

AQUANEBULA SMART WATER DISPENSER

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Introduction:

Water is a vital component of existence and a major force behind sustainable growth and development. The Atmosphere contains water in the form of water vapour, moisture etc. Within that amount almost 35% of the water is wasted. This amount of water can be used with the help of an Atmospheric Water Generator. It uses advanced air-to-water technology to pull moisture from the air and turn it into water, ensuring you always have a reliable source of drinking water. But that's not all AquaNebula also features a rain sensor that detects rainfall and automatically collects rainwater, which is then filtered and stored for later use. This dual-source system makes it a perfect solution for areas with limited access to traditional water supplies. The water generated by AquaNebula goes through a multi-stage purification process, including sediment filtration, activated carbon filtration, to remove impurities and make it safe to drink. It also adds essential minerals to improve the taste and health benefits of the water. The dispenser ensures that the stored water remains pure, free from contaminants, and accessible on demand. This project explores a promising alternative: Atmospheric Water Generators (AWGs) that extract water from air using Peltier devices. The implementation of Drinking Water ATM to effectively control water resources. A coin-operated water dispenser is a machine that provides water when a coin is inserted. It is commonly used in public places to offer clean drinking water for a small fee.

Objectives:

- To generate clean drinking water directly from atmospheric humidity, reducing dependence on traditional water sources.
- To ensure water purity utilize advanced filtration and mineralization processes to deliver safe, high-quality drinking water.
- To promote eco-friendliness, minimize environmental impact by reducing plastic waste from bottled water and conserving natural resources.
- To provide an economical alternative to cup water and traditional water supply systems over time.
- To Offer a reliable water solution for disaster relief operations and areas with limited infrastructure.

Methodology:

The Aquanebula Smart Water dispenser involves a structured methodology starting with a needs assessment and planning phase, where community engagement and site selection are crucial to understanding local water needs and determining optimal locations for the units. It takes a methodical strategy to design a air to water dispenser system for an embedded system.

System Design:

- Air Intake: Draws air from the atmosphere into the device using fans or blowers. Filters the incoming air to remove dust and impurities.
- Condensation Process: Cools the air to its dew point. This causes water vapor in the air to condense into liquid water.
- Rainwater Storage: A rain drop detector to sense rainfall and trigger an automatic valve. Direct the collected water into a storage tank for later use, activating the system only when rain is detected.
- Water Collection: Collects the condensed water and rainwater in a storage tank. Atmospheric Water Generator systems use gravity or a pump to transfer water to this reservoir.

- Filtration & Purification: Filters the collected water through multiple stages to remove any remaining impurities. Often includes disinfection methods to ensure the water is safe to drink.
- Storage & Dispensing: Stores the purified water in a tank, keeping it at a safe, drinkable temperature. Dispenses water on demand through a integrated pump system.
- Coin Detection: The IR sensor detects the insertion of a coin and sends a signal to the Arduino.
- Dispensing: Upon receiving the signal from the IR sensor, the Arduino activates the DC motor, which dispenses an empty cup glass.
- Water Refilling: After dispensing the cup glass, the Arduino activates the water pump to fill the cup with water.
- User Interaction: The system provides indicators (e.g., LEDs or an LCD screen) to inform users about the status of the operation (e.g., "Insert Coin," "Dispensing cup," "Refilling cup," "Operation Complete").

