Project: Smart Aquafarm Feeder and Monitoring System in Highly Turbid Condition *(SAqFeeder)*

Background :

In the realm of fish and aquaculture monitoring systems, tools are needed to restore highly turbid images to monitor the aquafarms effectively. Challenges in aquafarms, including forward and backward scattering, absorption, large particles, and artificial lighting, hinder effective monitoring, particularly in assessing feed quantities, which directly impacts the overall health status of aquafarms as well as the economic sustainability of farmers.

SAqFeeder aims to optimize the feeding process by developing an intelligent feeding system using computer vision, auditory filtering, and automated actuation, addressing the challenges of water turbidity.

Targets:

1. design a solar-powered actuation system
2. estimate the quantity of remaining feeds using computer vision
3. develop a dashboard to monitor the health status of the farm
4. forecast the best time to feed the aquafarm based on the data collected
5. automate the feeding system.

Speaker: Eduardo Jr Piedad, S&T Fellow @ DOST – Advanced Science and Technology Institute, Philippines

Project: Smart Aquafarm Feeder and Monitoring System in Highly Turbid Condition (*SAqFeeder*)

Project Members :

Name	Institution	Name	Institution
Dr. Franz Asunta de Leon	ASTI, Philippines	Mr. Gershom Defe	TUPV, Philippines
Dr. Meryl Regine Algodon	ASTI, Philippines	Mr. Gregorio Crisostomo	TUPV, Philippines
Mr. Gerwin Guba	ASTI, Philippines	Mr. Jovel Young	TUPV, Philippines
Ms. Vanesa Osiana	ASTI, Philippines	Dr. Eric Malo-oy	TUPV, Philippines
Dr. Tiong Hoo Lim	UTB, Brunei	Dr. Farhan Bin Mohamed	UTM, Malaysia
Dr. Nurun Najeebah Tashim	UTB, Brunei	Dr. Mohd Shafry Bin Rahim	UTM, Malaysia
Mr. Muhammad Wafiq Zariful	UTB, Brunei	Mr. Chan Vei Siang	UTM, Malaysia
Ms. Norhafizah Binti Muhammad	UTB, Brunei	Dr. Kazutaka Kikuta	NICT, Japan
Mr. Ace Zander Antonio	TUPV, Philippines	Dr. Ken Murata	NICT, Japan

Project Duration : 2 years
(1st April 2024 – 31st March 2026)

Project Budget: 80,000 USD

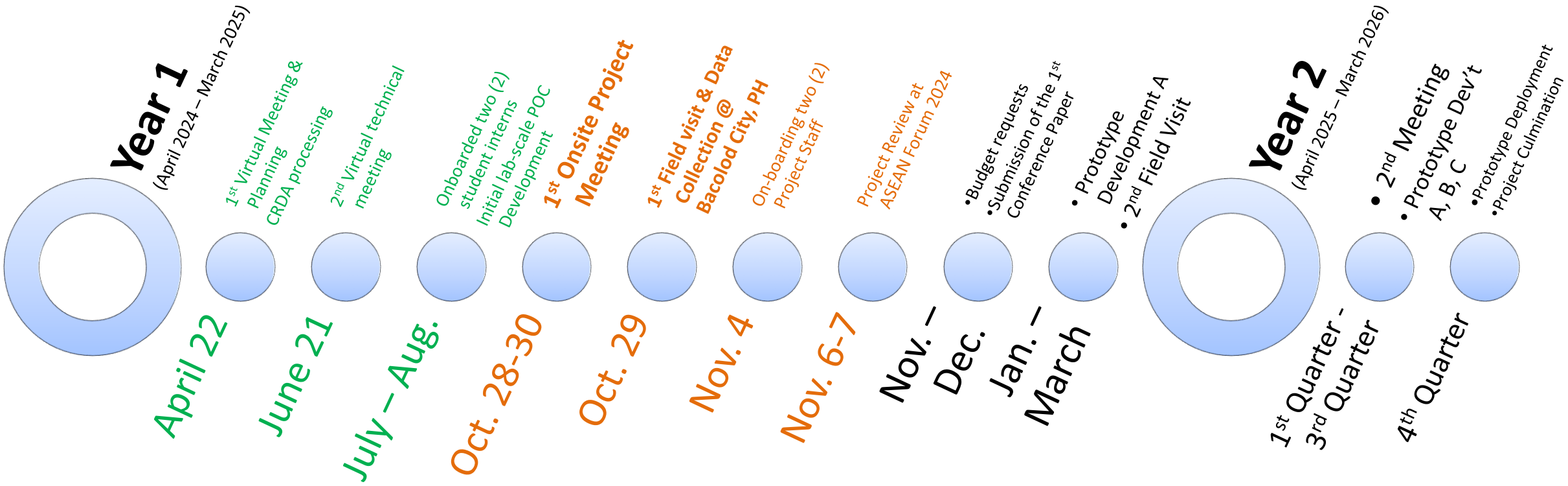
Associate Members :

