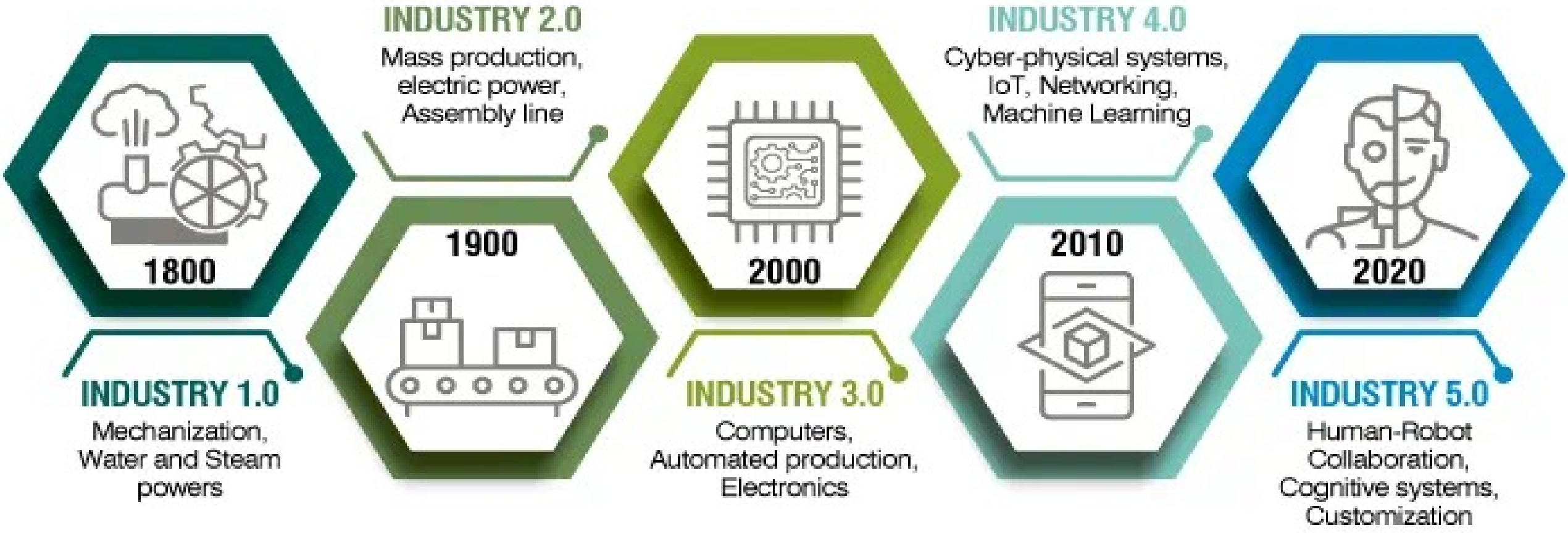
Exploring AWS: A Journey into Cloud Computing

