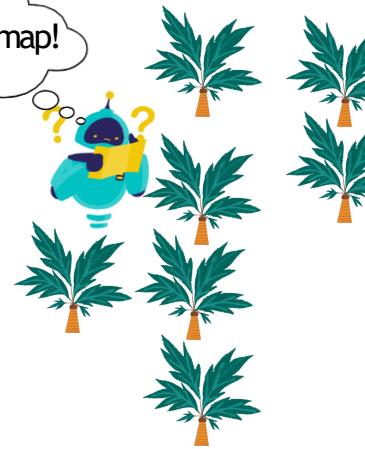
PALMIQ - LARGE LANGUAGE VISION
MODEL WITH AUTONOMOUS
GENERAL VEHICLE(AGV) SWARM
FOR PALM RIPENESS DETECTION
AND HARVESTING



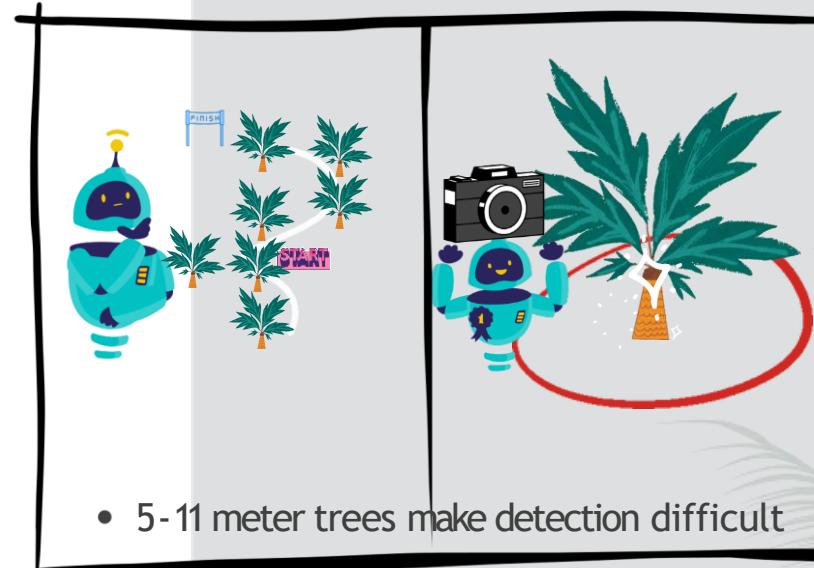
PROBLEM STATEMENT



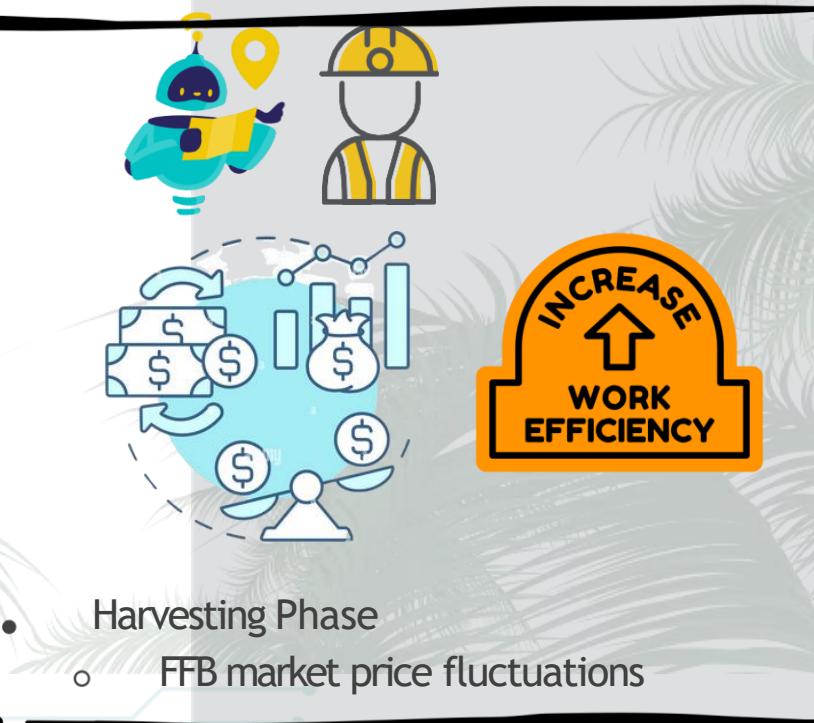
I need a map!