MARMI Agricultural Corp., Philippines
Kathleen P. Trebol

O.D.E Aquaculture & Agriculture Co., Brunei
Zuhairi Hj Azahari

Project *SAqFeeder* Activities

Project Timeline



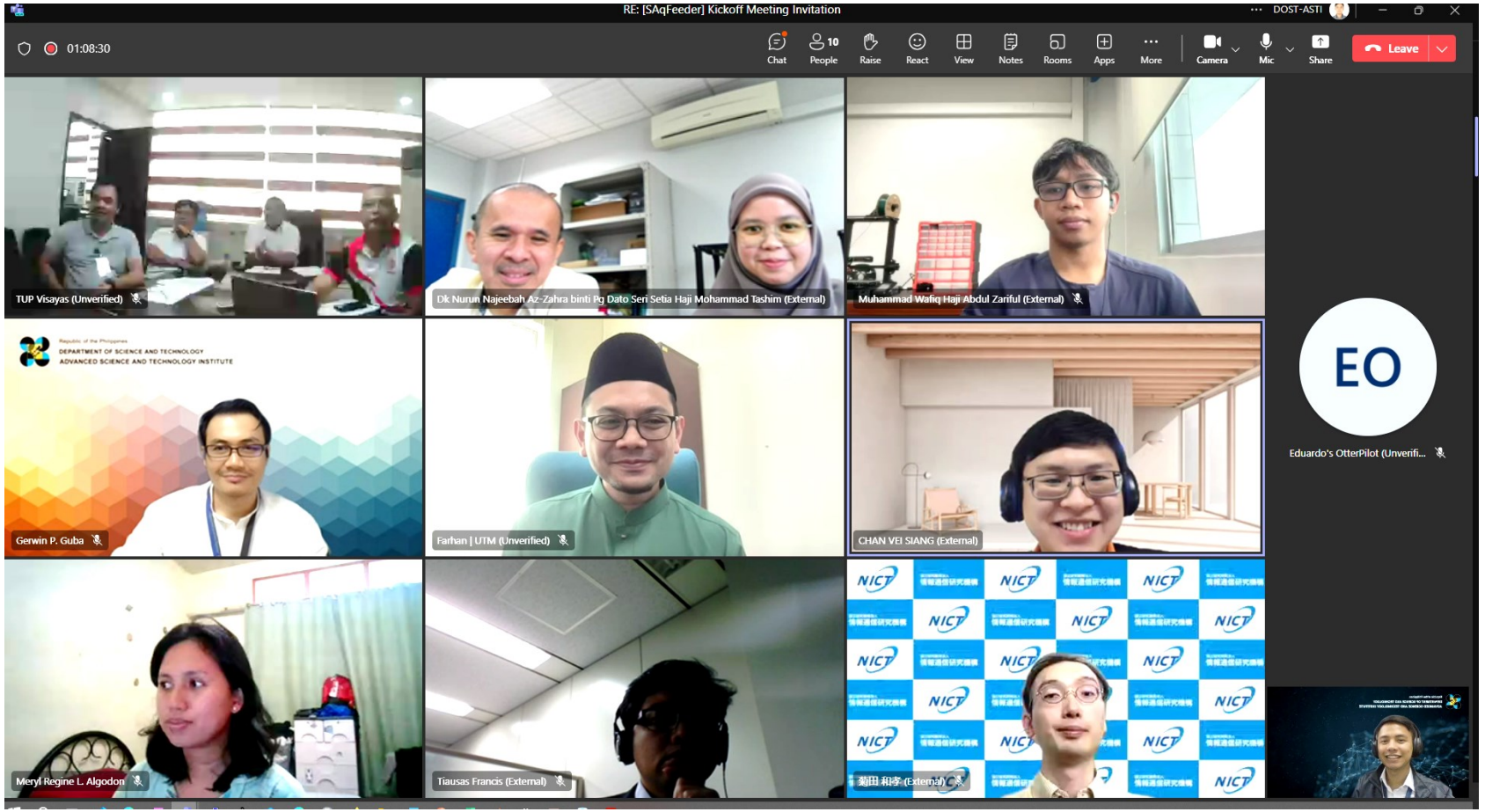
Notable Delays:

(1) CRDA signing => Budget requests => Onsite Planning => Data collection => R&D activities

(2) Project staff on-boarding *(due to the delay from other funding grant)*

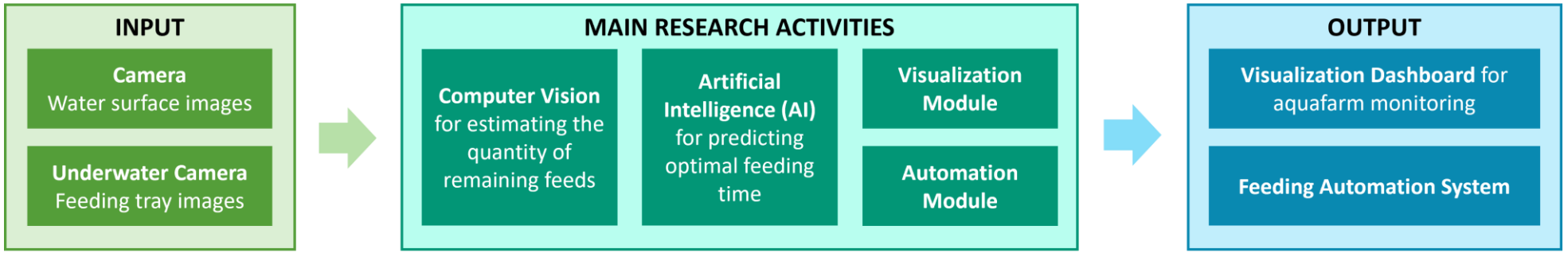
Project *SAqFeeder* Activities

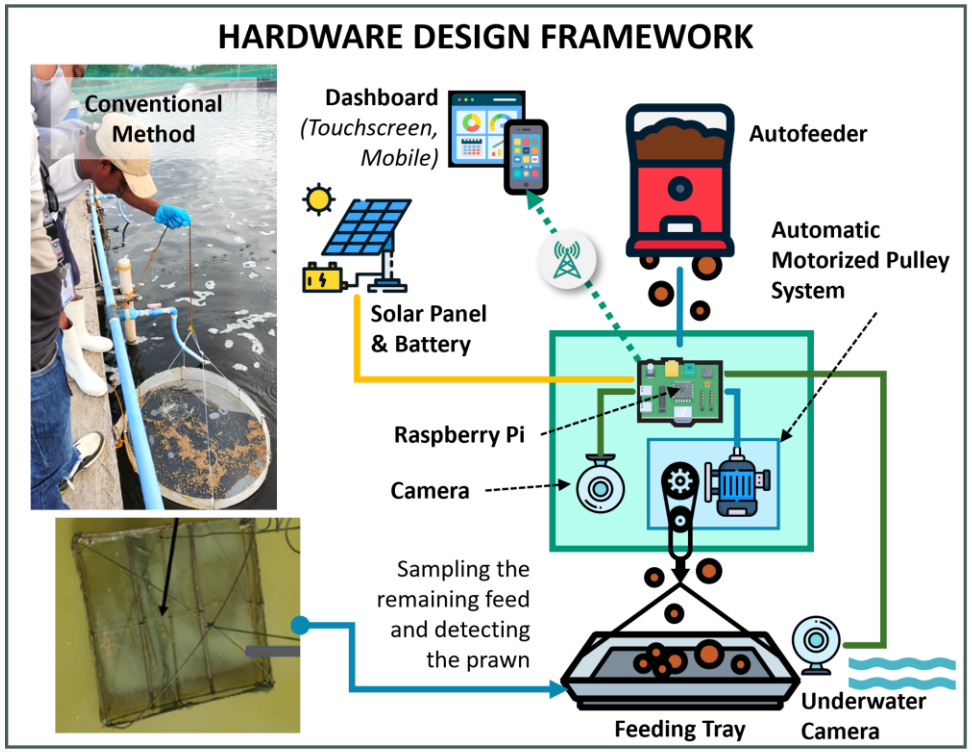
1st Project Commencement Virtual Meeting & Planning