Study case: Carbon Dynamic Monitoring Using IoT and Cloud Computing

Willy Sudiarto Raharjo

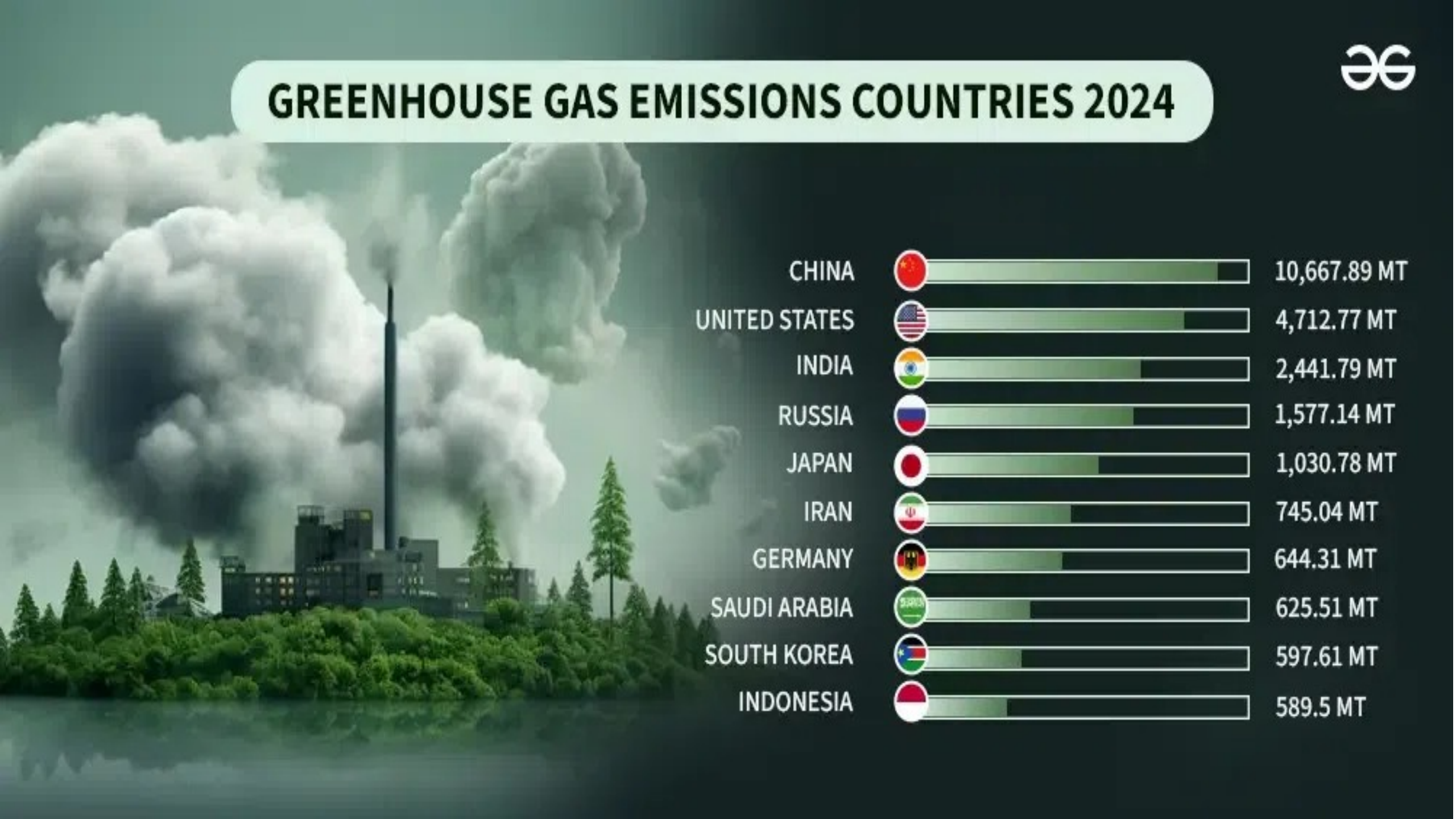
26 Agustus 2024

Industry Revolution



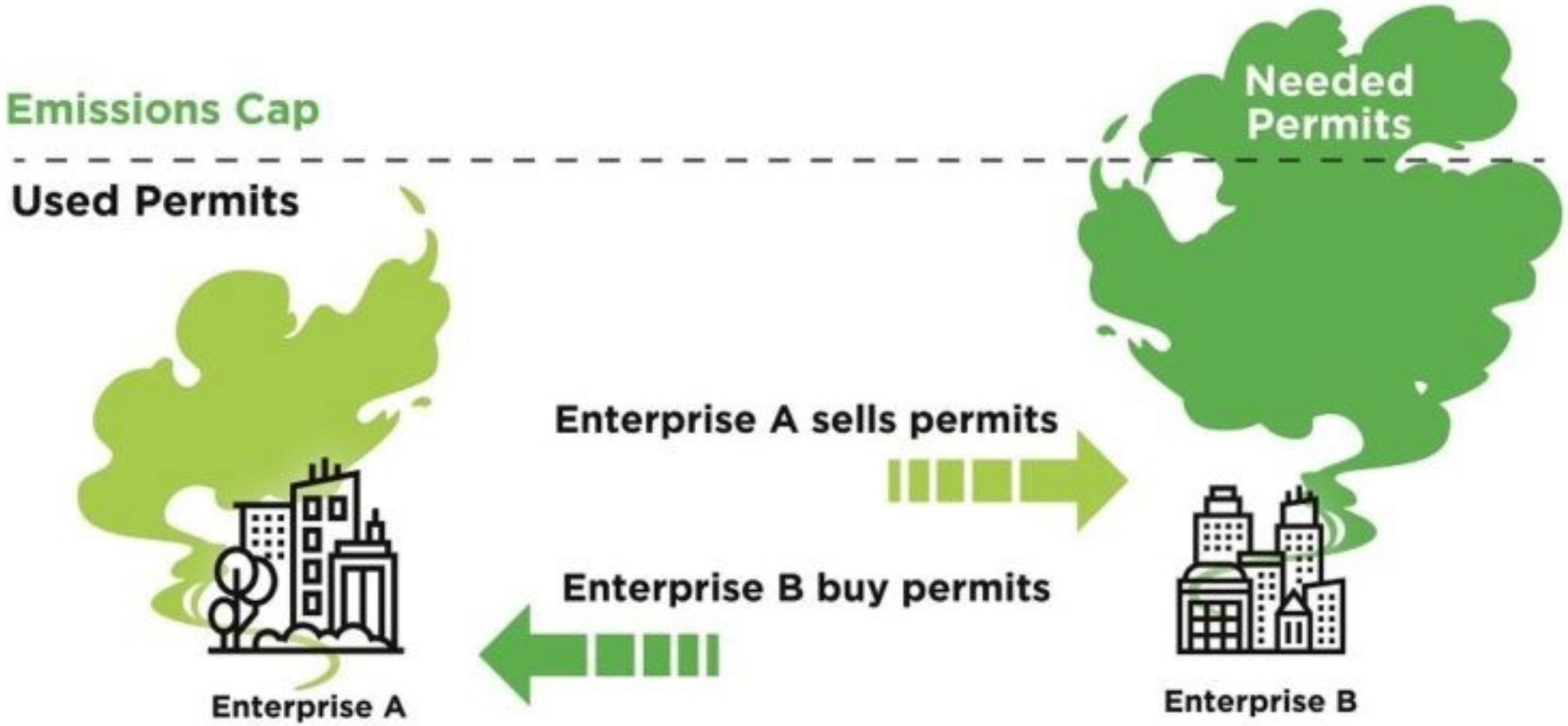
a rapid major change in an economy of radical modernization and mechanization