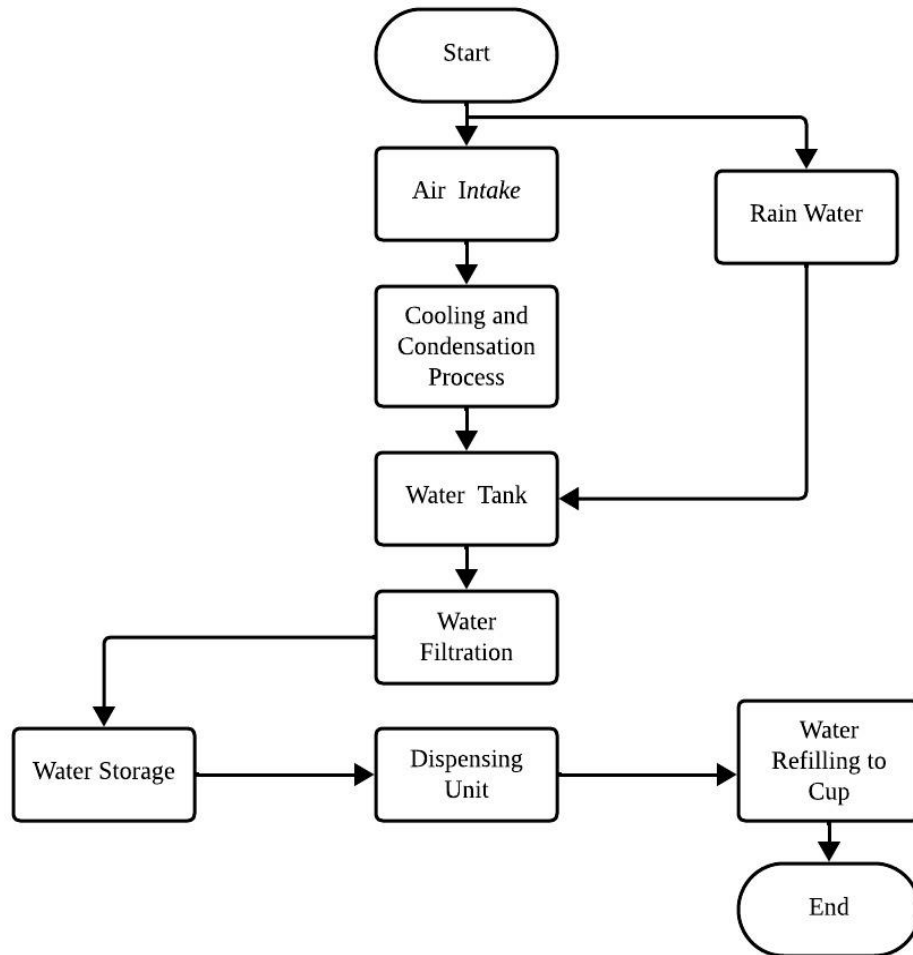


Figure 1: Block diagram of Aquanebula Smart Water Dispenser

Result and Conclusion:

This project successfully demonstrates the development of a Aquanebula smart water dispensing, Rain water storage and Dispensing system using Arduino. The system automates the entire process, making it user-friendly. It provides a practical solution for public places, ensuring easy access to clean water and promoting the use (cup). The project highlights the potential of Arduino in automating everyday tasks and addresses both convenience and environmental sustainability.

Step1: Air from the atmosphere into the device using fans. Filters the incoming air to remove dust, impurities and causing the moisture to condense into water droplets. Collects the condensed water in a storage tank as shown in the figure 2.



Figure 2: Air to Water Generator System

Step 2: A rain drop detector to sense rainfall and trigger an automatic valve. Direct the collected water into a storage tank for later use, activating the system only when rain is detected as shown in the figure 3.