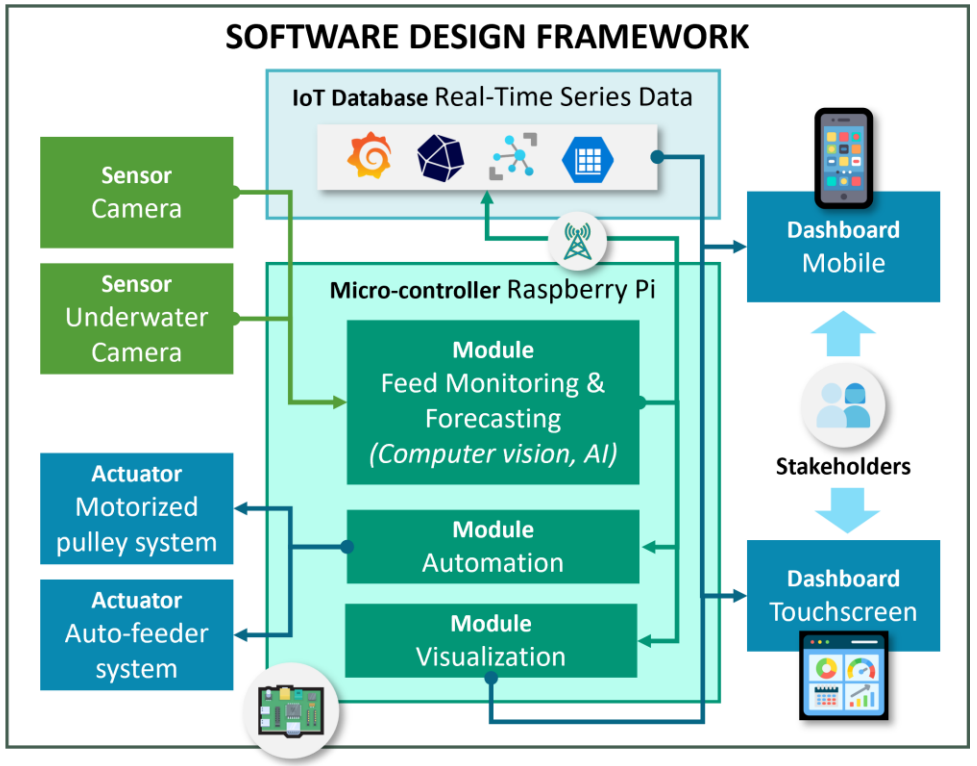


22 April 2024 via MS TEAMS

Project *SAqFeeder* Activities





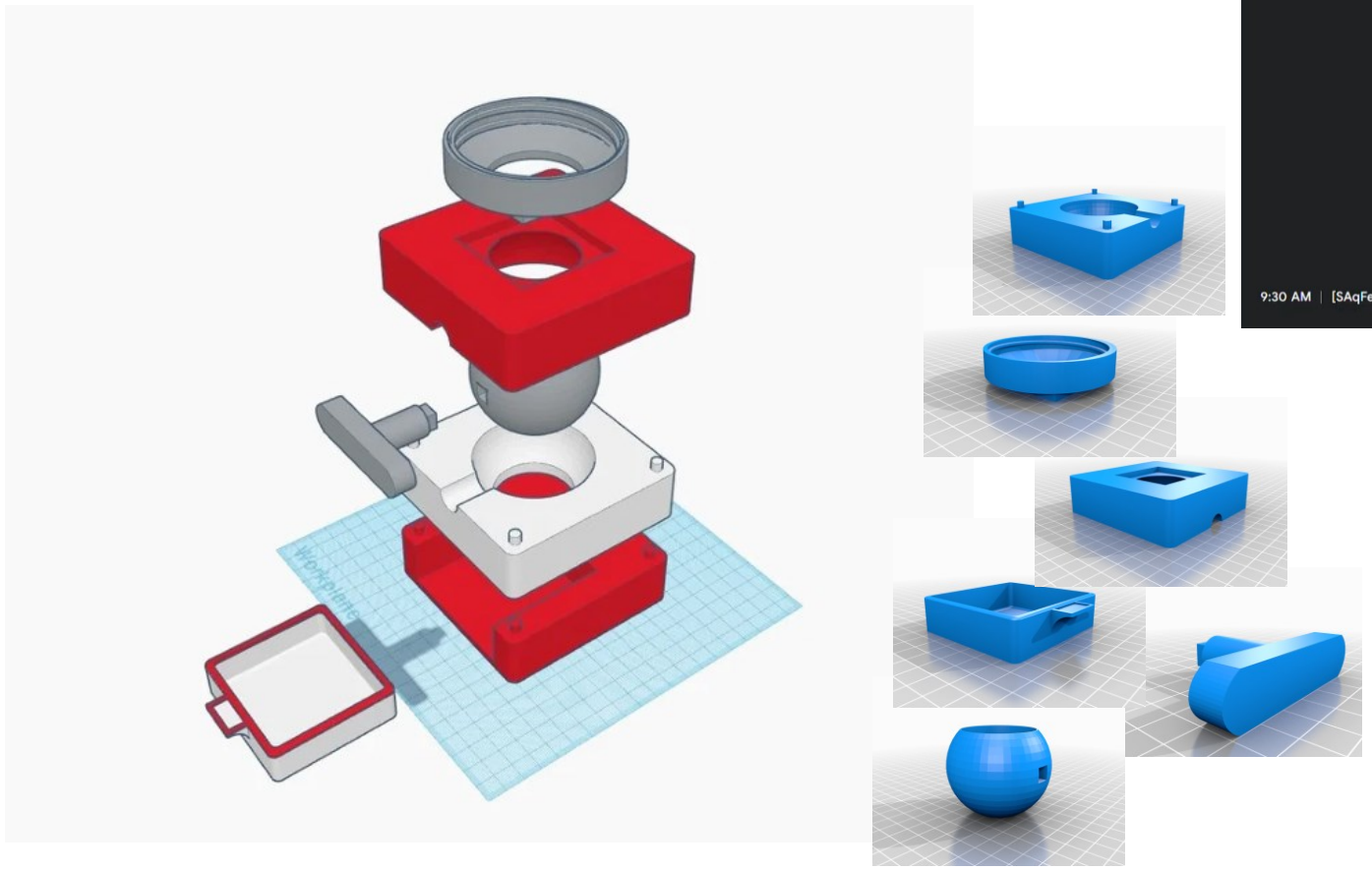


Initial Proposed *SAqFeeder* Hardware and Software Framework

Project *SAqFeeder* Activities

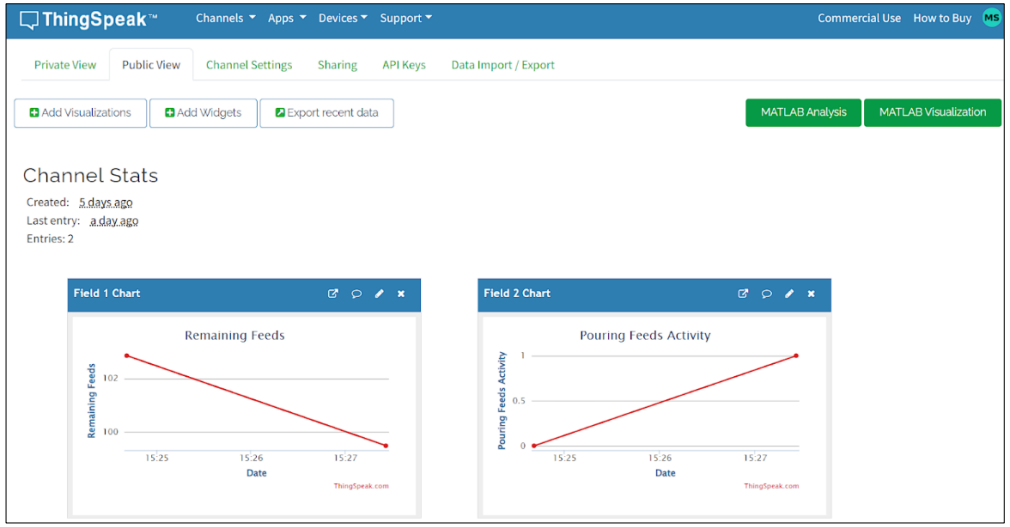
2nd Project Virtual Technical Meeting

& On-boarding of two (2) student interns



Initial *SAqFeeder* lab-scale POC dev't

21 June 2024 via Google Meet



Project *SAqFeeder* Activities

1st year Budget Plan

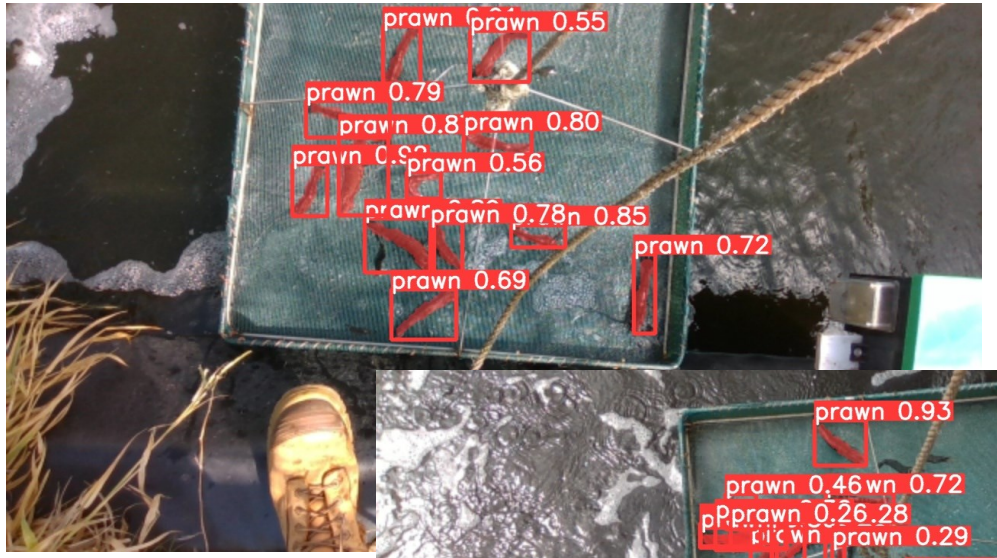
Expenses	Budget (USD)	Requested (USD)	Remarks
A. Project Meetings			
Commencement Project Meeting (Philippines)	3,000.00	2,951.59	Quarter 1, Year 1 (actual requested)
Project Update Meeting (TBD)	4,500.00	-	Quarter 3, Year 1
ASEAN IVO Forum 2024	600.00	500.00	estimated (travel expense c/o NICT)
B. Data collection			
Data collection prototype (7000 USD/farm x 3 farms)	21,000.00	-	Feeding tray, camera & sensors, MCU, automation, & other accessories
Computer and peripherals (1200 USD/user x 5 users)	6,000.00	-	Year 1
C. Local Field Visits			
Data collection setup & collection (700 usd/farm x 2 farms)	1,400.00	-	Year 2
D. Miscellaneous			
a. Publication Expenses (3 papers x 1500 US$ each)	1,500.00	-	Year 1, Year 2
b. Software Subscriptions (US$ per year)	1,500.00	-	Year 1, Year 2
c. Others (storage, printing, office supplies, etc.)	500.00	-	Year 1, Year 2
Total :	**40,000.00**	**3,451.59**	**9.13%** utilization as of 21/10/2024

