FARMTAB: Precision Agriculture System using Internet of Things and Artificial Intelligence for Urban Farming

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Introduction :

The objective of FarmTab is to boost the productivity of urban farming by automating the farming process by embedment of Internet of Things (IoT) and Artificial Intelligence (AI) technologies into one platform. FarmTab is designed to enable seamless data collection from various sensors such as temperature, pH level, Electrical Conductivity (EC) and Oxidation-Reduction Potential (ORP) in urban farm condition. The AI models track and predict various environment impacts on crop yield for urban farm.

Project Members :

Name	Affiliation
Chong Yung Wey, Widad Ismail, Tan Eng Kee, Hasnuri Mat Hassan	USM, Malaysia
Ooi Boon Yaik, Lee Wai Kong	UTAR, Malaysia
Muhammad Niswar, Zainal, Zulkifli Tahir, Abdul Azis	UNHAS, Indonesia
Achmad Basuki, Raden Arief Setyawan	UB, Indonesia
Naoki Shinohara	Kyoto University, Japan

Project Duration :

24 months

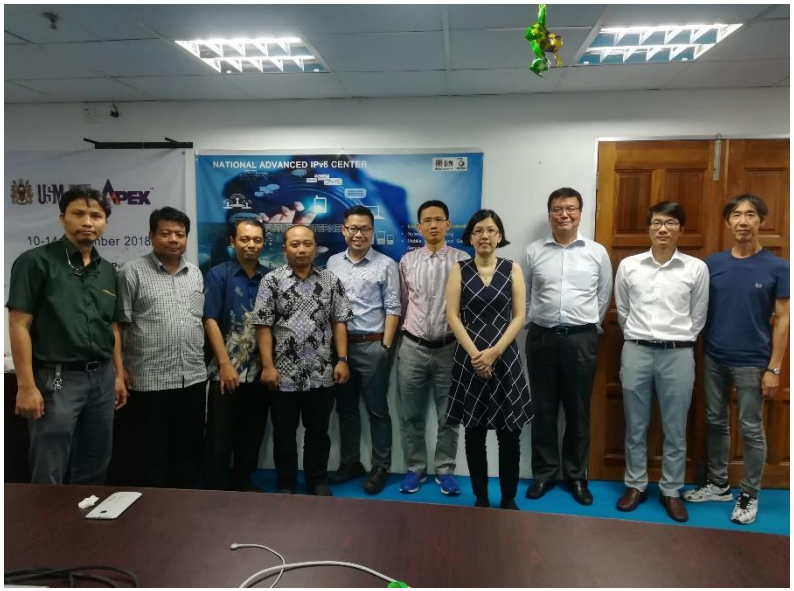
Target Countries :

