

## **Executive Summary: Agricultural Sensor Network**

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The world's climate crisis disproportionately impacts developing countries and low-income populations within those communities at all levels of society; it can change the societal structure, community health, and individuals' economic situations [1]. Thailand is an example of a developing country dependent on the success of the agricultural sector, specifically rice, maize, and sugarcane, which have been estimated to have fallen by up to 3.6% to date and are projected to increase to a 15% decrease by 2050 [2]. The rural farmers dependent on the success of Thailand's agricultural industry make up over thirty percent of the total labor force, but only account for about ten percent of the gross domestic product, implying the average farmers are poor and vulnerable to the effects of climate change without much individual recourse to protect themselves, their families, and their communities from economic hardship if crop production continues to decline [3]. The purpose of this project is to develop an integrated sensor network to provide individual farmers with data about the conditions of their land to react quickly when their crops experience sudden harmful conditions - conditions that happen more frequently as the effects of climate change become more pronounced.

Bryan Hugill founded Raitong Organics to grow an active and social community of farmers who can implement sustainable rice farming practices in rural communities. The main challenges he faces include an aging population of farmers who have increasing difficulty overseeing all their farmland, which is spread out over non-contiguous plots. For example, an essential detail in the process of rice farming is flooding paddies with the correct amount of water between three centimeters and ten centimeters which can fluctuate if either too much rain falls on the paddy or if a bund cracks and water is released from the paddy [4]. Bryan wants to have a low-cost system capable of detecting these conditions and notifying the farmers where a problem has occurred and the severity of the issue allowing for a rapid response. He can also store the data for future analysis if necessary.

The sensor nodes included in the system developed by this project will measure four specific environmental factors: temperature, humidity, wind speed, and water level. They will each transmit the data periodically throughout an entire network of sensor nodes to a base station capable of displaying the data, the time it was measured, and the node which sent it. This project iteration is focused on creating the network topology and radio transmissions necessary for node-to-node communication through the non-contiguous plots of land and displaying multiple different nodes on the same user interface. A network has been fully implemented and the data is received by the host node, although the data display is still a work in progress to differentiate between different nodes.

## References

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