GREENHOUSE GAS EMISSIONS COUNTRIES 2024




CARBON NET ZERO

Carbon Trading



ISAI

Intelligent System Aerial Imaging

BEEHIVE DRONES

kedaireka

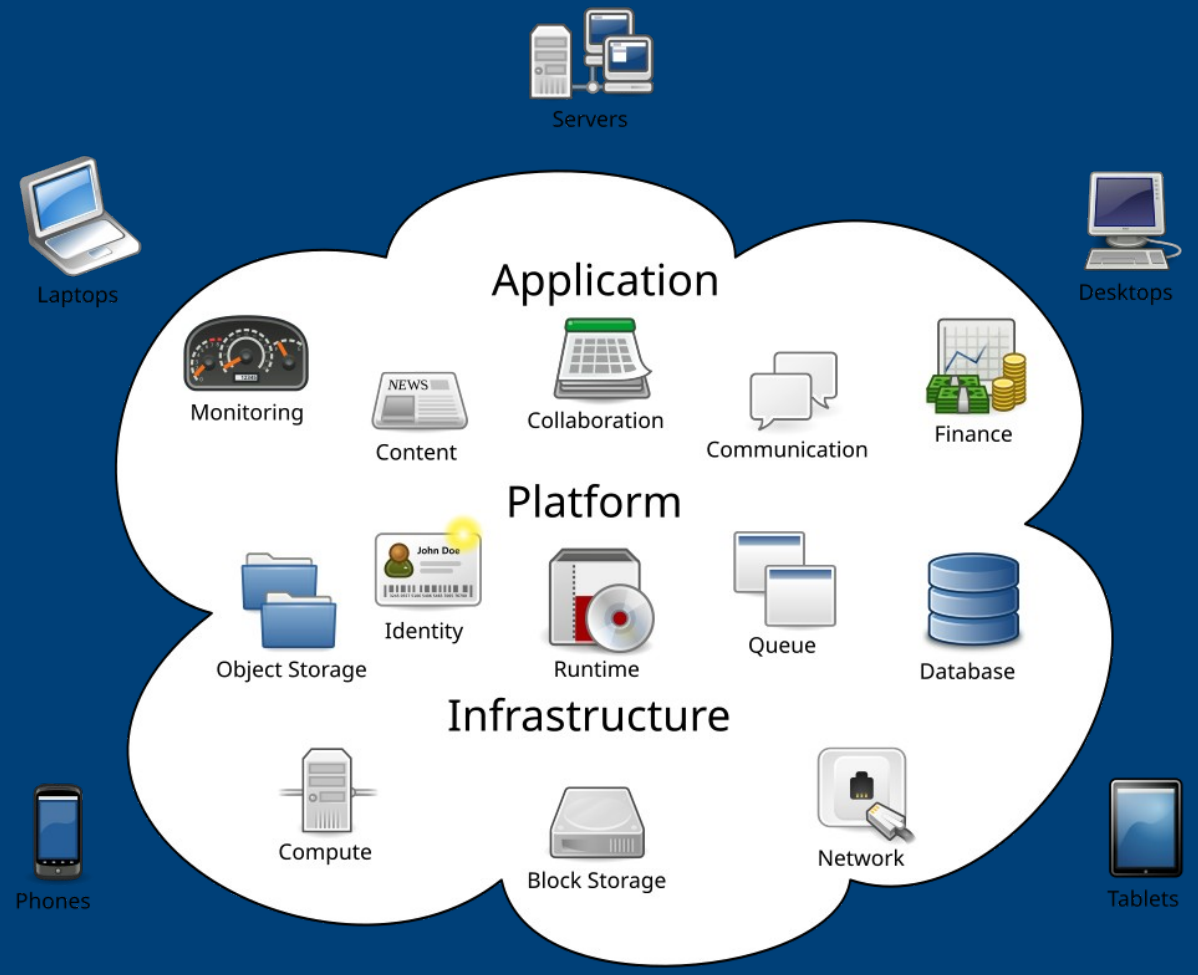
https://isai.fti.ukdw.ac.id/

ISAI

- Kedaireka Funding (2 periods) and MBKM Mandiri
- More than 24 students involved in this project
- 4 Thesis topics
- 4 Intellectual properties
- 5 lecturers from UKDW
- Staffs from Beehives Drones

ISAI

- Web-based application for predicting carbon values and monitoring carbon dynamics quantitatively on a land.
- Utilizes drone technology to capture image of a land.
- The system is also designed to automatically pick up carbon data through drones (future plan).
- It facilitates stakeholders in the agricultural sector to monitor and understand carbon dynamics and changes in environmental quality



Cloud computing is the **on-demand** delivery of compute power, database, storage, applications, and other IT resources **via the internet** with **pay-as-you-go** pricing.