South East Asia

Project's Kick-off Meeting

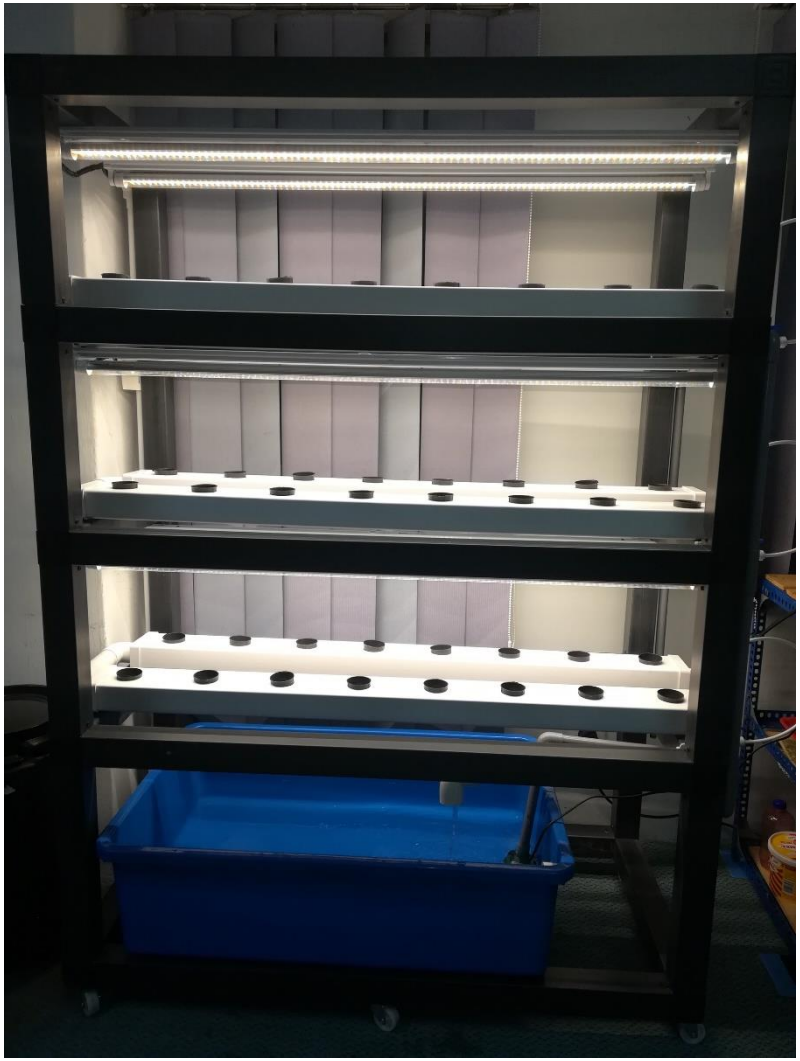
July 2019 at Penang, Malaysia

- Discussed strategic and operational issues of the project implementation.
- Refined the project methodology, exchanged ideas and discussed the approach for research and development collaboration.
- Testbed will be setup at USM, UTAR, UB and UNHAS.



FARMTAB Hardware Design

Vertical shelving system



Crops that will be grown and analysed at each institution:

Lettuce

USM + UTAR

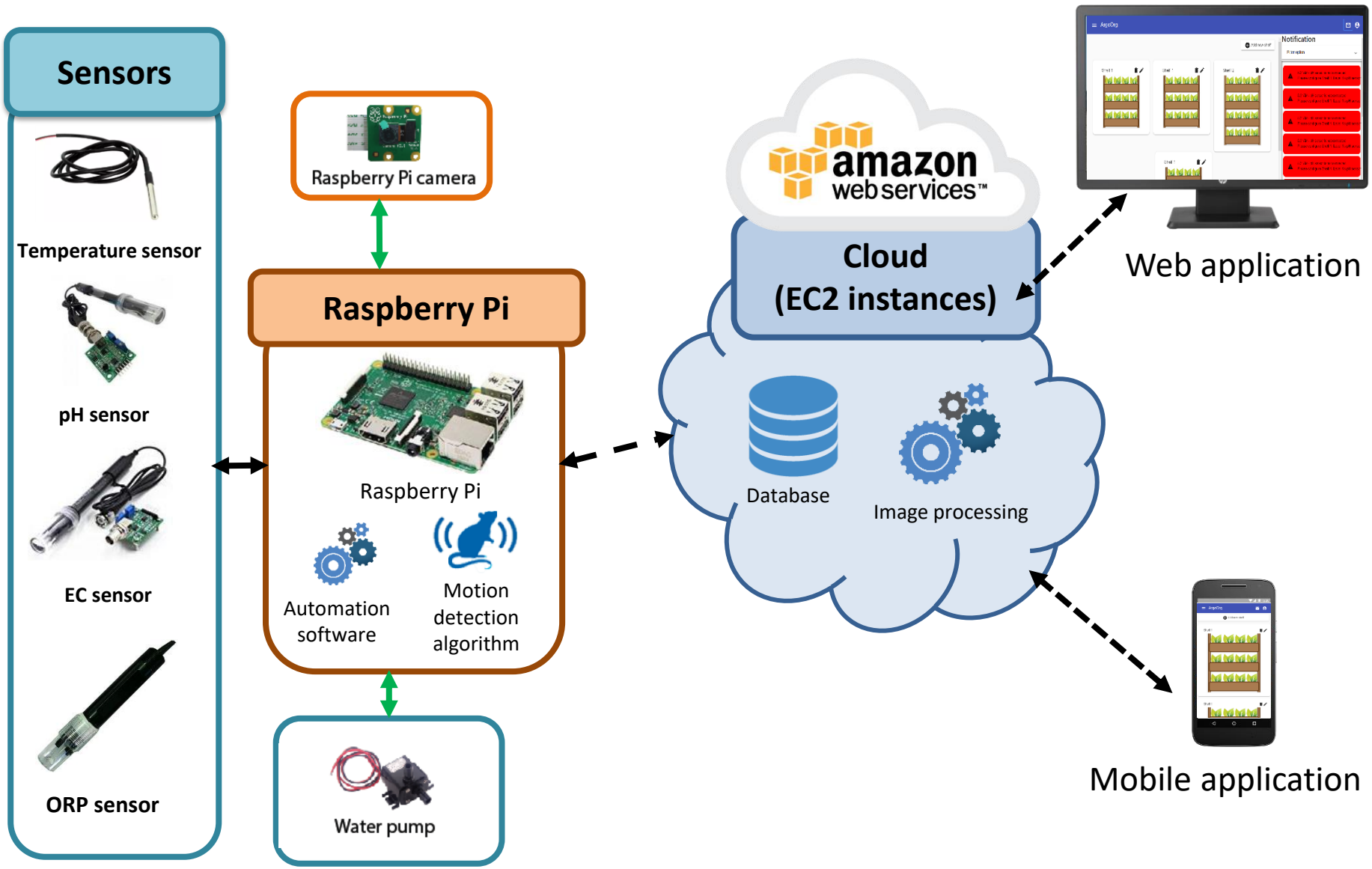
Red Spinach

UNHAS

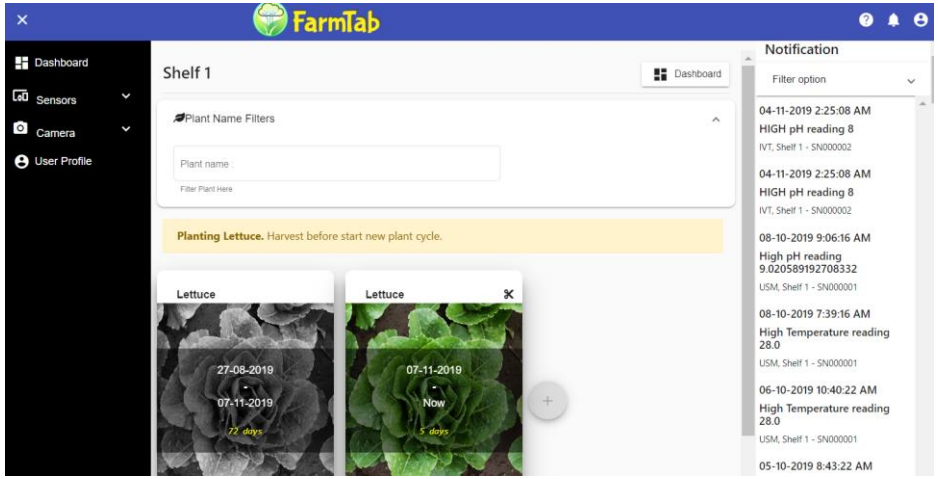
Bak Choy

UB

FARMTAB System Architecture

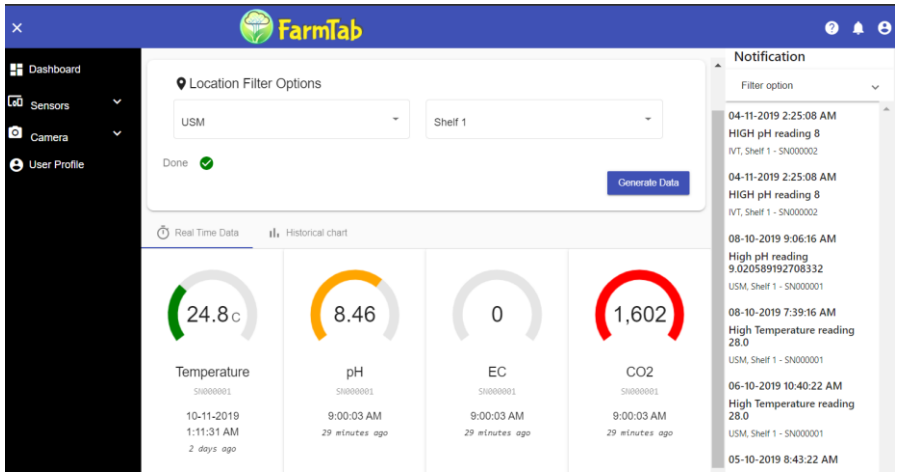


FARMTAB Research & Development



