Automatic Rainwater Harvesting and Water Purification System

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Abstract: - Nowadays we are facing many problems, especially water scarcity. Most people have wasted the rainwater so it gets mixed with drainage and sometimes in the ocean. Now, we are using the rainwater and purifying it by using our natural resource charcoal, since charcoal is the cheapest, best and harmless for our body. The components of our project are the collecting tank, pipes, microcontroller and sensors. So, the cost project is low. Our product is very much useful in the summer season. This project aims to avoid the wastage of rainwater by using an effective harvesting system and ensures the purity of water with the help of a charcoal filter.

Key Words: — *Rainwater Harvesting, Charcoal filter, Arduino, Solenoid Valve, pH sensor.*

I. INTRODUCTION

While the future is difficult to predict, available freshwater resources will certainly decrease in the coming years due to increasing demand of a growing world population. Many areas of the world that are already experiencing a shortage of water resources will see their water issues worsen, causing hardships for millions. Water covers 70% of our planet, and it is easy to think that it will always be plentiful. However, freshwater- stuff we drink, bathe in and irrigate our farm with is incredibly rare. Only 3% of the world's water is freshwater, and two-thirds of that is tucked away in frozen glaciers or otherwise unavailable for our use. As a result, some 1.1 billion people worldwide lack access to water, and a total of 2.7 billion find water scarce for at least one month of the year. Inadequate sanitation is also a problem for 2.4 billion people who are exposed to diseases. By 2025, an estimated 1.8 billion people will live in areas plagued by water scarcity, with two-thirds of the world's population living in water-stressed regions.

Water demand in India will reach 1.5 trillion cubic meters in 2030 while India's current water supply is only 740 billion cubic meters. By the time 2040, there won't be enough water in the world to quench the thirst of the world population and keep the current energy and power results going if we continue doing what we're doing moment. To avoid all these problems an effective rainwater harvesting systems should be enforced. This automatic rainwater harvesting systems can be installed every place and original people can be fluently trained to apply similar technology and conservation material is fluently available. It has low conservation cost and running cost, first of all, we need to clean our roof or catchment area to help any dirt or other gratuitous accoutrements from polluting the water. The construction of cement jars or provision of gutters doesn't bear veritably high professed force.

II. LITERATURE SURVEY

Dr C. Kishore Kumar Reddy, PR Anisha, Rajashekar Shastry, Dr B V Ramana Murthy, Dr Vuppu Padmaka: in the year 2019 proposed with a project on "Automated Rainwater Harvesting System". They Harvested Rainwater and stored in underground. Bandi Lasya, Yethinthala Bhavana, Bachu Deekshitha, Priya B.K; in the year 2020 proposed with a project on "An Innovative and Effective Electronic Based Automatic Rainwater Harvesting System". They Harvested Rainwater and used for various household works. Gaurav

Verma, Shubhangi Gupta, Rohan Gupta: In the year 2020 proposed with a project on "IOT Based Technique for Household Rainwater Harvesting". They are also harvested rainwater and used for household work. K.Pushpa Rani, Krisha Sriya. A. Jyothianvitha, M. Ashasri, I. Mamatha, G. Rajesh: In the year 2021, proposed a project on "Rainwater Harvesting for Smart Water Management Using IOT. Vatsala Sharma, Kamal Nayanam, Himani: In the year 2020 proposed with the project on "Arduino Based Smart Water Management".

III. PROPOSED SYSTEM

The proposed system is a combination of software and hardware. The block diagram of an automatic rainwater harvesting and water purification system is shown in figure 1.
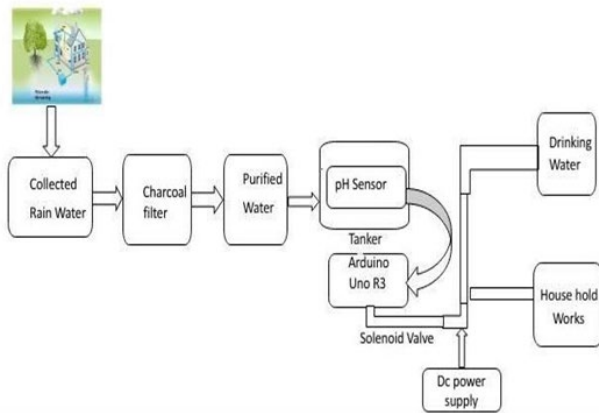