- Need to harvest at optimal ripeness



- Canopy cover and bad lighting obstruct FFB view and image capture



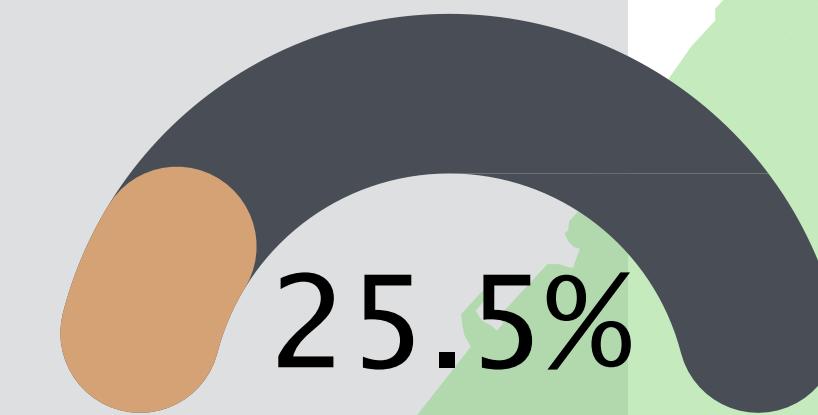
SEARCHING TIME FOR MATURE PALMS
2436%

Padilla, 2004

EXAMINATION FOR MATURE PALMS
7 - 13 DAYS

Bernal, 2009

LABOR COST TO A TON OF PALM OIL



Duarte, 2009

OUR SOLUTION (WORKING PROTOTYPE)



Mobile App for Digital Twin Visualization Plantation with PalmGPT LLM Model for Recommendation & Reports



**Passive Loose fruit
Collectors to Gauge Loose
FFB Ripeness and Trigger
Inspection AGV**



**Autonomous General
Vehicles(AGV) to Inspect
Ripeness and Assist FFB
Harvest**

PALM PLANTATION SMART REPORTING in APP and Web Dashboard

• Forecast Reports

- Harvesting Schedule (By Zone / Location)
- Manuring Scheduling
- Tree Leave Pruning Scheduling
- Labour Allocation & Scheduling
- Transportation Scheduling



• Fruit / Produce Monitoring Reports

- Zonal / By Row / By Tree Estimated Fruit
- Ripe Condition (By Time vs Predicted Harvest)
- Deviation of Yield Report (to analyse factors/issues)
- Deviation of Fruit Ripe Expectant (to analyse factors/issues)
- Scheduling Report Update

• Palm Price Market Study

- Expected Yield vs Market Price
- Forecast Profit during Harvest
- Forecast Best Sales value Schedule

• Produce Analysis Report

- Yield vs Forecast Analysis – Detect Deviation
- Palm Yield Reports (By Rows/Zone/Location)
- Fruit Quality Study and Market Value
- Palm –Market Logistic schedule (Market Price)