Project *SAqFeeder* R&D Results

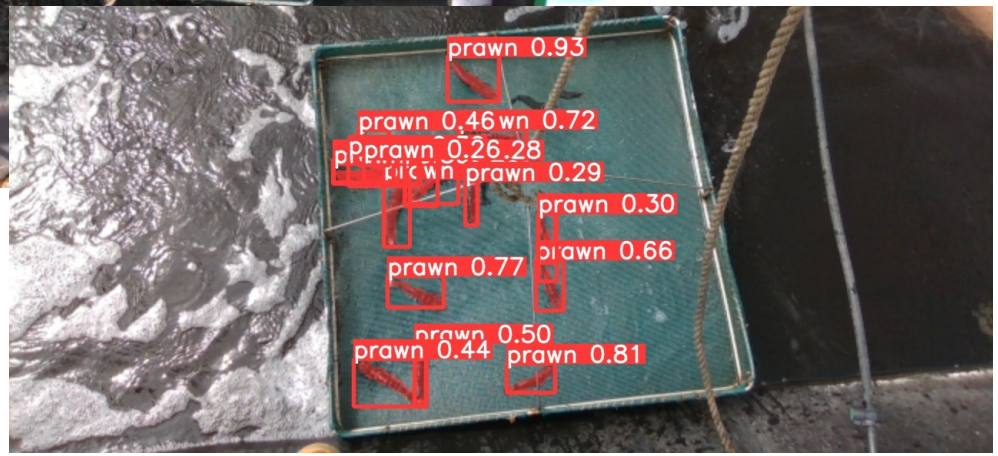
AI Model Development with **ASTI**

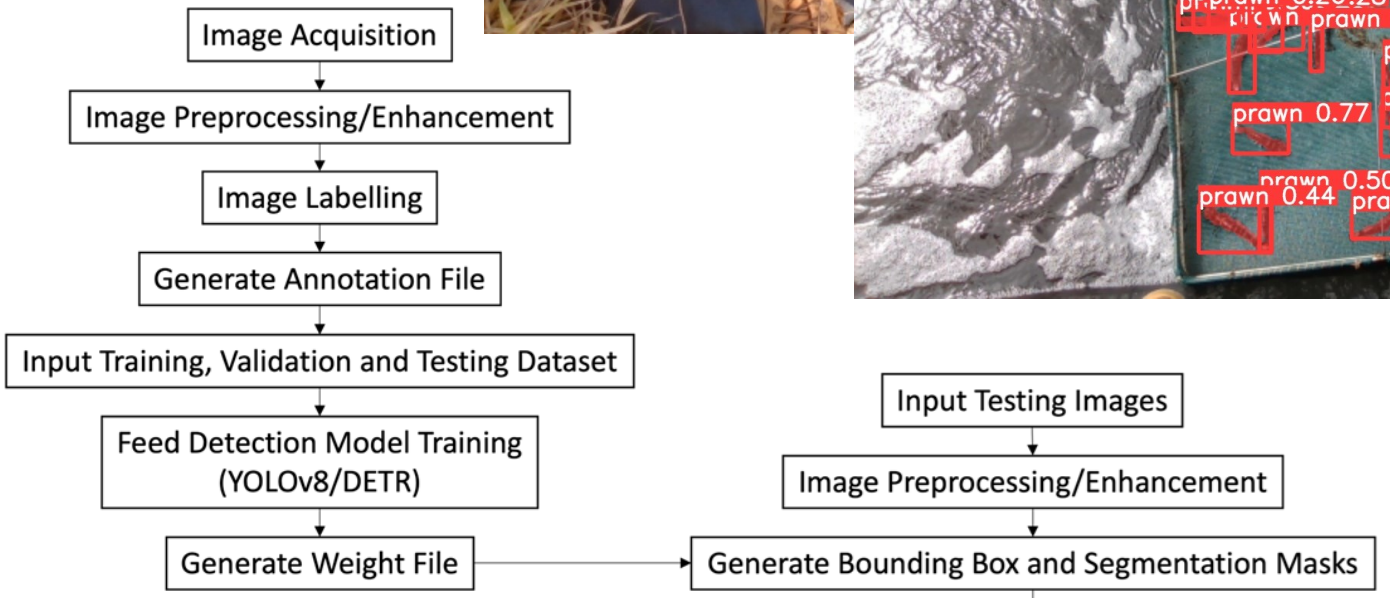
Target Aquafarm
Pre-project visit (02/2023)
Bacolod City, Philippines

