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Applications of Temperature Sensor Cultivation Fish and Plant Aquaponic with Greenhouse for Local Food Innovation

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Abstract. Aquaponic Cultivation Technology can be done inside the house or outside the home, this cultivation also produces plants and fish that can be used by the community with urban farming on local food. Aquaponic system fish farming is a culture system that can save land use and increase the efficiency of nutrient utilization from the rest of the feed and fish metabolism. The purpose is to design water temperature sensors on aeroponics and to test temperature sensors by validating others.. The design of an early warning system application due to a landslide there are several stages, namely: first, Designing a DS18B20 sensor on acuponics. Second, Testing the DS18B20. The measurement results will be stored on the scratchpad and read by the device. This sensor can measure temperatures in the range 0 ° -50 °C. Microcontroller functions as an electronic circuit controller and stores the program in it. Microcontroller is called a single chip because the microcontroller has a memory and I / O devices. The test was carried out using a container containing chunks of ice. The test was carried out safely for 15 minutes and data was taken every minute. Testing the DS18B20 sensor with a comparison sensor found an average error of 0.0409 with a standard deviation of 0.08023. The results of the measurement of small error errors presented that the DS18B20 sensor can be used properly.

Keywords: Aquaponic, Temperature sensor, Green House,Local Food

INTRODUCTION

Aquaponic cultivation technology is one of the implementation of local food innovation. Aquaponic cultivation technology is one of the planting media used by farmers. Farmers have many ways of planting such as hydroponics, aeroponics and aquapoiics. This media is a medium that has been developed by farmers so that it is easy to use by the people who want to grow crops. This varied planting media does not require large tracts of land such as gardens or rice fields, some media can be done in the home environment so that it becomes an easy planting medium. The basic concept of aquaponics is the combination of aquaculture technology with hydroponic technology in a system [1]. Aquaponic Cultivation Technology can be done inside the house or outside the home, this cultivation also produces

plants and fish that can be used by the community. Aquaponic system fish farming is a culture system that can save land use and increase the efficiency of nutrient utilization from the rest of the feed and fish metabolism [2].

Aquaponics is a blend of growth hydroponic or aeroponic system plants and fish aquaculture systems in one system, usually in Indonesia recirculation system [3]. Aquaponics is a closed loop freshwater system, where recirculation of plants and fish grows together in symbiosi [4]. The aquaponic system combines two methods of agricultural production recirculation of aquaculture and hydroponics.[5]. Greenhouse is a closed system with plants in accordance with conditions of plant growth.[6-10]. Utilization of the LM 35 temperature sensor on this system setting is required for know the rise and fall of temperature and keep the sea water temperature for grouper cultivation according to temperature of grouper habitat (25°C-32°C) [11]. The purpose is to design water temperature sensors on aeroponics and to test temperature sensors by validating others..

RESEARCH METHOD

2.1.Stages of design a DS18B20 Sensor

The design of an early warning system application due to a landslide there are several stages, namely: first, Designing a DS18B20 sensor on acuponics. Second, Testing the DS18B20 sensor on aquaponics seems like the block diagram below.
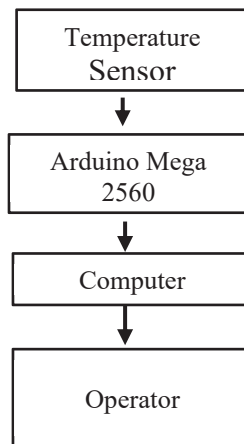

FIGURE 1. DS18B20 sensor block diagram in aquaponics

Figure 1 is a block diagram of the DS18B20 water temperature sensor workflow. Arduino microcontroller is connected to the accelerometer sensor as a tool to measure the angle of the tilt. Processing data in the form of water quality by the microcontroller according to the instructions desired by the user

2.2. Design of Temperature Sensor DS18B20

DS18B20 is a digital temperature sensor that can be connected to a microcontroller via a 1 wire interface. Temperature readings on this sensor provide 9 to 12 bits. This sensor is specially packaged so it is waterproof, suitable for use in a room or in water. DS18B20 temperature sensor images and specifications can be seen as follows:

DS18B20 is one of the temperature sensors with units of °C. has 4 main components namely 64-bit ROM, temperature sensors, temperature alarms that are not easily changed for TL and TH and configuration registers. Here is a block diagram DS18B20.
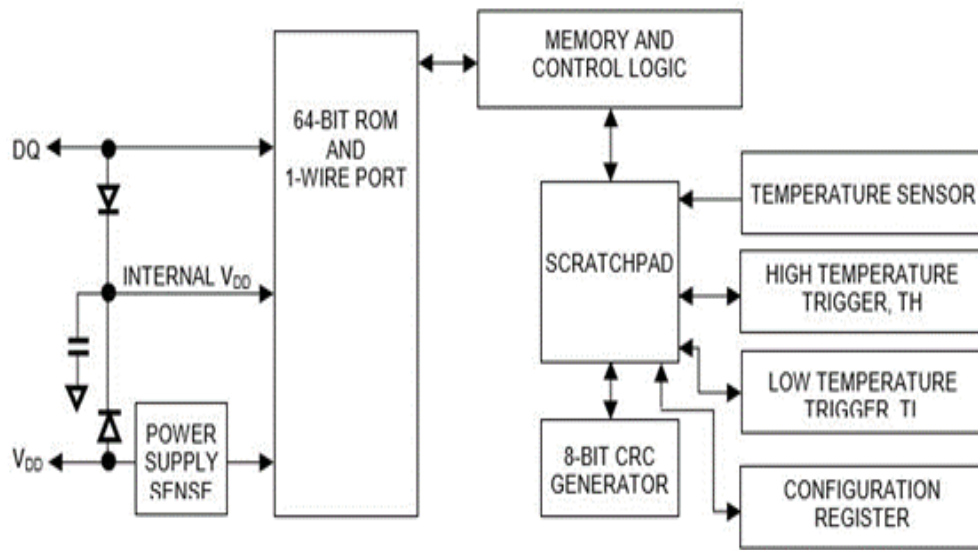
FIGURE 2. Blok diagram temperature sensor DS18B20

Figure 2 explains that the device gets voltage from a 1-wire communication line by storing the voltage on the VDD internal capacitor for a certain time. As an alternative DS18B20 can be given a voltage from an external 3V-5V power supply. The measurement results will be stored on the scratchpad and read by the device. This sensor can measure temperatures in the range 0 ° -50 °C.