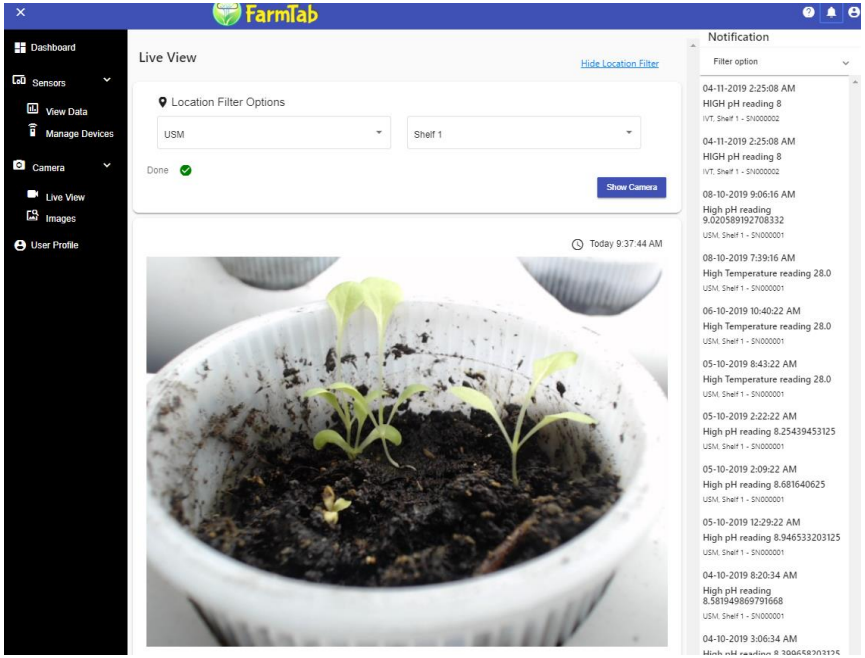
Dashboard

Historical sensor data



Real time sensor data

FARMTAB Research & Development



Live view

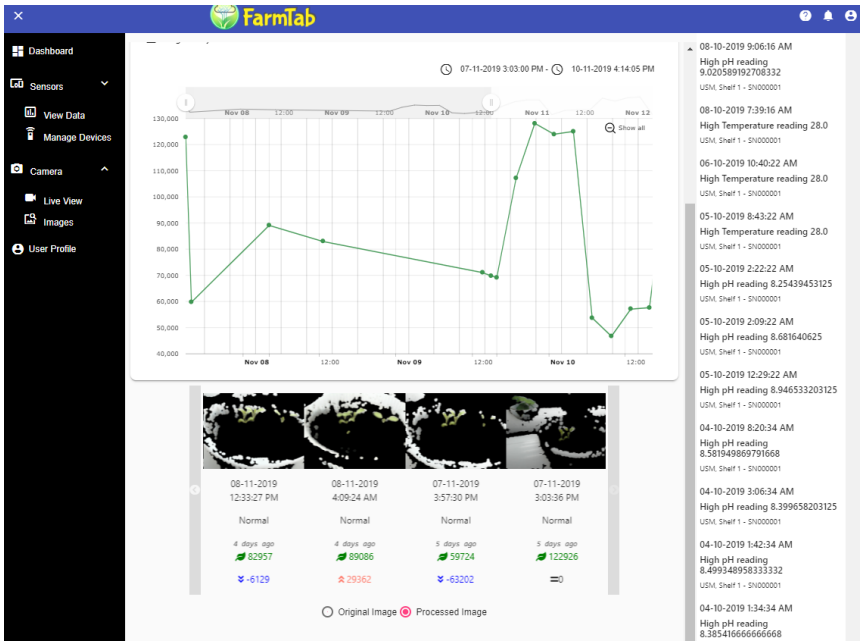
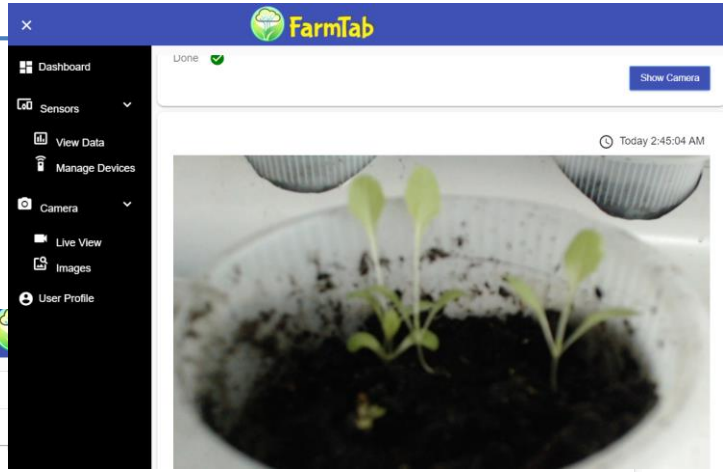