Project Metbuoy+
Purchased: 10/2024



Instant segmentation of prawns using **yolov8n-seg**

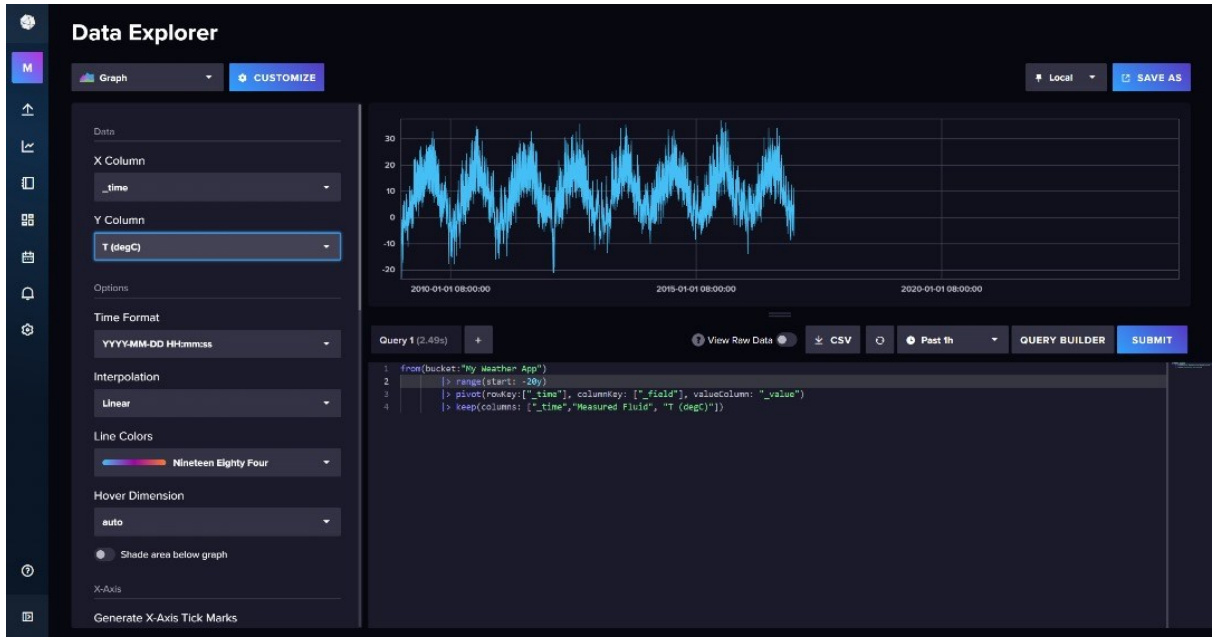




SAqFeeder team is exploring models for feed estimation instead of prawn detection