PLANTING / FRUITING PHASE

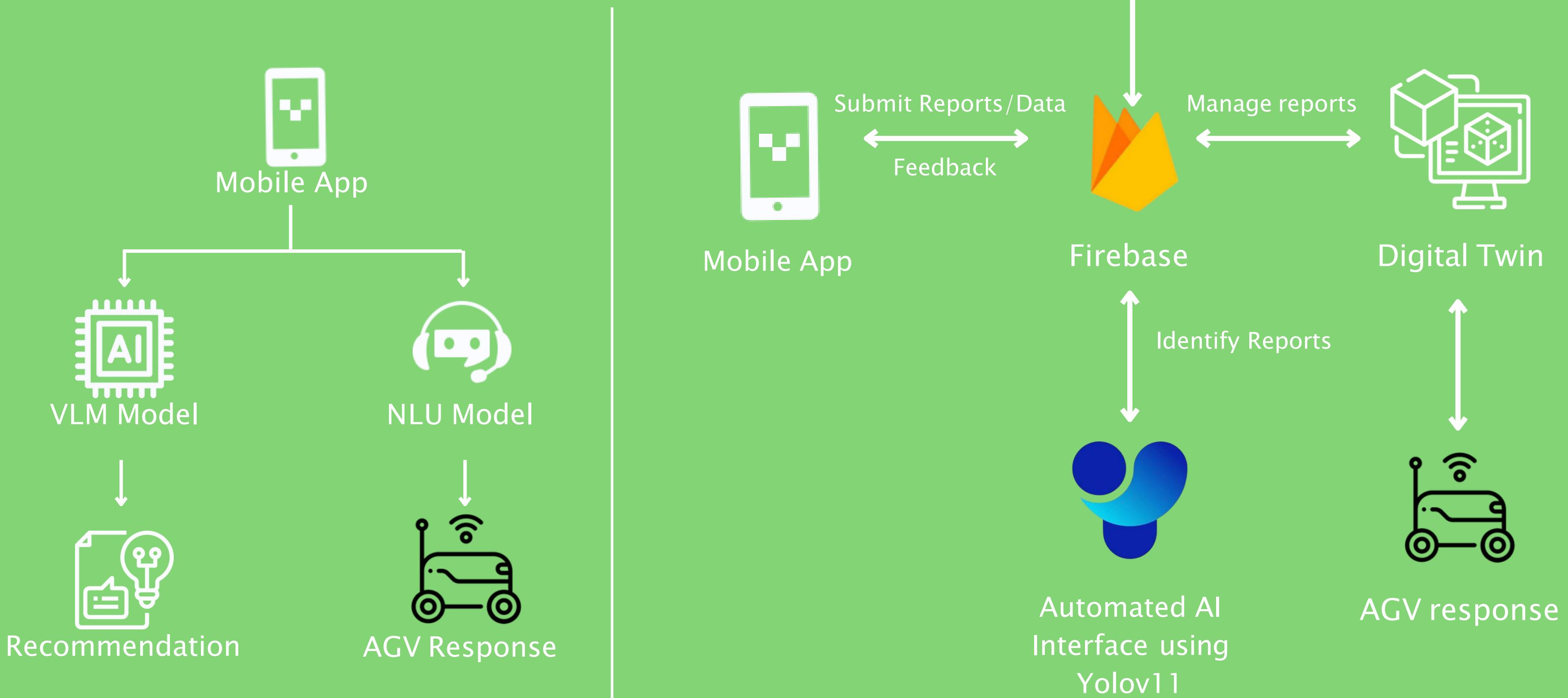
MANURE PHASE

HARVEST PHASE

