

# Microcontroller Application on Watering Automation

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**Bronze Medal for Computer Science Category in Asia Pacific Conference of Young Scientists (APCYS) 2016**

The research, called The Microcontroller Application on Watering Automation aims to develop a device that can water plants automatically by using microcontroller combined with Real Time Clock (RTC), soil moisture sensor, and SD Card writer. And to describe the application of Microcontroller program on a device to water plants with different characteristics: plants that need low soil moisture, medium soil moisture, and high soil moisture. The research is a development of Loving Plant Robot which is a mobile robot and APWA which is a permanent device that can only water 1 type of plant. The device is permanent device which absorbs sunlight as the energy source by using solar cell and the application is more effective and has less possibility of error that can water several types of plants with different characteristics. The research was carried out by assembling electronic gears needed as the board and assemble the device. The result of the research shows that the device is more effective than Loving Plant Robot which is a mobile robot and APWA which can only water one type of plant. This device can keep on operating non-stop without human help because a timer installed is used to determine when to water the plants and when not to water them. The conclusion of this research is that the making of a device that can water plants automatically is by applying automatic switch system (Solenoid valve) that we can determine when will it water the plants anytime by using solar cell as its energy. The microcontroller in this device uses Arduino program to set the schedule to water the plants automatically with soil moisture sensor to determine when to stop watering and SD Card writer to save the data in the SD Card.

Keywords : Microcontroller, Plants, Automation

## 1. Introduction

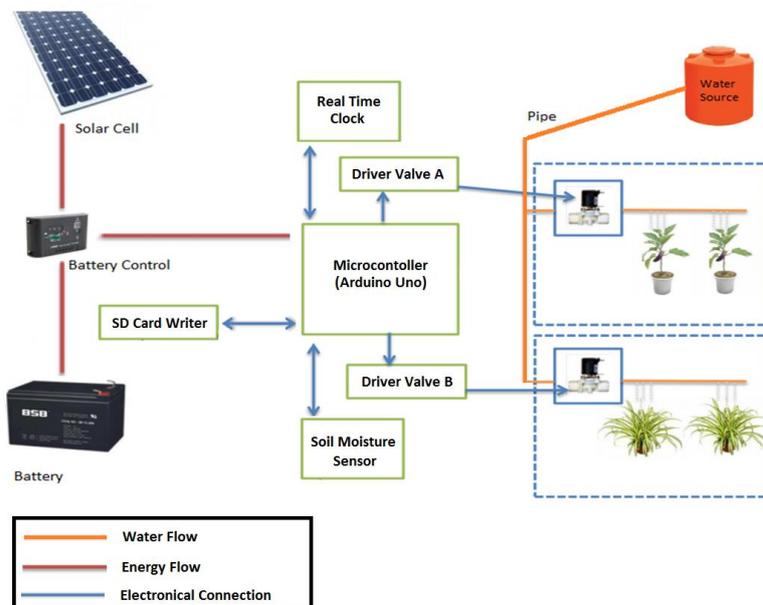
On July 2014, Al Azhar 13 Junior High School started a program called evergreen school. In this program, there are plants planted in every empty places we have. 6 months since it started, many of the plants die and have been changing plants three times. Two devices have been created to solve this problem, but both devices are not efficient enough. The first device is a mobile device that detects metal line to detect where to go, but if there is an object on its way, the device became error which makes the device not reliable. The second device is a permanent device that can only water one type of plant. The new device combines Real Time Clock (RTC), soil moisture sensor, and SD Card Writer to water plants in a certain time with a precise soil moisture and save the data to be read by the user.

## 2. Problem Identification

Based on the background above, this research will show how to develop a device that will water the plants without reliably and to develop ad device to water plants with different characteristics: plants that need low soil moisture, medium soil moisture, and high soil moisture.

## 3. Research Methodology

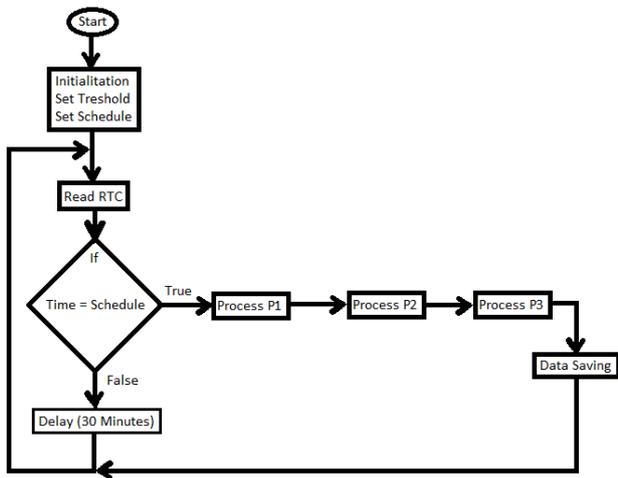
This research used design system was as the picture bellow



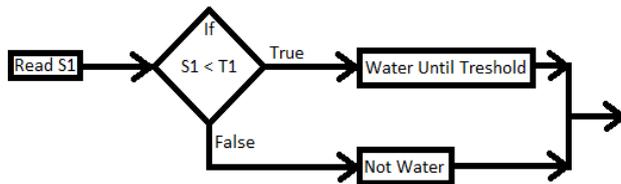
used. This device only needs to be set once to make it worked based on the needs of the plants.

Three kinds of plants were used in the research, which are : Cactaceae, Rosa, Ipomoea Aquatica.

The working process of the device was as the flow chart below



Process P1, P2, P3



#### 4. Result and Analysis

In the device, the microcontroller controlled the solenoid valve (automatic tap). RTC is used to provide data of time to microcontroller when to switch on and off the solenoid valve. The use of soil moisture sensor helped the device to water until a certain soil moisture .

Three solenoid valves were used to water three different characteristics; one that needs low soil moisture, one that needs medium soil moisture, and one that needs high soil moisture. The source of energy of those devices is a battery which gained its energy from solar cell. To control the battery's absorption of the sunlight, the battery control was

#### 5. Conclusion and Future Works

A device was successfully developed that can water several types of plants which have different characteristics reliably and In the future, there will be the development of the device by making weekly report to user using mobile app and create greenhouse with the device that is equipped with temperature sensor, blower, and CCTV.

#### Acknowledgments

We are very grateful to Miss Nuning Ratna Megawati as our research supervisor, Mr. Gunawan Siswoyo and Mr. Rodik Wahyu Indrawan as consultants in our project, Miss Ernovilinda and Miss Eka Devi Mayasari as our English language supervisor and also our parents for supported project funding.

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