

Automatic Rain Water Harvesting

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ABSTRACT: *This paper is about an Aquaspace rainwater harvesting system. As the world population is increasing day by day the demand for good quality of water also increases. The world faces an increasing change in climate one should be alert to address climate change. The impact of water conservation is a sustainable source of environment wherein groundwater is the primary source to freshwater that provides for the demand of the environment, wherein Aquaspace is one of the decorative water features with a sub-surface rainwater harvesting storage system. Aquaspace provides access to clean, clear, and usable water along with decorative water features. Locating and storing rainwater underground maintains the integrity and beauty of home and landscapes.*

KEY WORDS: ARM7 (Advanced Reduced Instruction Set Computer), LCD (Liquid Crystal Display), ROM (Read-only Memory).

INTRODUCTION

About $\frac{2}{3}$ of the earth surface is covered with water. However, the amount of usable water is very small. The growing population and growing industries and agricultural practices needs lots of water. The huge consumption of water is causing reduction of available water. We need to think about various ways to save and conserve water resources [1]. One of the very important inventive measures for conservation of water is rain water harvesting. Basically water comes on the surface with rain, however it gets collected in the rivers which ultimately flows into the ocean. Which means that the usable water is lost in the ocean. We can catch the rainwater and prevent it from flowing into the ocean, this is rainwater harvesting.

There are mainly two methods for rainwater harvesting i.e.

- a. Rooftop rainwater harvesting: during raining rain water gets collected on the rooftop. It can be transferred to a storage tank through a pipe. Often water contains soil particles and other impurities in such case water should be filtered to remove these impurities. Water stored in this storage tank can be used to fulfill our water needs. Instead of storage tank water can also be transferred to a pit in the ground from where it saves into the soil. The saved water gets added to ground water and so the level of water increases. In both ways we can prevent water from flowing away.
- b. Roadside drains: Rainwater falling on the road gets collected in the drains. The drains can be modified so that the water entering in them get seeped into the soil or this water can be collected in a storage structure as well[2].

Apart from the above methods Aquaspace rainwater harvesting is one of the larger rainwater harvesting systems which can be constructed using a sub-surface rainwater

exchange system[3]. This system is a revolutionary design that combines a recirculating decorative water feature with a sub-surface rain water harvesting storage system. The clean, filtered water that is stored in the sub-surface can be stored for irrigation or to maintain the water level in the decorative water feature. To make this Aquaspace rainwater more effective an LPC2148 controller which is an ARM7 based microcontroller with high performance of 32-bit RISC microcontroller with thumb extensions 512KB on-chip flash ROM with in-system programming and in-application programming, 32KB+8KB of data memory is used along with a raindrop sensor, LCD and an alarm, wherein the raindrop sensor will sense the rain water moisture, LCD is attached to the sensor to display whether the droplets is rain drop or not. An alarm to alert the presence of rain. Once the presence of rain is detected an input is sent to the controller and the controller makes the motor to open the valve of the pump. Then the water passes through the pump and we can further proceed to the harvesting process[4].

REVIEW OF LITERATURE:

In this literature an lpc2148 microcontroller is interfacing with a raindrop sensor which will detect the rain, an LED to display whether the moisture is rain drop or not and an alarm attached to make an alert. The rain water detector is used in the irrigation field, home automation, communication, automobiles etc. The drawback of this literature is it just detects the raindrop not showing the method of harvesting[5]. This paper disclose creates a truly sustainable water feature using all rain water. The underground reservoirs comprise of the aqua box storage units, this are made from recyclable plastic and the modular nature of this unit allows it to put together in such configuration to meet the sight requirements for any size projects. The best thing about this system is we can drive heavy equipment over the top of the system once it is buried under the ground, it is very useful for commercial application. Aquaspace snorkel vault and centipede has a high efficiency pumping system and provides a convenient access point for inspection and maintenance. The rain exchange comes in free packets, easy to use kits and can also be customized for the larger or more unit projects. This entire process helps us to capture, filter and reuse rainwater.

