ABSTRACT

This Micro-scale Smart and Integrated Farming System is intended to make farmers more familiar with digital technology based on the Internet of Things (IoT) which will be integrated and can be monitored in real time through the application. This system is designed vertically starting from the top there is an agricultural sector, then in the middle there is a livestock sector, and at the bottom there is a fisheries sector. In this system, the needs that must be met include software and hardware needs. In the hardware part, the devices needed include sensors, microprocessors, relays, power supplies, and others. As for software needs, the application is used to monitor in real time the parameters of the three aspects of the Micro-scale Smart and Integrated Agriculture System.

The agriculture sub-system uses DHT11 sensors and TDS sensors that can monitor temperature, humidity, and water nutrient levels in watercress plants. The livestock sub-system uses an MQ135 sensor and a DHT11 sensor that can monitor ammonia gas levels, temperature, and humidity in duck cages, if ammonia and temperature levels are high, it will activate the fan. The fisheries sub-system uses a DFRobot pH sensor and a turbidity sensor that can monitor the pH value of pond water and the turbidity of pond water, if the pH is abnormal and the water is cloudy, it will activate the water circulation system.

Testing the application using the System Usability Scale (SUS) method through google form resulted in an average score of 82, which indicates that this application is user friendly. Testing of all sub-systems was carried out 10 times, starting with the agriculture sub-system which resulted in an average water nutrient level of 376.3 PPM in normal water and 655.3 PPM in water mixed with vitamins. In the livestock sub-system, the average ammonia gas level in dirty cages was 39.3 PPM, while in clean cages it was 10.7 PPM. In the fisheries sub-system, the average pH value of water when mixed with acidic water was 2.23 and 7.39 in normal water. Water turbidity testing in normal water conditions shows an average value of 114.62 NTU, while in abnormal water conditions the average value is 201.96 NTU. Thus, it can be concluded that the sensor used works well.

Keywords: Agriculture, Controlling, Internet of Things, Monitoring