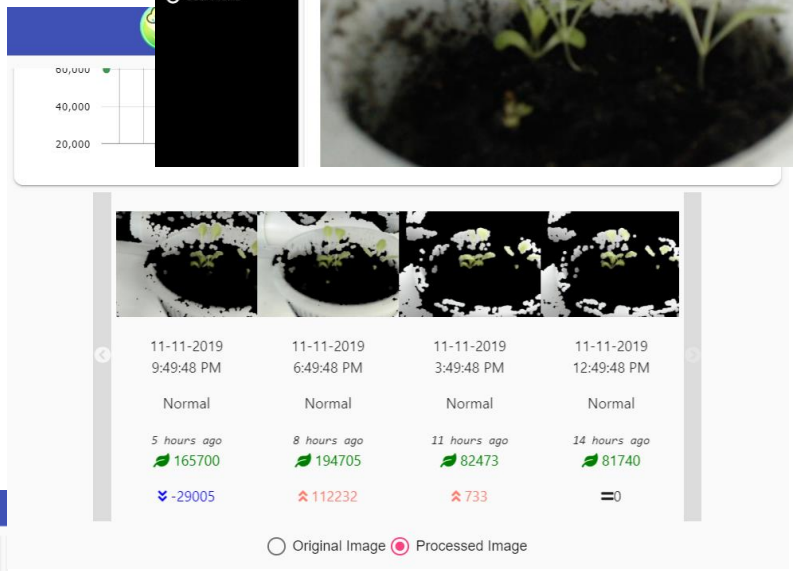
Image Processing

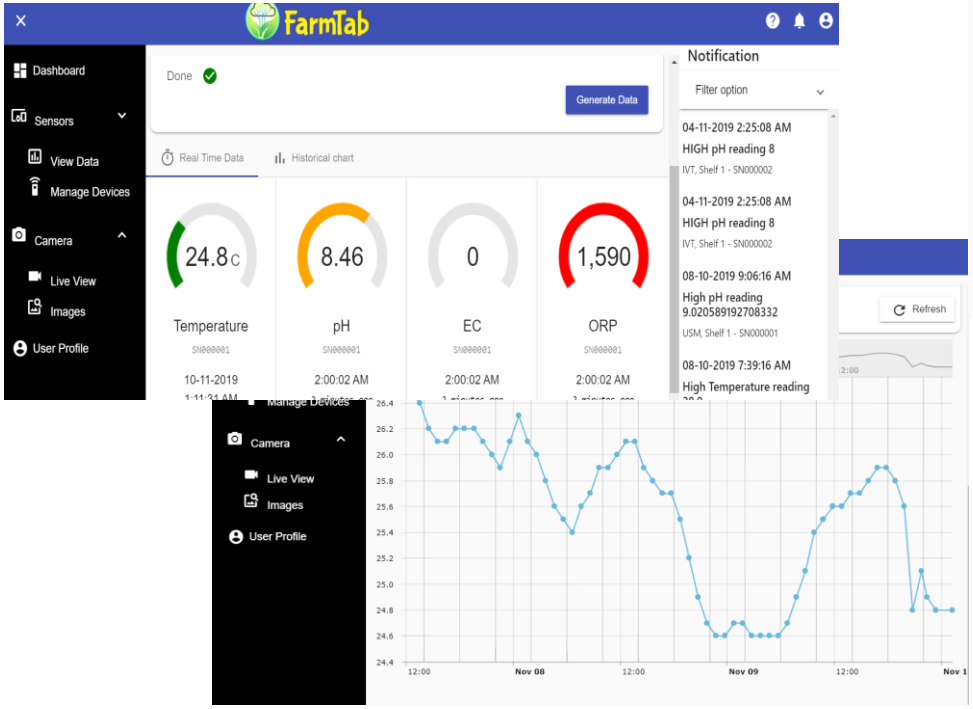
FARMTAB Research & Development

All the data is captured in AWS cloud server. The data format is standardised so that every partner uses the same platform for data gathering. The frequency of the data that is captured:

- Sensors: every 1 hour
- Image: every 3 hours







FarmTab

Project Milestones

Research and Development Description	Activities	Completion Date
A: Design and develop solar-powered shelving system	a: Mechanical design of shelving with lighting b: Design of solar energy harvester	Month 4
B. Design and implement the precision agriculture control system	a: Develop sensor nodes b: Develop software for real-time monitoring of sensor data c: Algorithm for control system	Month 8
	d: Obtain dataset for illness for different crops	Month 12
	e: Develop image processing algorithm in detecting illness in crops	Month 15
	f: Develop monitoring solution for agriculture control system using mobile sensor nodes	Month 18
C. Field trial and validation	a: Field test and implementation of proof of concept in ASEAN region b: Data analysis and visualization of precision agriculture system	Month 24

Moving Forward

- Purchase of experimental equipment (remaining)
- Meeting and demonstration of experiment in Makassar (Indonesia), Malang (Indonesia) and Kuala Lumpur (Malaysia)
- Presentations at International Conferences
- Journal papers publications

Societal Impact

SOCIETAL IMPACT

Economy

Testing with a local urban farmer to increase yield

Environmental Impact

Providing data to biologist to develop new fertiliser that is environmental friendly

Open Data

Making dataset for illness for different crops public

Thank you for your attention!

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