DESIGN METHODOLOGY

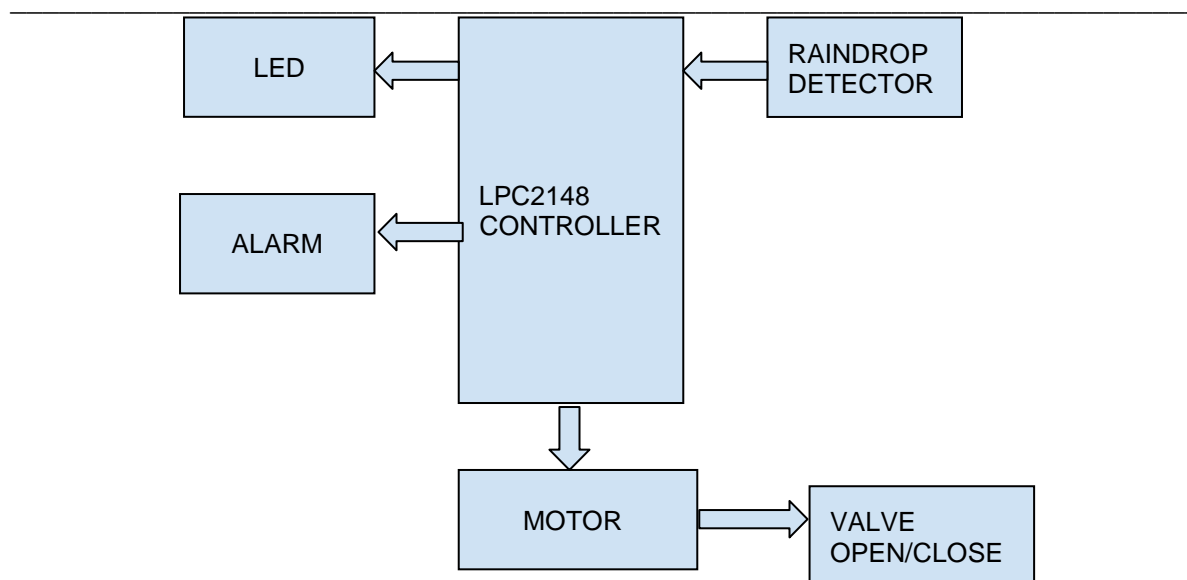


Figure 4: This figure shows the block diagram of rainwater detection and storage process wherein a LPC2148 controls the entire process of rainwater detection system. Once the detector detects the rainwater the motor opens the valve to store the water for further use[6].

This are the component used in my research paper to complete the Aquaspace rainwater harvesting system using ARM7 comptroller:

1. Lpc2148
2. Raindrop sensor
3. Led
4. Alarm

CONCLUSION

Water is a basic need in everyday life. So saving water and using it in a proper manner is very important. Here is a project by which we can check the rainwater status, so that if the water status is confirmed motor valves get activated and rain water gets harvested. One of the beautiful and easy technique is used in this project to harvest rainwater i.e. Aquaspace rain water harvesting. By this technique we can capture, filter and reuse rainwater. The best thing about Aquaspace rainwater storage system is it adds beauty to our home. If each and every home follows this technique, we can give rise to a green environment as green earth is degrading day by day also we will be able to store large amounts of water for our daily use. In this research paper Aqua space rainwater harvesting is successfully done using an ARM7 controller. The process starts with the detection of rainwater, once the rain water is detected an input signal to the LPC2148 controller. Then the controller converts the received input analog signal to digital signal. An output from the controller allows the LED to display the status whether the moisture is rainwater or not. If the detected moisture is rain water, then an alarm gives an alert to the authorized person and the controller sends a signal to the motor to open the valve. The open valve allows the rainwater to flow through the pipe and passes through the filtering process called Aqua space downspout filter. This filter is located at the

base of the downspout and has a 300-micron bag located inside of it. It is made for the easy removal and capture of all the leaves, twigs, sediments and seeds that are generated from the roof. From here the water goes through a pipe system into the underground modular reservoir.

The revolutionary design of a rain change system combines the modular underground reservoir with a decorated water feature. The benefit of that is we get the sight and sound of the water feature combined with aeration and filtration aspects of the moving water also gives us more usable water. Beneath there are thousands more reservoirs for capturing all the water, the water gets through into the modular and underground reservoirs. From this can circulate it to a decorated water feature. This creates a truly sustainable water feature using all rain water. The underground reservoirs comprise of the aquablox storage units, this are made from recyclable plastic and the modular nature of this unit allows it to put together in such configuration to meet the sight requirements for any size projects. The best thing about this system is we can drive heavy equipment over the top of the system once it is buried under the ground, it is very useful for commercial application. Aquaspace snorkel vault and centipede has a high efficiency pumping system and provides a convenient access point for inspection and maintenance. The rain exchange comes in free packets, easy to use kits and can also be customized for the larger or more unit projects. This entire process helps us to capture, filter and reuse rainwater.

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