Amazon Web Services

AWS Services


Analytics


Application Integration


AR and VR


Blockchain


Business Applications


Compute


Cost Management


Customer Engagement


Database


Developer Tools


End User Computing


Game Tech


Internet of Things


Machine Learning


Management and Governance


Media Services


Migration and Transfer


Mobile


Networking and Content Delivery


Robotics


Satellite


Security, Identity, and Compliance


Storage

Serverless Computing

AWS IoT

AMAZON API GATEWAY

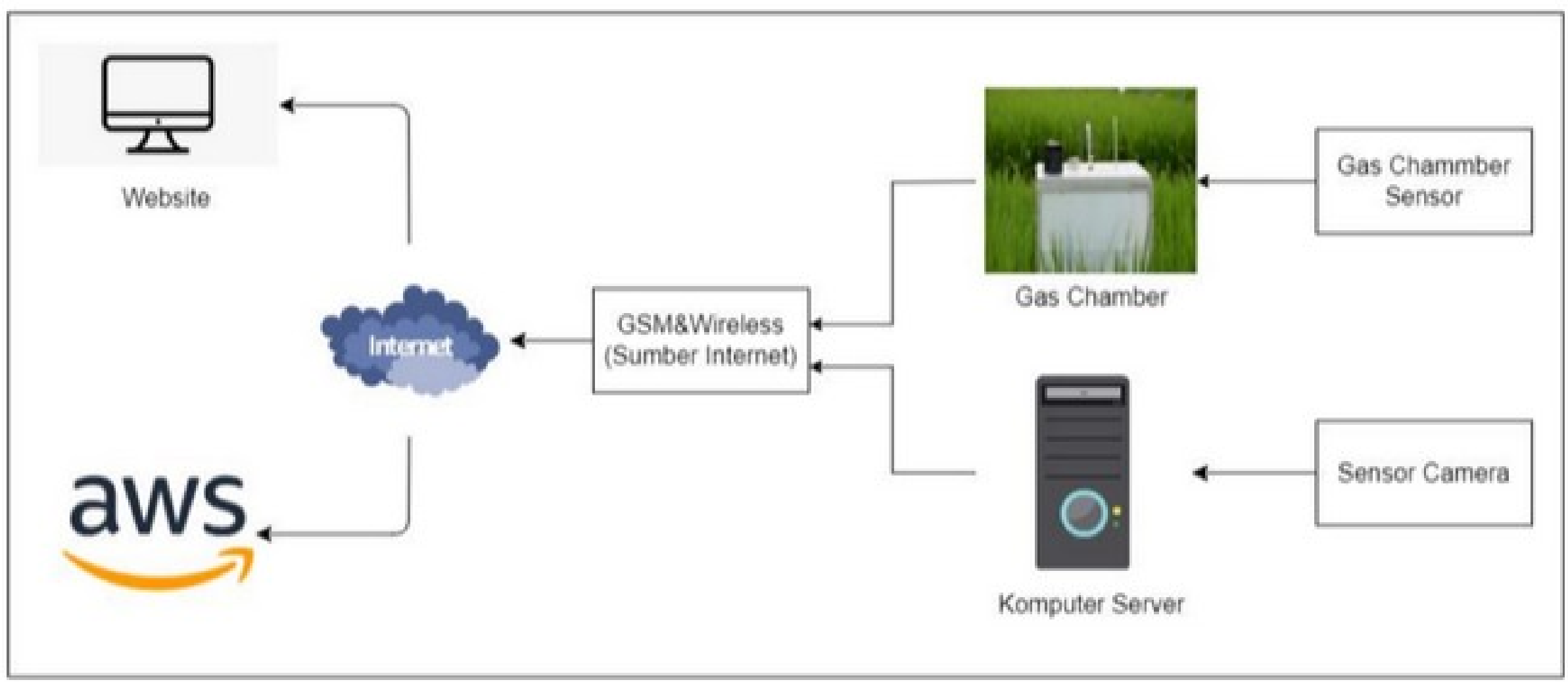
aws

AMAZON S3

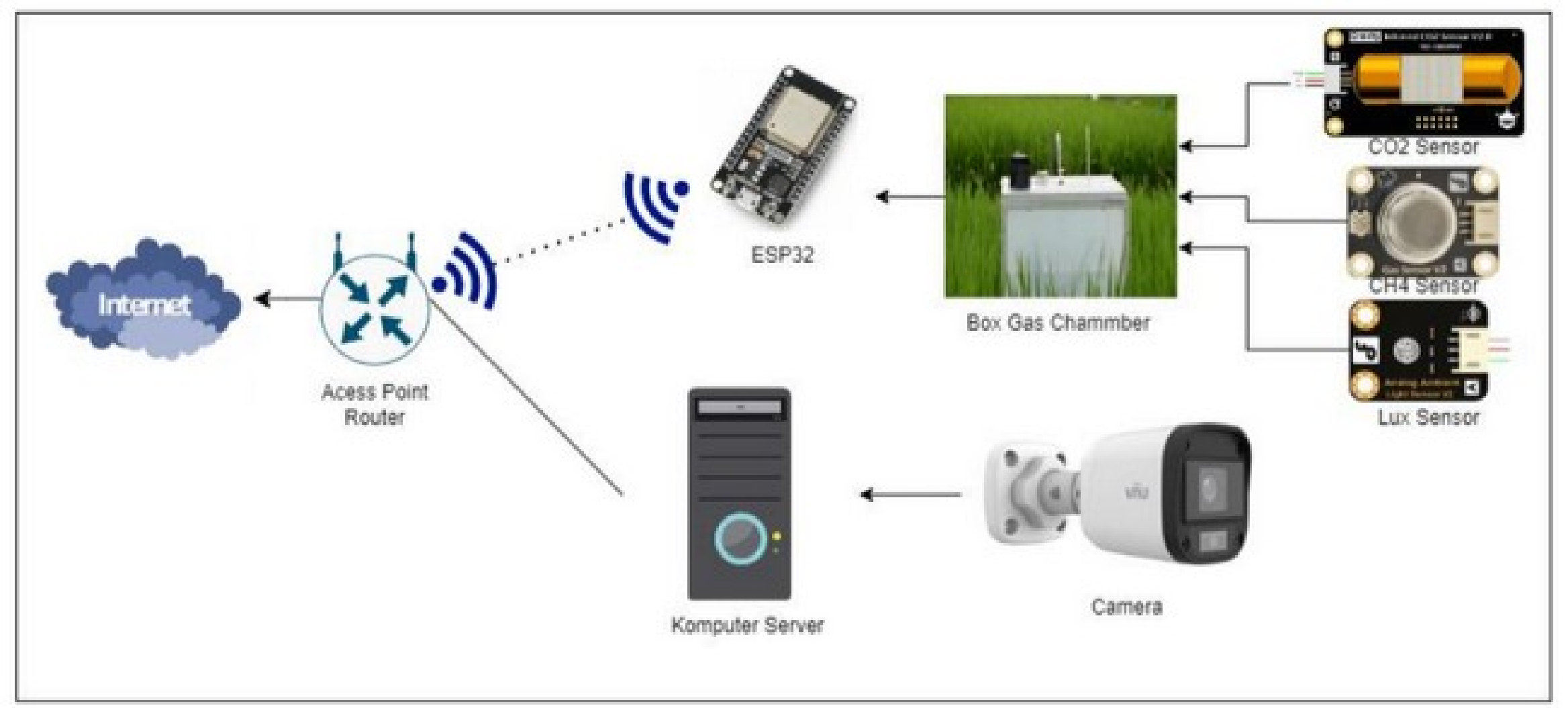
AMAZON DYNAMODB

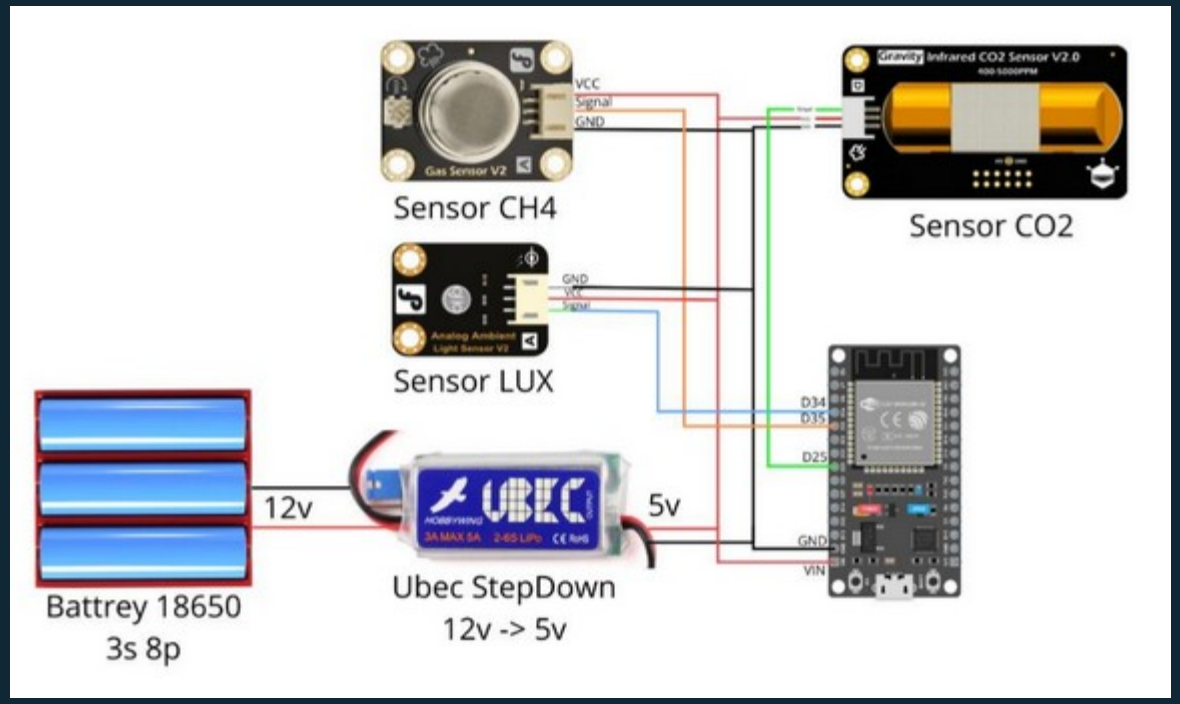
AWS LAMBDA

