# ENVIRONMENTAL SUSTAINABILITY Report 2022

Universiti Teknologi MARA Sarawak

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# Affordable Automated Smart Agriculture System (AASAS)

AASAS is the acronym for Affordable Automated Smart Agriculture System, developed by the IoT committee of the Natural Product Research and Development Center UiTM Sarawak Campus. The system is responsible for the maintenance, monitoring, and performing corrective measures towards the condition of the soil. This technology is built upon the foundation of the Internet-of-Things, to be in line with the Sarawak state government's vision of digitalising modern farming technology.

The project is headed by the IoT steering committee of the Natural Product Research and Development Center (NPRDC) UiTM Sarawak Campus. The person who is responsible for this project is an Electrical Engineering lecturer, En. Mohd Yazid Bin Mohd Anas Khan. The project came into reality after the idea of having a smart monitoring system to be deployed at the pineapple crop areas was discussed among the NPRDC members.

AASAS has been developed to further strengthen UiTM Sarawak's vision of becoming the go-to Center of Excellence for modern agriculture. Researchers from various disciplines have gathered and contributed to the development of AASAS, as one of UiTM Sarawak's in-house developed products. In comparison to some currently comparable products out there, AASAS is going to be in a league of its own due to the affordability and expandability of this system. AASAS is essentially a direct competitor to the existing established system by the company named Wondernica, originating from Penang. The name of the system is Agromon which stands for Agro-Monitoring. Nevertheless, Agromon costs more, 3-4 folds in comparison to AASAS which would not be suitable for the B40 agricultural practitioners. AASAS basically runs 24-hour on a 12V 5000mAH gel battery connected to a 10W solar panel. This will definitely save a considerable amount of mainline energy usage as compared to if they were connected to the grid considering as there are multiple AASAS nodes spread throughout the farm plot which will eventually accumulating to a large degree of power distribution.

Applications of IoT that are fully embedded with AI techniques and deep learning approaches, are developed through practical and innovative solutions to minimize climate change effects on agricultural practices through soil and crop nutrient content monitoring. Numerous innovation potentials in the form of sensors detecting different crops, with diverse crop nutritional conditions, could be developed to strengthen the agricultural practices. An integrated sensor that combines the detection of water scarcity and soil-crop nutrient status will ensure optimum productivity of agricultural produce, improve product quality, and protect the environment. Agricultural data repository resulting from the acquisition,

crops, with diverse crop nutritional conditions, could be developed to strengthen the agricultural practices. An integrated sensor that combines the detection of water scarcity and soil-crop nutrient status will ensure optimum productivity of agricultural produce, improve product quality, and protect the environment. Agricultural data repository resulting from the acquisition, processing, storage, visualisation, and analysis of agricultural big data will become the main resource for developing fertiliser monitoring and fertiliser recommendation mobile apps as shown in Figure 5.5.

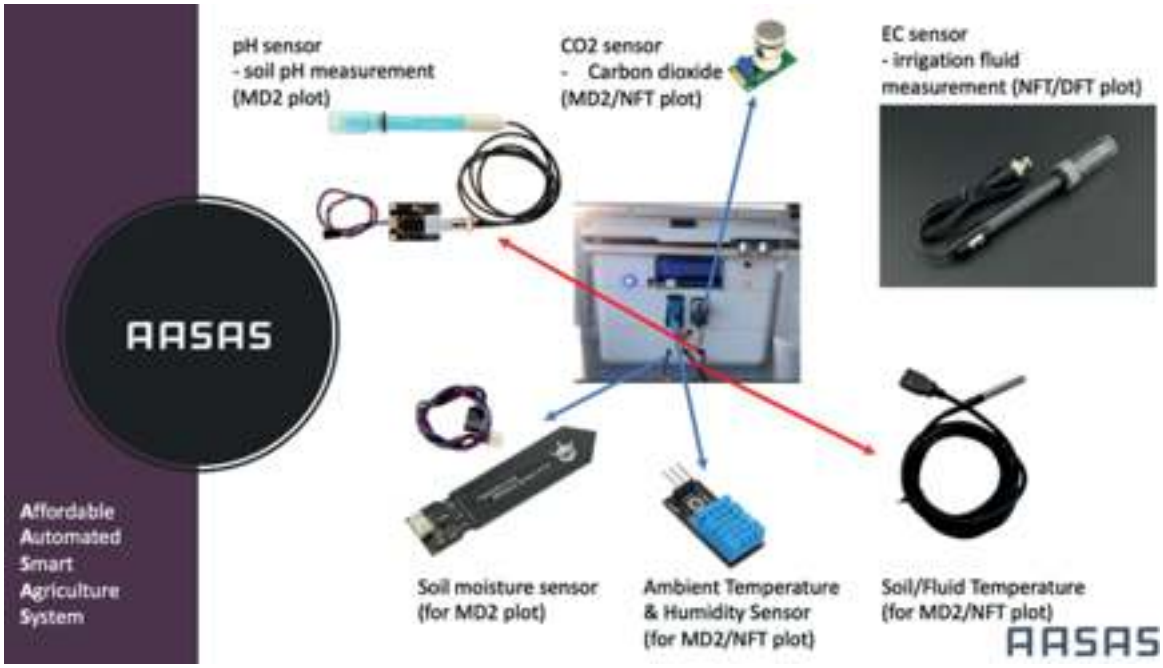


***Figure 5.5*** *AASAS Detailed Input/output With 10 Watts Solar Panel*

The system has been field-tested for various crop types available within the campus. Among them are the Chili/Ginger fertigation, Multitier fertigation, Nutrient Film Technique (NFT), Deep Flow Technique (DFT), Hydroponic and last but not least, the MD2 Pineapple plantation as depicted in Figure 5.6. With this system, the researchers and consumers will gain the ability to systematically monitor the crop growth via the collected data which are accessible through both smartphones and computers. Smart Agriculture management is of utmost importance in the modern agricultural practice to produce high-quality yields.

This system also allows involvement among students, graduates, and alumni who wish to pursue this particular field. Indirectly, they are giving back to the community. It is expected that this system will assist the community who are very much affected by the Covid-19 pandemic that has impacted most of their conventional farming practices. Therefore, there will be an increase in the level of sub-urban socio-economic development, especially in the B40 group of people whose lives are so much dependent on agriculture. Other than that,

***Figure 5.6*** *Application Of AASAS For Monitoring Soil Nutrient In The MD2 Pineapple Plantation*

The other variation of AASAS that is also currently being developed for another specific purpose is given the name of AFS which stands for Automated Fertigation System. This system unlike AASAS is mainly dedicated to generate the required energy to operate a single unit 1hp (horse power) equivalent to 750W water pump for fertigation process. This can easily be achieved by having a 360W solar panel and a rated peak power output of 3000W inverter in the system. There are currently 2 units of AFS running in UiTM Sarawak. The usage of solar energy to operate the fertigation system contributes to the reduction of mainline electricity usage by UiTM Sarawak. The system operates by turning on the pump 3 times a day for the duration of 5 minutes at each activation. As the system keeps on running every day, the standalone power generation is a step forward in realising green technology in this practice (Figure 5.7).

***Figure 5.7*** *Variation of AASAS known As SStormQMS For Stormwater Quality Monitoring*

# Editorial Board Members

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