FIGURE 3. Temperature Sensor DS18B20

TABLE 1. Temperature sensor specification DS18B20

Range	$-55°C\ to +125°C$
	$-67°F\ to +257°F$
Operating Voltage	$3.0 - 5.5V$
accuracy	$\pm 0.5°C$
resolution	$9 - 12bits$

2.3 Microcontroller

Microcontroller is a single chip found on a computer or on a small device microcontroller that is used to perform actions on an object, process or command. Microcontroller functions as an electronic circuit controller and stores the program in it. Microcontroller is called a single chip because the microcontroller has a memory and I / O devices in it.. The microcontroller used is Arduino Mega2560 which can be seen in the picture below.

FIGURE 4. Arduino Mega2560

TABLE 2. Specification Arduino Atmega 2560

Microcontroller	Atmega 2560
Operating voltage	5v
Input Voltage	7-12v
Input Voltage	6-20v
Digital I/O Pins	54(15 bisa untuk keluaran PWM)
Analog Input Pins	16
DC current per I/O pin	20Ma
DC current for 3.3V pin	50Ma
Flash Memory	256KB, 8KB untuk boatloader
SRAM	8 KB
EEPROM	4 KB
Clock Speed	16 Mhz

RESULTS AND DISCUSSION

The DS18B20 temperature sensor testing is done by comparing the two DS18B20 temperature sensors. The test is carried out in the rooftop greenhouse of the dean building which can be seen in figure 5. The first stage of this test is to provide a container containing chunks of ice cubes. The second step is connecting the DS18B20 sensor that has been programmed to measure the temperature in the container. Testing is done by comparing fellow DS18B20 sensors. Here are the results of testing the two sensors:
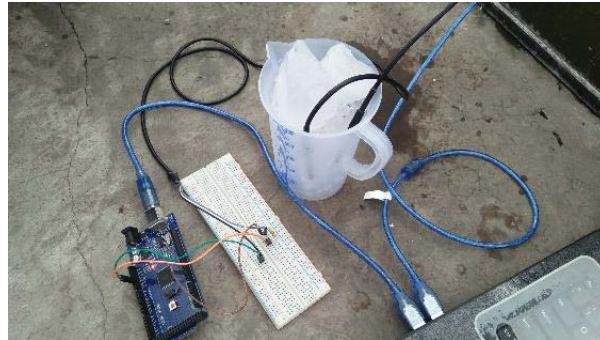

FIGURE 5. Testing of DS18B20 Sensor with Comparative Sensor at Green House
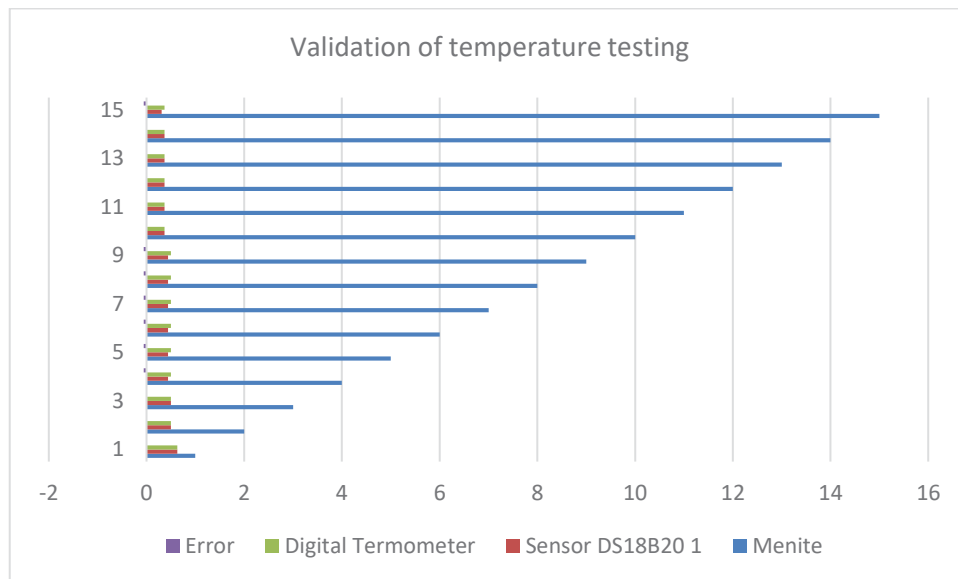

FIGURE 6. Testing of temperature sensor DS18B20

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The test was carried out using a container containing chunks of ice. The test was carried out safely for 15 minutes and data was taken every minute. Testing the DS18B20 sensor with a comparison sensor found an average error of 0.0409 with a standard deviation of 0.08023. The results of the measurement of small error errors presented that the DS18B20 sensor can be used properly

CONCLUSION

The system reads the temperature conditions in realtime the system runs quickly, precisely and efficiently and The results of the DS18820 temperature sensor design were successful with validation with an average error of 0.0409 And can be used in this studyHasil rancangan sensor suhu DS18820 berhasil dengan validasi dengan error -0.028 %.

ACKNOWLEDGMENTS

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