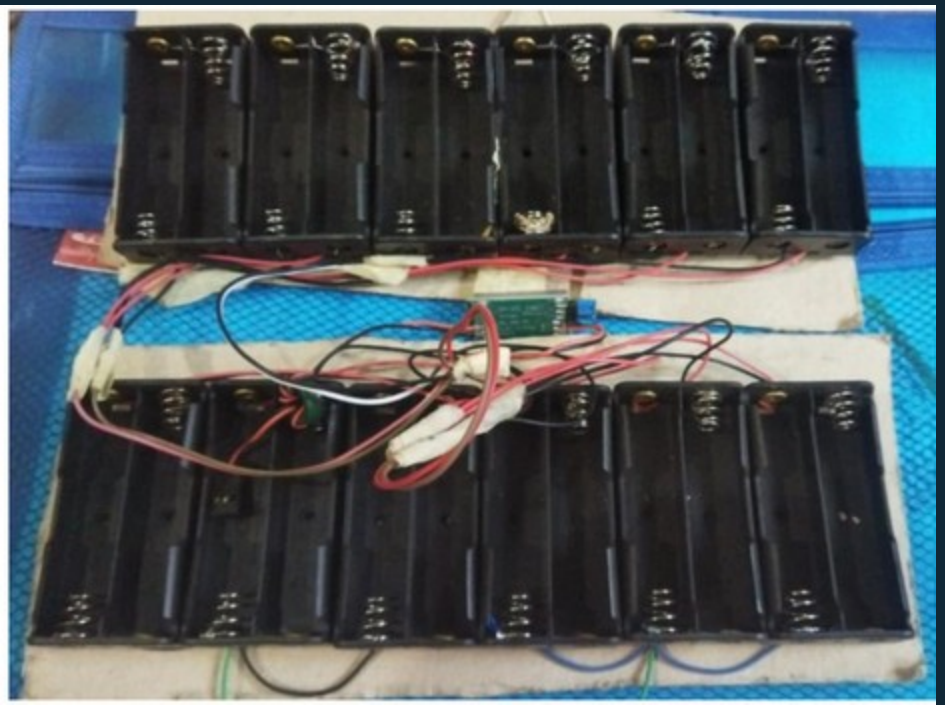
General Architecture

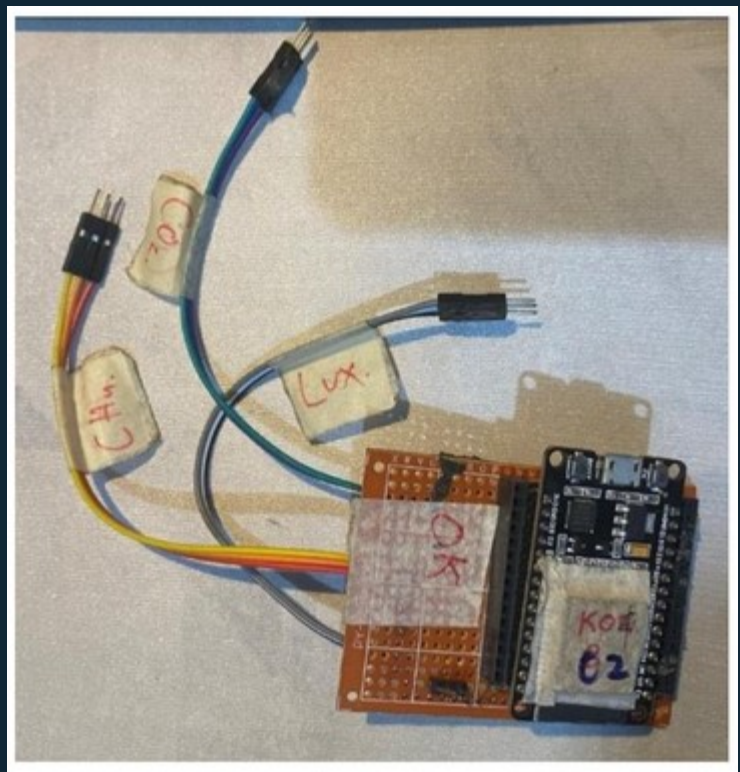


Embedded System Architecture

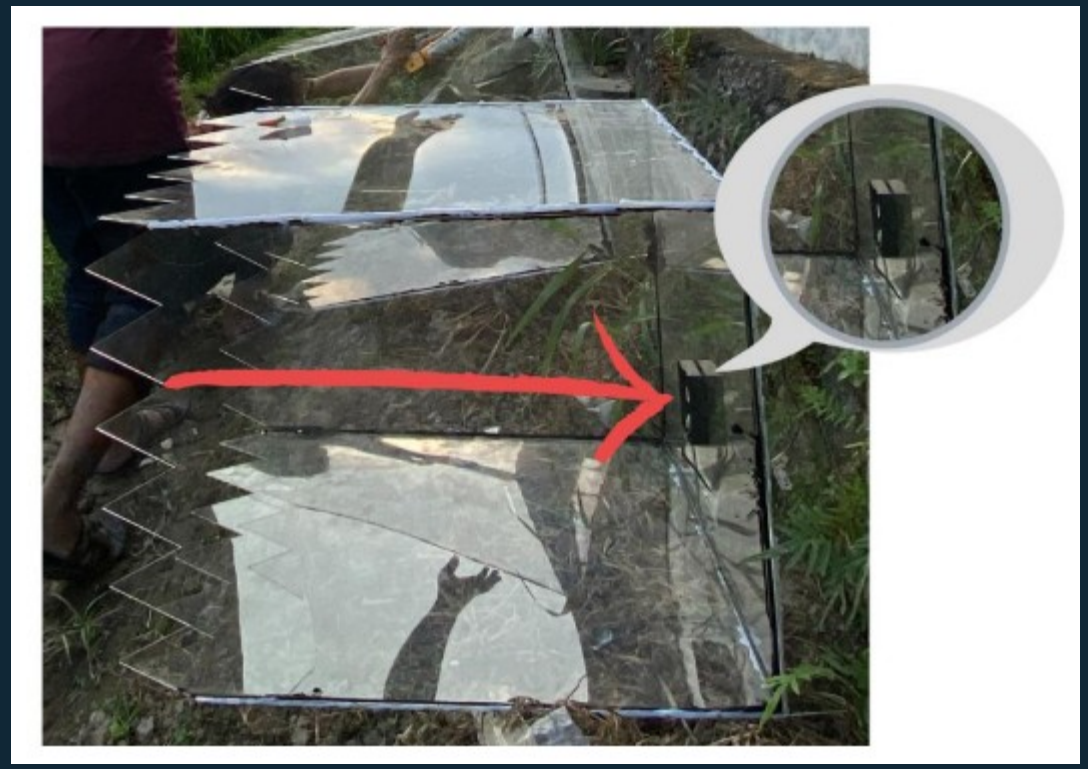



VCC
Signal
GND
Sensor CH4
Gravity Infrared CO2 Sensor V2.0
Sensor CO2
GND
VCC
Sensor LUX
D34
D35
D25
GND
VIN
12v
5v
Battrey 18650
3s 8p
Ubec StepDown
12v -> 5v