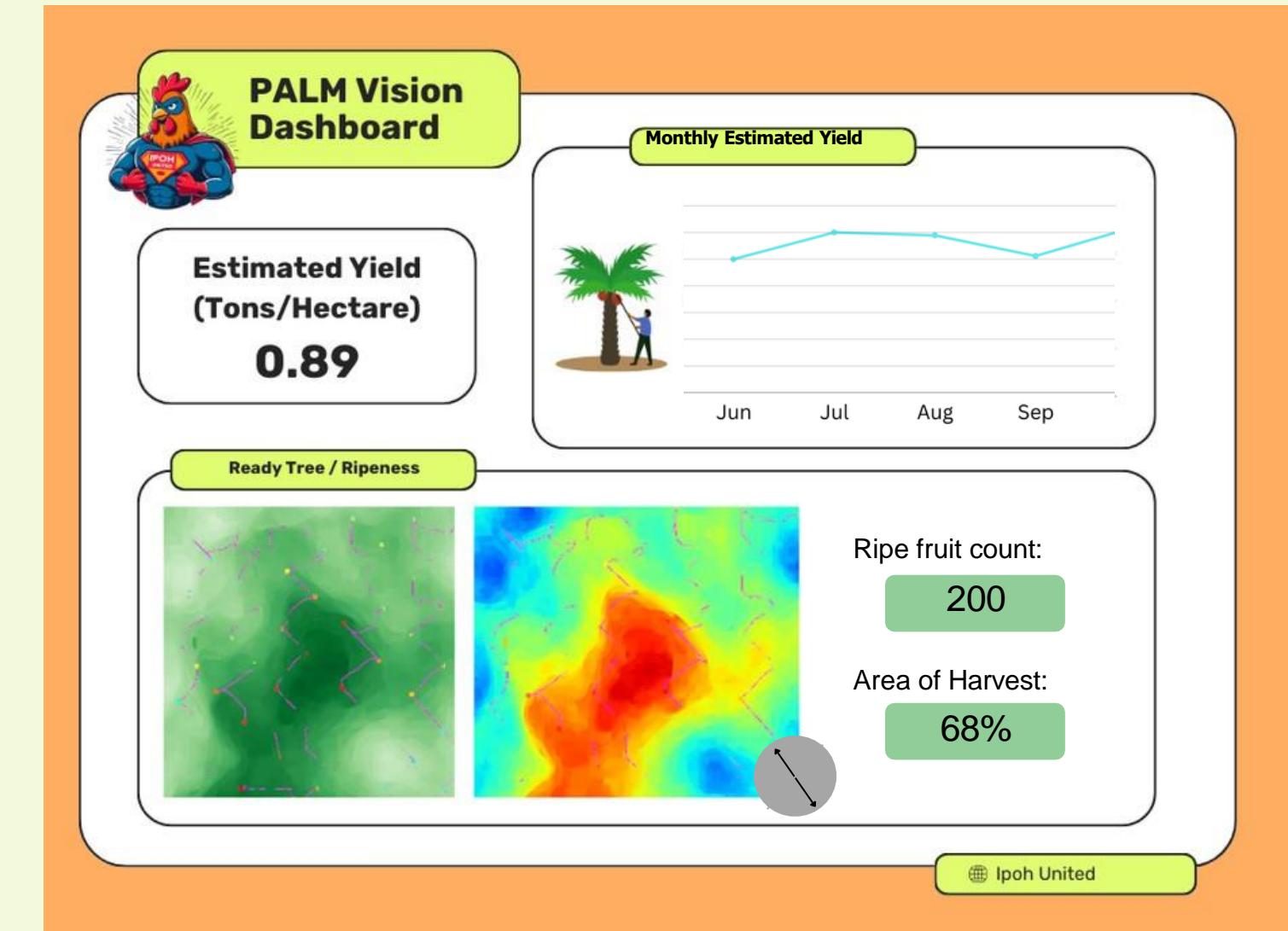
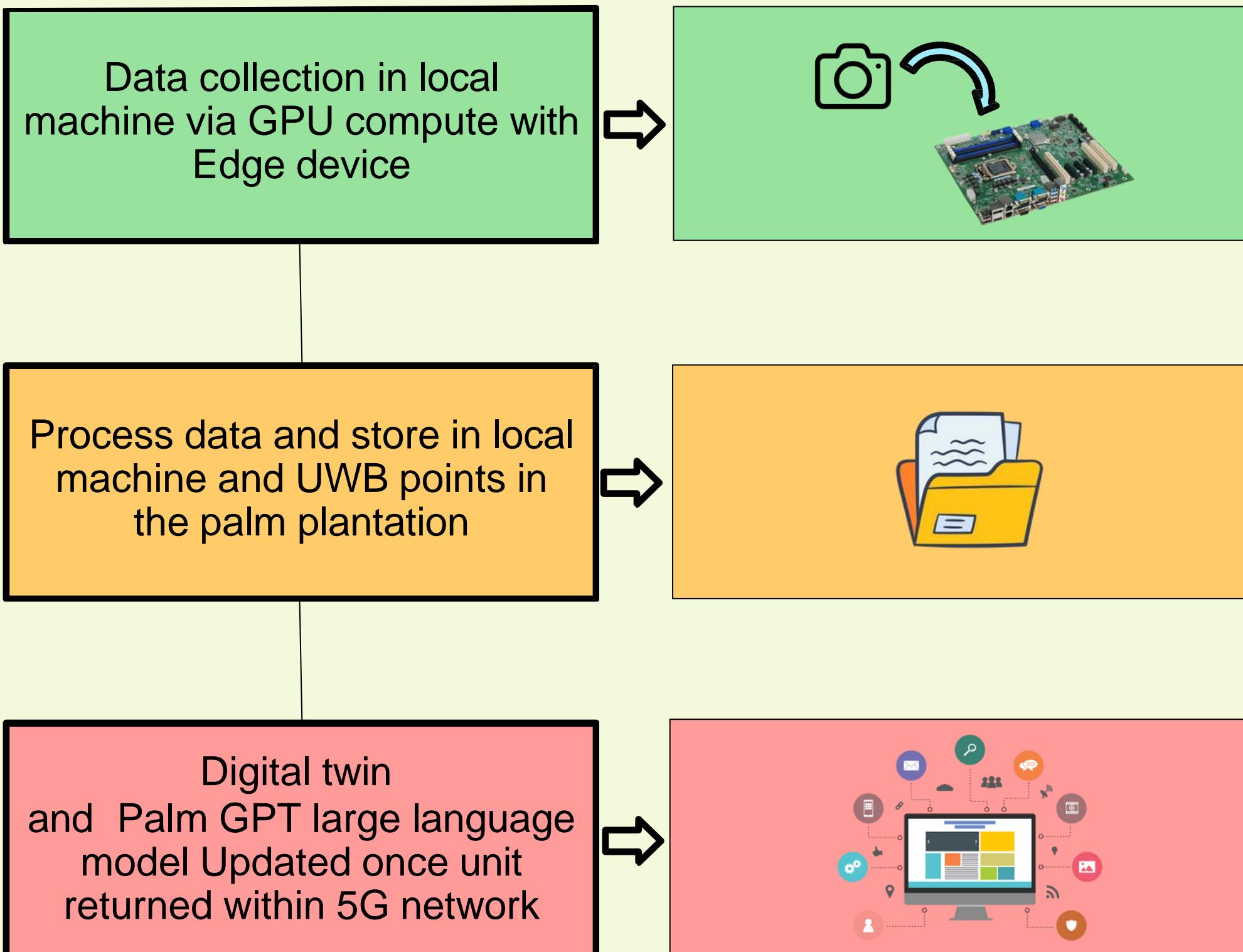
LOGISTICS PHASE