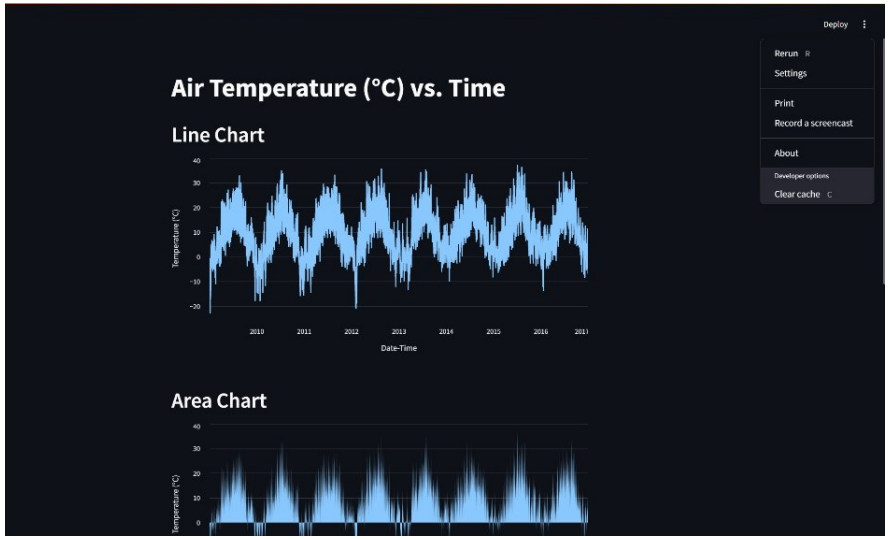
Project *SAqFeeder* R&D Results

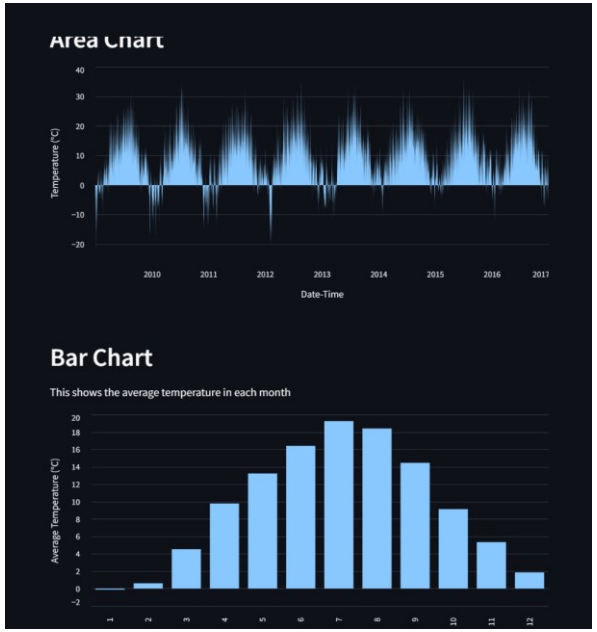
Software Development with **UTM**



InfluxDB Interface

It shows the weather data (datetime vs temperature) saved in localhost. Using InfluxDB, we can communicate with the IoT device (Raspberry) to store the real-time data. It is possible to store them in online (We will explore the subscription plan).





Same data, different visual representation (area plot, histogram). The graphs are interactable.

Next, we can visualize these data in the Streamlit platform. User can refresh the dashboard or clear cache with ease.

Project *SAqFeeder* Societal Impact

Presentation at International Conference:

No:	Paper title:	Author names	Affiliation	Conference name:	The date of the conference	The venue of the conference
1	Strengthening Artificial Intelligence-On-Edge Education in the Philippines: A Teacher-Centric Curriculum Development Strategies	Eduardo Jr Piedad	DOST-ASTI	2024 IEEE 13th International Conference on Engineering Education	19-20 November 2024	Kanazawa, Japan (hybrid)

Societal Impact (in the Philippine Education)

Empirical Data on Educator Expertise in the Philippines

Importance of Energy-Efficient Edge Devices

Gap in Practical AI-on-Edge Application

Identification of Critical Fields

Current State of AI-on-Edge Resources

Practical AI-on-Edge Skills Deficiency

Educators' Confidence in AI-on-Edge

Project *SAqFeeder* Future Works

Future Works

Activities	Year 1 Timeline	Remarks
Prior Art Search and Review	April – Dec. 2024	ongoing
Data Collection	a. October 2024, b. Feb/March 2025	a. scheduled at Bacolod, Philippines b. TBD
Prototype Development	October 2024 – March 2025	for budget request
Monitoring Dashboard Development	January – March 2025	for budget request
Edge-AI Development	January – March 2025	for budget request
Deployment	(for year 2)	for budget request