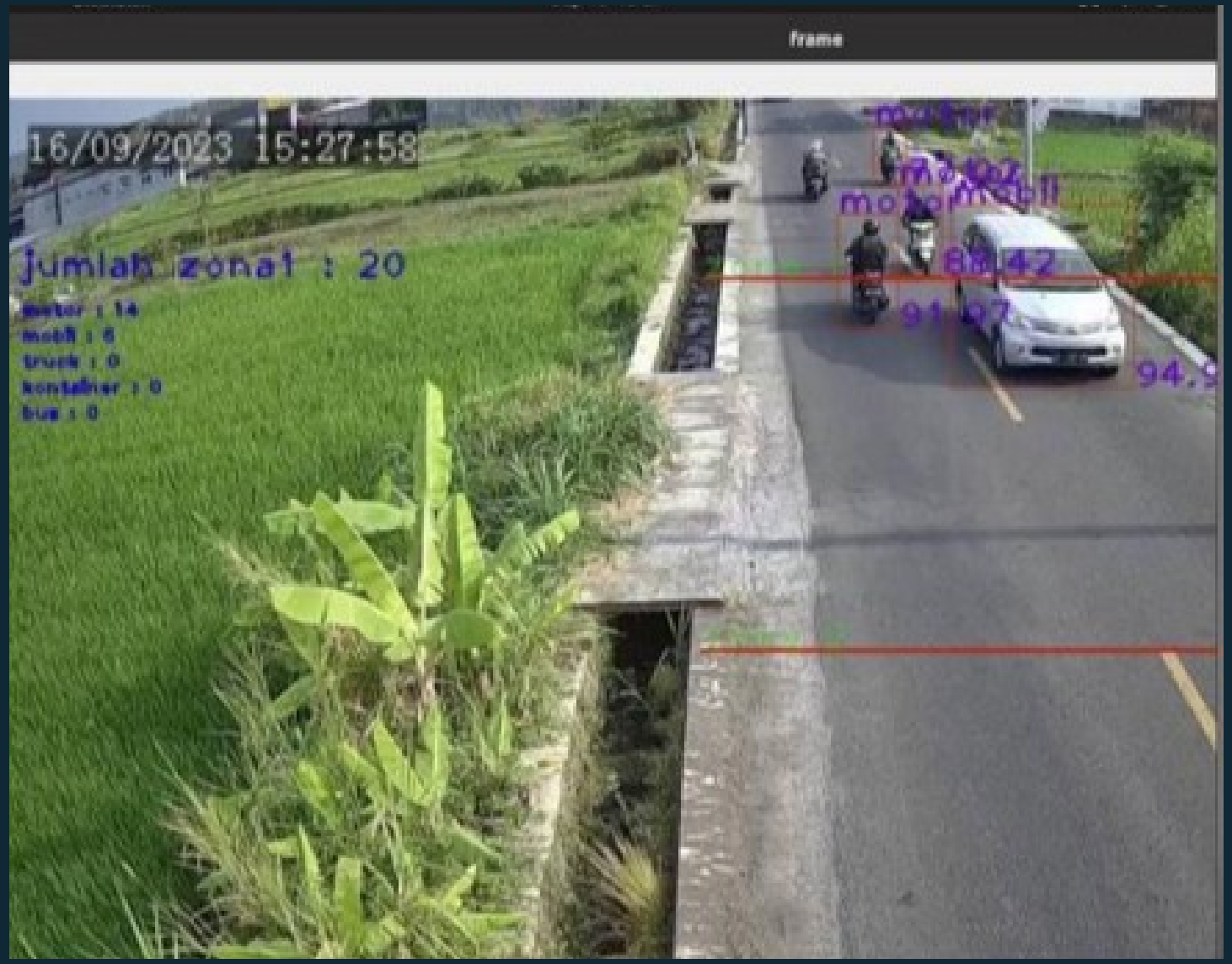



CO2
CH4
Lux
KOŁ
02

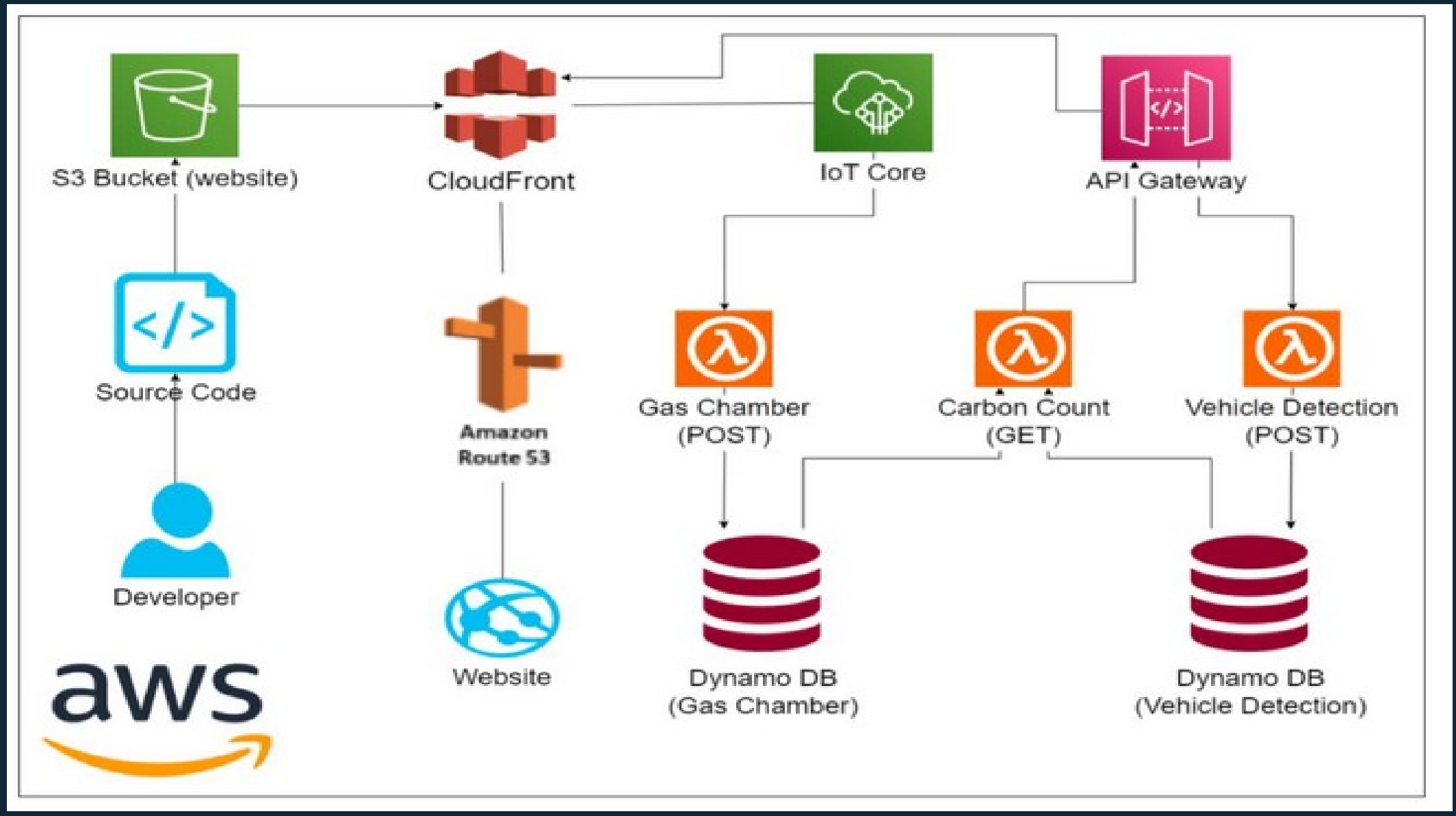
Sensors and Gas Chamber



CCTV with object detection



Cloud Architecture



Implementation Area

Kowang

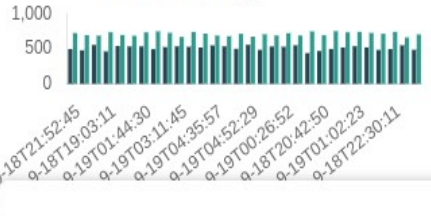
Tulung

Taman Martani, Kalasan, Sleman, Yogyakarta.

Map Satellite

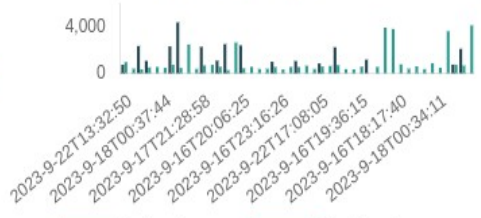
Nama Lahan : Kowang
Komoditas : Padi
Rata-rata CO2 : 514.63 ppm
Rata-rata Gas CH4 : 711.57 ppm
Fase (HST) : 0

Data Karbon (gr)



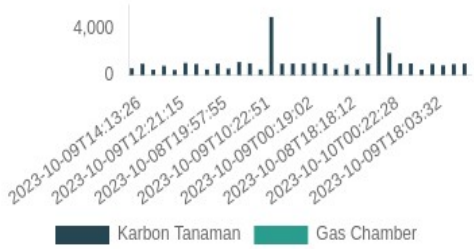
Nama Lahan : Kowang
Komoditas : Padi
Rata-rata CO2 : 623.32 ppm
