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Smart Garden Based on Microprocessors

Shlok Sharma
Department of Electronics and Communication Engineering
School of Polytechnic
Mit WPU

Ojal Tambekar
Department of Electronics and Communication Engineering
School of Polytechnic
Mit WPU

Kavya Jain
Department of Electronics and Communication Engineering
School of Polytechnic
Mit WPU

Aryan Bhosale
Department of Electronics and Communication Engineering
School of Polytechnic
Mit WPU

Vijaya Pangave
Department of Electronics and Communication Engineering
School of Polytechnic
Mit WPU

***Abstract* – Currently, controlling of plants is done manually, where the farmer and people use hand labor to water the plants. Technological advancement is taking place in every sector and we are unable to stop it in this lifetime as it will always follow scientific discoveries. As a result, the goal of every invention is to improve people's life and make it easier. If there is adequate supply of water, plant growth will be phenomenal. One way to reduce human error and take appropriate action during low rainfall or harsh weather is through creation of a system that monitors the plant and takes actions if needed. A prototype microprocessor based system for smart garden that uses ATMega328P as the controller, soil moisture sensor to sense the soil moisture and dht11 sensor to sense the temperature and humidity. The process output is sent to a 16x2 LCD screen which displays the soil moisture, humidity, temperature and triggers automatic watering and cooling.**

Keywords – Plants, Automation, Smart Garden, ATMega328P.

I. Introduction

People fill their free time with various hobbies in real life. It can be occupied with bringing joy to one's heart, especially interests. Hobbies are a common human activity that provide entertainment to anyone that engage in them. Some of the common hobbies include playing some type of sport, fishing, painting, reading etc.

Microprocessors can be used by means of a programming argument, whereby each argument command can generate an interaction between machines that are linked automatically, without the need for human intervention, and as closely as feasible.

The evolution of technology can be used to regulate different types of electronic devices in structures. Progress is inevitable given the speed at which technology is developing nowadays; it must be utilized, understood, and integrated into daily life.

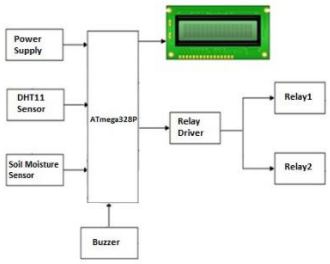
The Smart Garden is a working prototype for an automated plant-care or monitoring system that makes use of the ATMega328P. This prototype's design attempts to support individual plant care system control (personal user).

The present issue with plant culture is a lack of time and opportunity for upkeep, which calls for a plan

to be able to have your own garden conveniently. Today's plant cultivation farmers struggle with a lack of relevant knowledge and a shortage of time for fertilizing and watering their plants. A work-saving alternative is to use a microcontroller to automatically water plants based on data from measurements or the detection of temperature and humidity around the plant using a DHT11 sensor and a soil moisture sensor.

II. Methods

a. Hardware Block Diagram



b. Temperature and Humidity Monitoring System

The monitoring process is carried out by reading the DHT11 sensor output and processed using the microprocessor. The system takes the last condition of the sensor output reading and checks the connection on the microprocessor to display the nominal temperature on the LCD Screen.

c. Soil Moisture Monitoring System

The monitoring process is carried out by reading the soil moisture sensor output and processed using the microprocessor. The system takes the last condition of the sensor output reading and checks the connection on the microprocessor to displays either 'WET' or 'DRY' on the LCD Screen.

d. Watering and lowering the temperature process

The lowering the temperature process is carried out by paying attention to the temperature. On the LCD screen there is a display of temperature and humidity in the air. As soon as the temperature increases over 35°C the microprocessor will command the relay to turn on the fan which will help to lower the temperature.

The watering process is carried out by paying attention to the reading of the soil moisture sensor. It gives digital output, meaning that it will only display either wet or dry on the screen. As soon the sensors sends the dry signal to the microprocessor, it will signal the relay to turn on the water pump and as soon as the condition becomes wet it will switch off the pump.

III. Results

a. Dht11 sensor reading

No.	Time	Sensor reading	Thermometer reading
1.	Morning	28°C	27.8°C
2.	Afternoon	31°C	31°C
3.	Evening	26°C	26.2°C

b. *Smart Garden* in dry state

No.	Soil moisture sensor reading	Pump condition
1.	Dry	ON
2.	Wet	OFF

c. Result displayed on the LCD screen

IV. Conclusions

From the tests carried out, the following results can be concluded:

a. When the system is operating correctly, the ATMega328P can transmit a data signal to the LCD screen when the soil moisture sensor detects moisture in the soil and the DHT11 sensor detects temperature. Soil moisture test obtained was dry when the soil wasn't watered and when the water was supplied it showed wet, as well as the ambient temperature test obtained 30°C
b. In the controlling system, a fan and a pipe run through a pump. The relay, which controls the pump and the fan, has an on-off status that is determined by the microprocessor's output once it gets the sensor readings.

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