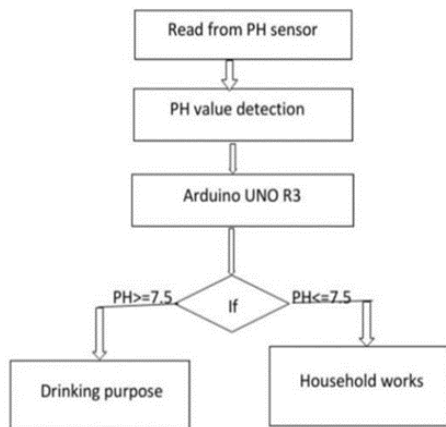Fig.1. Block Diagram of Proposed System

3.1 Flow Chart

Fig.2. Flow Chart of the Proposed System

Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins. Arduino acts as a decision-maker. A charcoal filter is the ideal water filter because it removes toxins from the water with act stripping the water of salts and important minerals. By using the charcoal filter, we filtered the rainwater. A pH sensor helps to measure the acidity or alkalinity of the water with a value between and 0-14. With the help of a pH sensor, we know the pH value whether it is acidity (or) alkalinity. A solenoid valve is when electrically energized or de-energized, either shut off or allow fluid flow, solenoid valve controls the filtered water's for flow for whether drinking purpose or household work purpose.

IV. EXPERIMENTAL SETUP

The proposed design collects the rainwater from various places of our home on or roof of the buildings and stores in a tank or underground. Then the waste from the collected water is removed with the help of a charcoal filter. The charcoal filter consists of eight layers. The bottom layer is filled with cotton, second layer is with black stone, the next layer is with sand, another layer with cotton, next layer with red bricks, then the next layer is filled with sand, next layer with cotton, and the final layer with charcoal. The water purified in the charcoal filter. Then the purity of the water is measured by using a pH Sensor. If the Output is nearer to the specifications of Indian standard specifications for drinking water the Arduino will enable the connection with drinking water pipeline or else if the readings have any deviation in it, then the controller will forward the water to the domestic usage pipeline with the help of solenoid valve.

Fig.3. Experimental Setup of Proposed System

V. RESULT AND DISCUSSION

The charcoal filter has filtered the water as we expected. The

purification process is shown in figure 4. Then the pH sensor is measured the pH Value. Then there is an Arduino UNO R3 board which checks the valve of the sensor and the solenoid valve is redirecting the purified water into their corresponding pipelines based on their pH level.
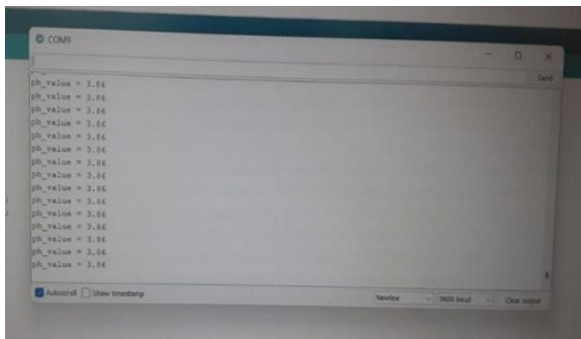

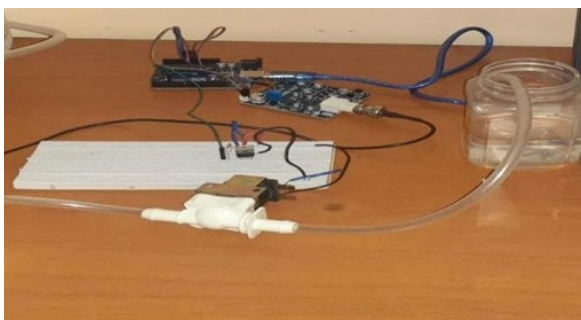Fig.4. Charcoal Filter

Fig.5. Output of the pH Value

Fig.6. Connections of Solenoid Valve

VI. CONCLUSION

Automatic rainwater harvesting has to be used in an important and possible thing similar that it can alleviate the goods of depleting groundwater degrees and shifting climate conditions. Rainwater harvesting can overcome the problem of a deluge, while also helping in storing redundant water that can help in furnishing water to the water-scarce region.

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