Rata-rata Gas CH4 : 898.38 ppm
Fase (HST) : 3

Data Karbon (gr)



Nama Lahan : Kowang
Komoditas : Padi
Rata-rata CO2 : 1107.77 ppm
Rata-rata Gas CH4 : 0.00 ppm
Fase (HST) : 1

Data Karbon (gr)



Cost Estimation

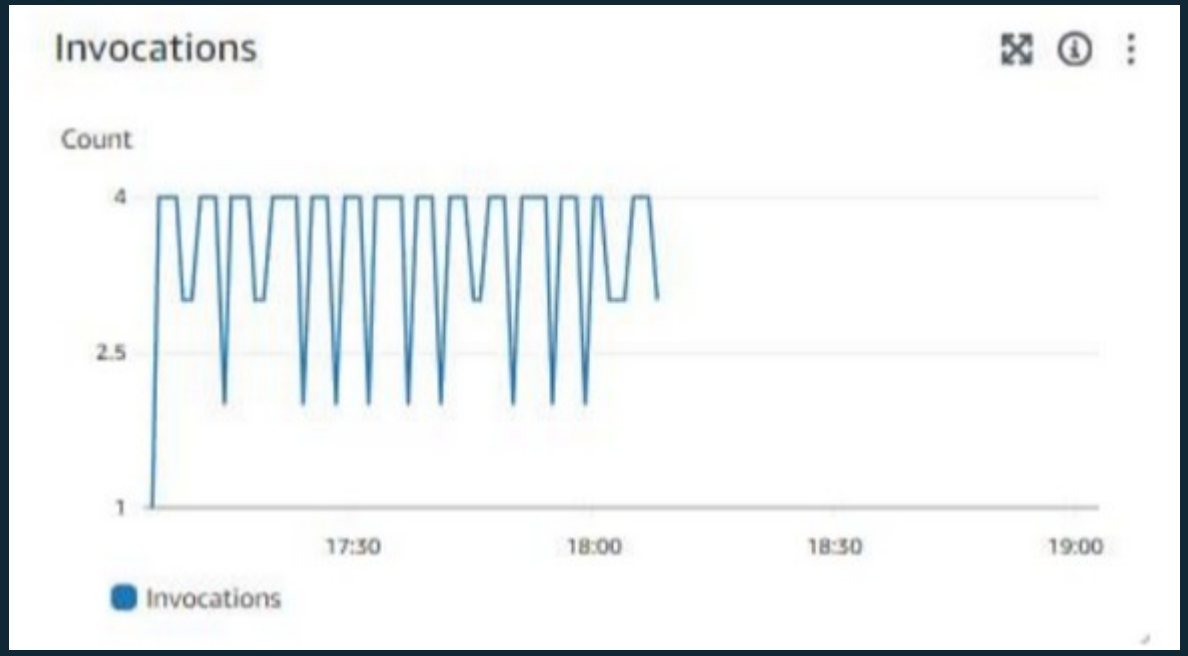
- 10 CCTV
  - Upload interval 24h
- 12 Gas Chambers + Embedded systems
  - Post interval 15s
- Website (1000 visits per day)

Estimate summary

Upfront cost	Monthly cost	Total 12 months cost
0.03 USD	5.78 USD	69.39 USD
		Includes upfront cost

Results

- System is cost-effective
- Success Rate: 91.025%
  - Issue on embedded system (ESP32)



Thank You!