DATA PIPELINES: Structured data (Tree , Locations, Manure), Scout Drone Image /Video Data, Sensors (Fruit Colour Detection)

Solution Workflow



Data Collection & Processing



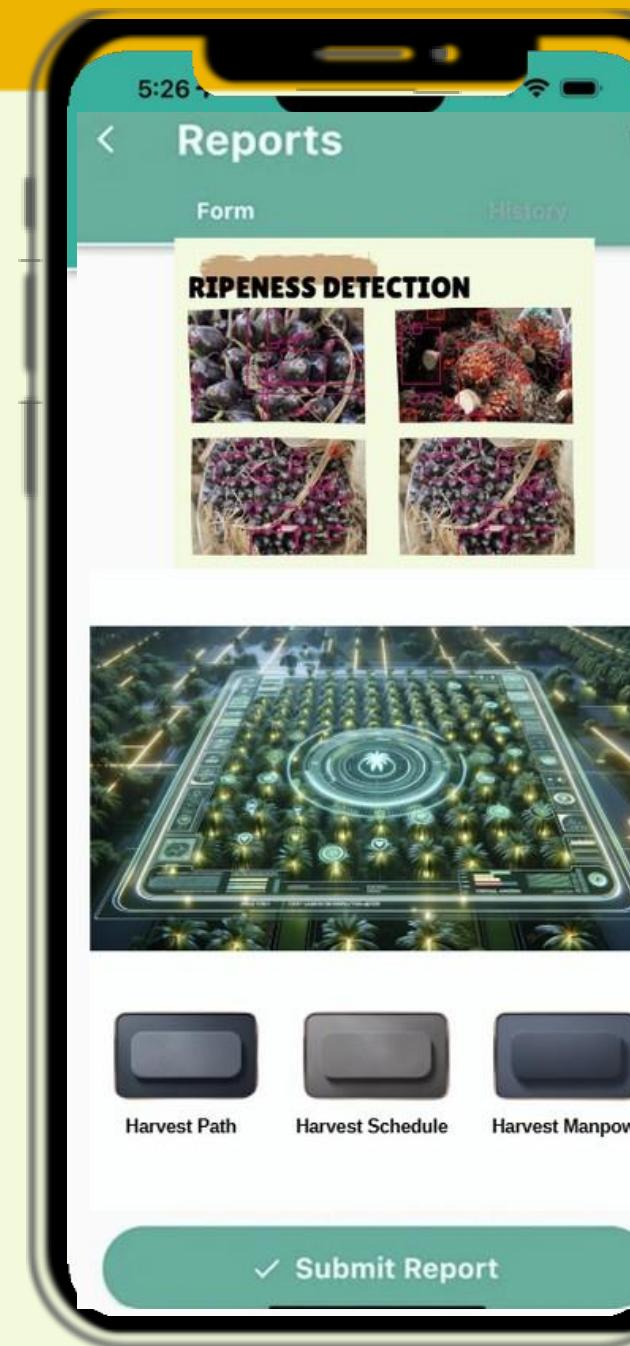
Technology partners



FUNCTIONALITIES (MOBILE APP)



Click On "Report"