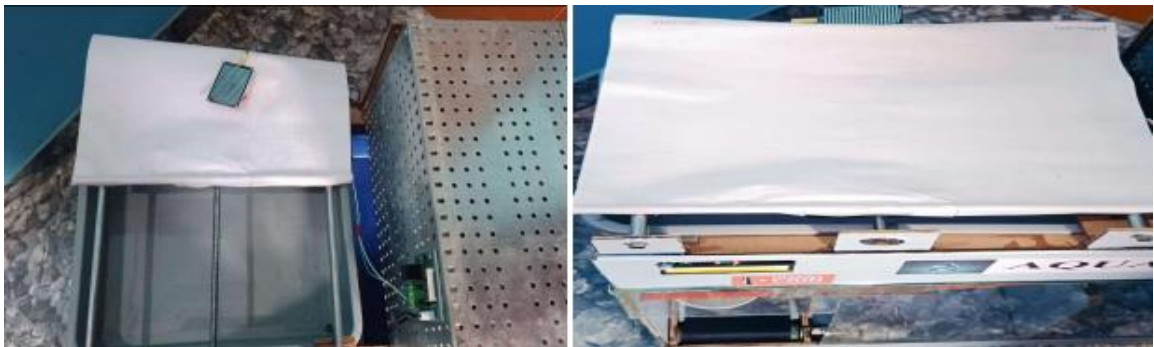


Figure 3: Collecting the Rain Water

Step 3: The condensed water and rainwater go through a filtration system. The both water sources makes a multi-stage filtration before storing for use as shown in the figure 4.



Figure 4: Filtration system and storage tank system

Step 4: The Coin Detection of IR sensor detects the insertion of a coin and sends a signal to the Arduino and the LCD displays corresponding information as shown in the figure 5.



Figure 5: Smart Dispenser Display the Coin Detection

Step 5: Cup Dispensed upon receiving the signal from the IR sensor, the Arduino activates the DC motor, which dispenses an empty Cup, Water refilling after dispensing the cup, the Arduino activates the water pump to fill the cup with water as shown in the figure 6.

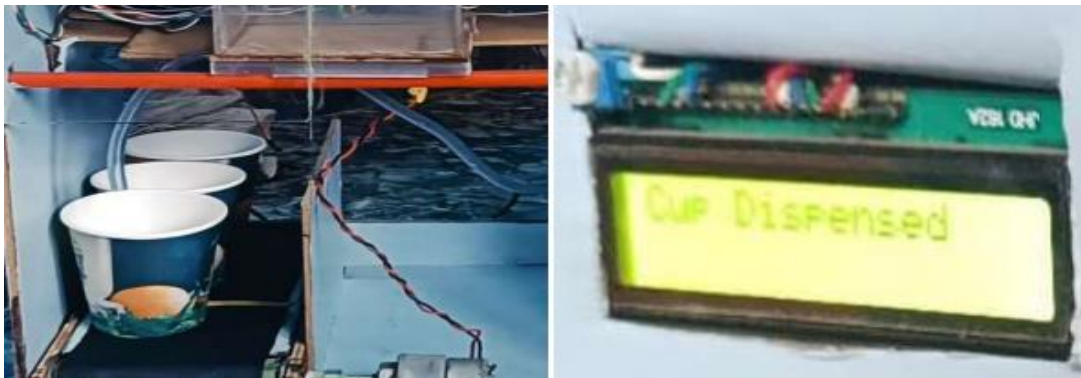


Figure 6: Cup Dispensed and fill with water

Conclusion

The AquaNebula Smart Water Dispenser is a game-changing solution for clean, safe, and sustainable water access. By combining air-to-water technology with rainwater harvesting, it ensures a reliable water supply, even in areas facing water scarcity. The system extracts moisture from the air and collects rainwater using a smart rain sensor, providing a dual-source solution that's both efficient and ecofriendly. With advanced

filtration, AquaNebula delivers water that's not only safe to drink but also enriched with essential minerals for better taste and health. The rain sensor maximizes water collection during rainy seasons, reducing reliance on external water sources and promoting sustainability. Designed for homes, offices, and communities, AquaNebula is a modern, energy-efficient device that fits seamlessly into any environment.

Future Scope:

The future scope of the Aquanebula Smart Water Dispenser, combined with rainwater storage and dispensing units, offers a promising sustainable solution. As water scarcity becomes a global concern, integrating smart dispensers with rainwater harvesting systems can provide an eco-friendly, efficient way to manage water usage. Advanced sensors and AI could optimize water usage, monitor quality, and predict maintenance needs, making the system even more automated. With increasing focus on sustainability, such systems could not only reduce dependence on municipal water sources but also help in promoting conservation, offering a smarter, greener alternative for homes and businesses alike.