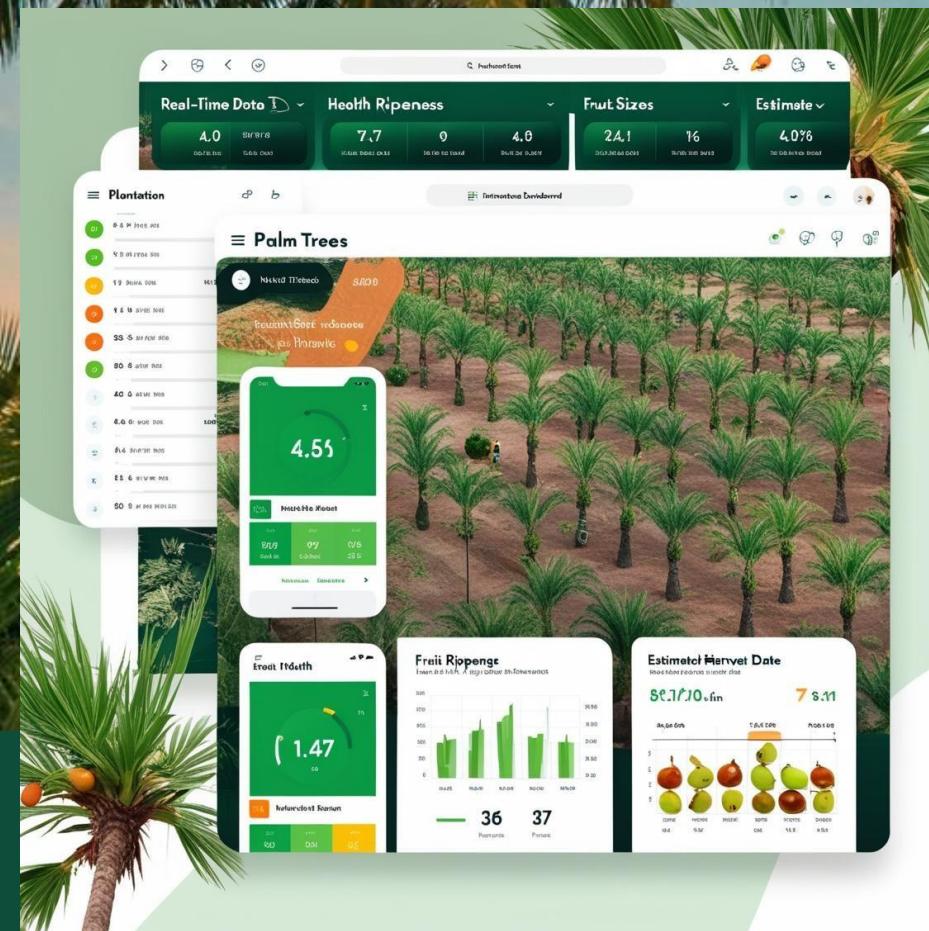


- Choose to see ripeness detection ,
- See Harvest manpower allocation & schedule See
- AGV harvest path for FFB zone & AGV details

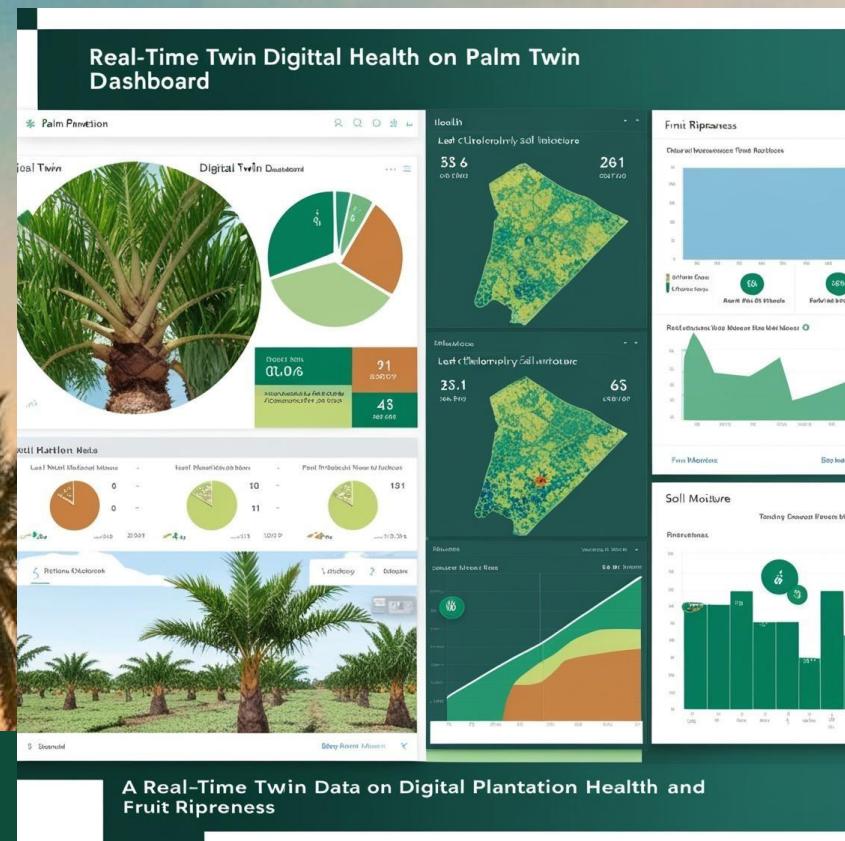


Users' Privacy Protection
with Security Features
(AES-CTR encryption +
BIP39 Mnemonic Phrase)

FUNCTIONALITIES DIGITAL TWIN PLANTATION



Digital twin of the Palm Plantation and sensor Information

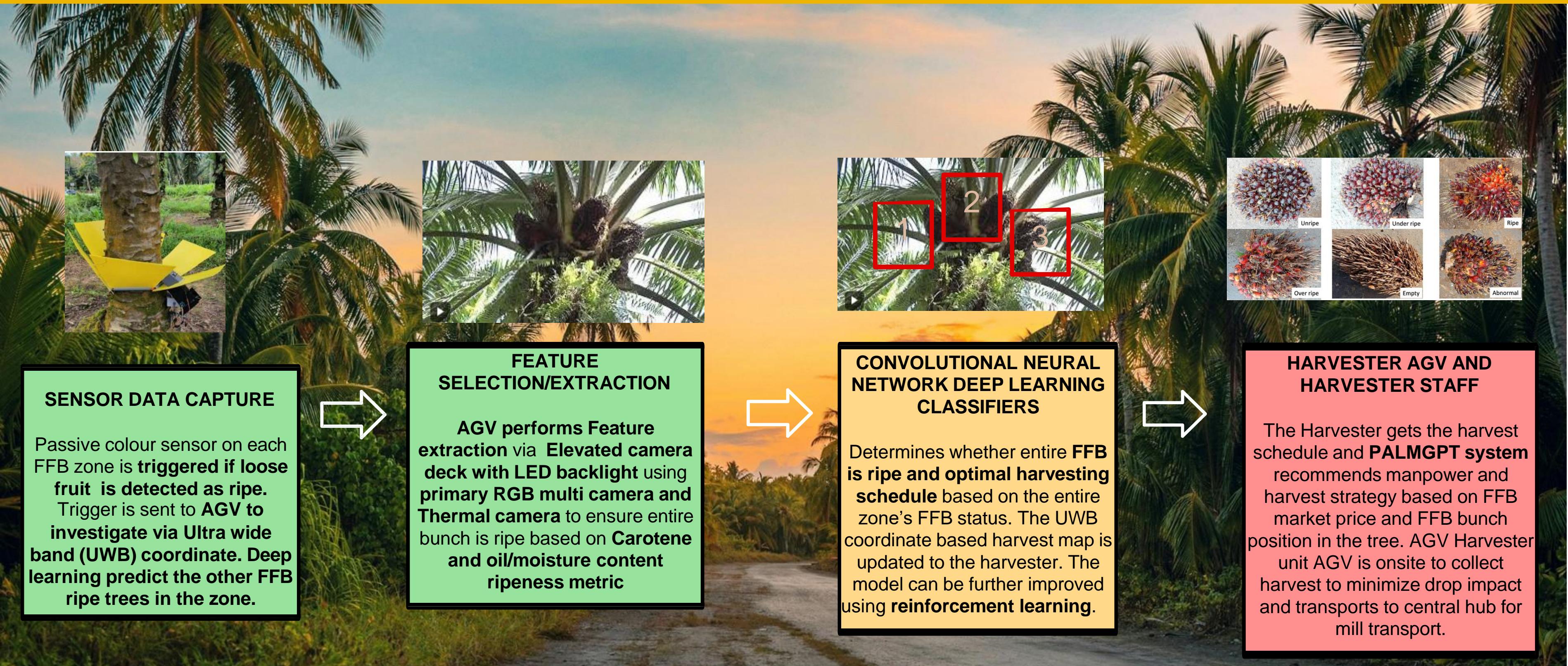


Overall prediction of the plantation on palm tree ripeness, harvest scheduling and optimal FFB harvest pricing strategy

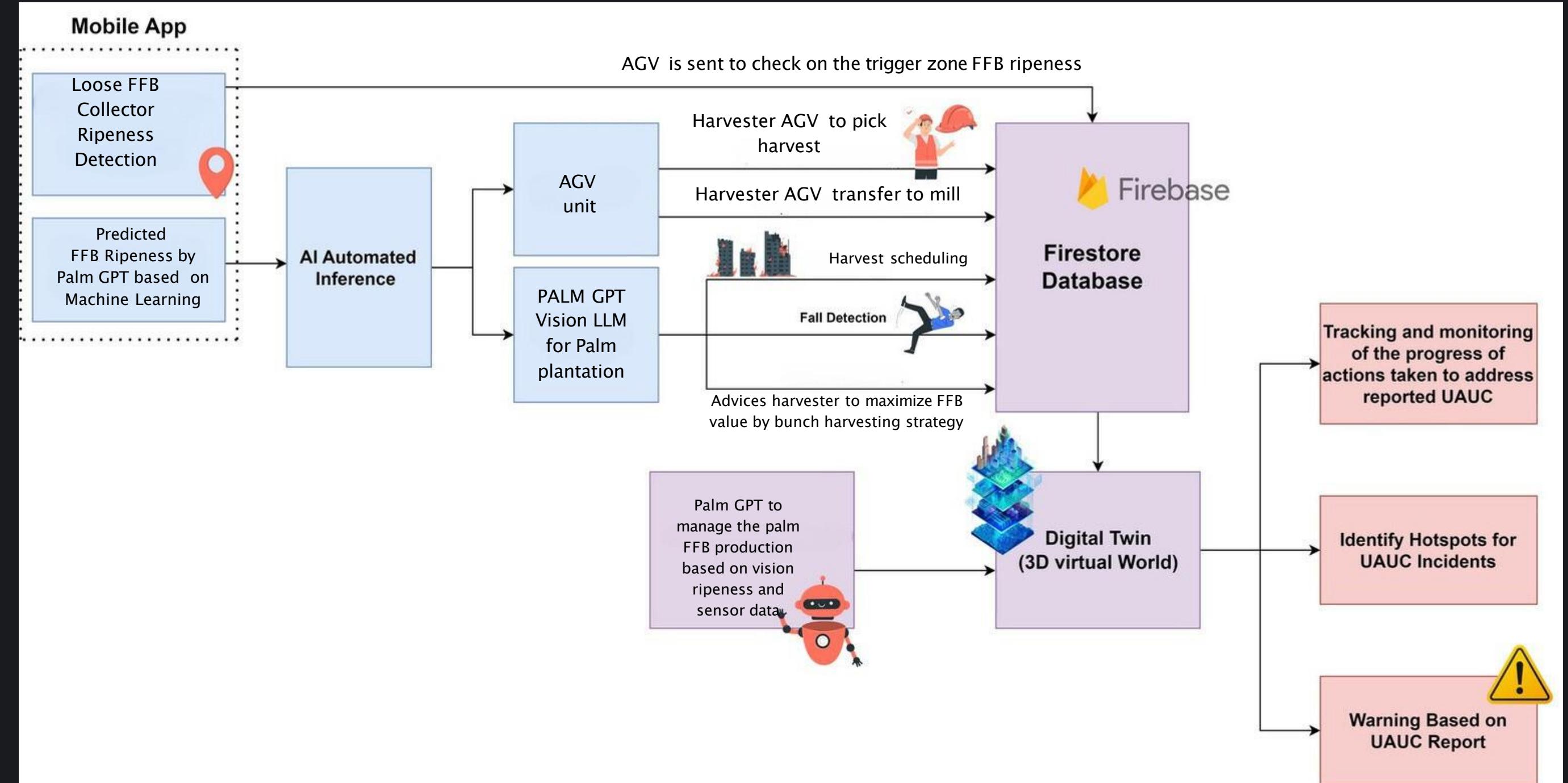


Edge AIOT Ripeness detection and livestream of the Inspection from AGVs.

Fruit Counting, Ripeness and Harvest Prediction Computer Vision Flow



Solution Architecture



Solution Technology
for Implementation:



Unity



Firebase



YOLOv8



Integration & Support

