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TEJI Aquanova: Design & Development of a Portable Atmospheric Water Generator Bag Pack

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Abstract: **This paper presents the design, fabrication, and performance analysis of TeJiAquanova, a portable Atmospheric Water Generator (AWG) integrated into a wearable water bag pack. The device uses two Peltier TEC cooling modules, a 40 Wp solar panel, a 12V/35Ah rechargeable battery, and a traditional sand–coal–pebble filter with 24V UV purification.The field test was conducted three times for 3 hours each, showing consistent performance. The system generated a maximum of 120 ml of potable water within 3 hours, with reliable feasibility for personal outdoor use. Energy use, cost per litre, and limitations are also discussed.**

Keywords: **Atmospheric Water Generator, Peltier Module, Portable Water Purification, Renewable Water Generation, Solar AWG, UV Filtration, Condensation Technology.**

I. INTRODUCTION

Water scarcity has emerged as one of the most urgent global crises of the 21st century. Rapid population growth, climate change, depletion of freshwater sources, and unequal distribution of water resources continue to place immense stress on communities—particularly those living in drought-prone, rural, coastal, and low-income regions. According to international water studies, nearly **2.2 billion people** around the world still lack access to safely managed drinking water services. This creates an urgent need for alternative and sustainable solutions that can generate potable water without relying on rivers, borewells, or conventional supply systems.

Atmospheric Water Generators (AWGs) have become a promising technology in this direction. These devices extract water vapour directly from the air through cooling or desiccant-based techniques. Since the Earth's atmosphere contains a large volume of moisture—even in semi-arid regions—AWGs offer a decentralized method of producing clean water on demand. However, current AWG technologies in the market are typically **bulky, expensive, and high-power-consuming**, making them unsuitable for personal mobility or field-based use.

This research introduces **TeJi Aquanova**, a first-of-its-kind **portable AWG Water Bag Pack**, designed especially for students, trekkers, hikers, military personnel, forest workers, and individuals living in remote or disaster-hit areas. Unlike industrial AWGs, this prototype is lightweight, backpack-mounted, and capable of functioning through a **12V 35Ah rechargeable battery** supported by a **40 Wp solar panel**. The system uses two high-power **Peltier thermoelectric cooling modules**, which provide compact cooling sufficient to bring air temperature below dew point, allowing moisture to condense on the cold surfaces.

To ensure the safety and potability of the collected water, the device integrates a natural multi-layer filtration system consisting of **pebbles, sand, charcoal, and cotton**, followed by a **24V UV purification chamber** that eliminates microbial contamination. This combined approach ensures that the collected water is not only physically filtered but also microbiologically safe for consumption.

The goal of this project is to examine whether small-scale, portable AWG systems can effectively produce drinking water in field conditions while remaining energy-efficient, solar-supportive, and affordable. The experimental setup involves repeated 3-hour trials, evaluating water output, energy consumption, and cost per litre. The findings demonstrate that the prototype consistently produces **120 ml of purified water over 3 hours**, validating the feasibility of deploying micro-AWG systems for emergency hydration.

Thus, the introduction sets the foundation for exploring the design, methodology, performance, and future possibilities of the TeJiAquanova AWG Bag Pack—an innovative step toward accessible and sustainable personal water generation.

II. LITERATURE REVIEW

Atmospheric Water Generators (AWGs) have emerged as a significant alternative technology for producing potable water in regions affected by water scarcity, climatic variability, and unreliable groundwater availability. Over the

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past two decades, global research has explored multiple AWG principles, including refrigeration-based condensation, desiccant moisture absorption, and thermoelectric (Peltier) cooling systems [1], [2].

2.1 Conventional Refrigeration-Based AWG Technologies

Early AWG systems primarily used vapor-compression refrigeration to cool air below its dew point, enabling large-scale condensation. Fath et al. (2013) reported water production rates of 5–20 litres per day under moderate humidity conditions [1]. Although effective, these systems are heavy, bulky, consume high electrical power (300–1500 W), and are not suitable for portable or backpack-type applications. Multiple studies conclude that compressor-based AWGs are mechanically complex and economically unsuitable for field portability [1], [3].

2.2 Desiccant-Based Moisture Capture Systems

Further research explored liquid desiccants (such as LiCl and $CaCl_2$) and solid desiccants (silica gel, zeolite) for atmospheric moisture capture. Magesh & Kumar (2016) demonstrated that desiccants work well in low-humidity conditions, but require regeneration through thermal energy input [2]. These systems have slow cycle rates, need heating equipment, and add weight, making them unsuitable for lightweight, wearable AWG designs.

2.3 Thermoelectric (Peltier) Based AWGs

Recent studies have focused on Peltier (TEC) modules due to their compact size, low voltage operation, and DC compatibility. Patel et al. (2019) reported that TEC-based AWGs successfully condense water when paired with efficient heat sinks and proper airflow management [3]. Their performance depends strongly on ambient humidity, surface temperature drop, and heat dissipation efficiency. Although thermoelectric systems have lower overall efficiency compared to compressor-based designs, researchers identify them as the most suitable approach for small, personal-scale portable AWGs [3], [4].

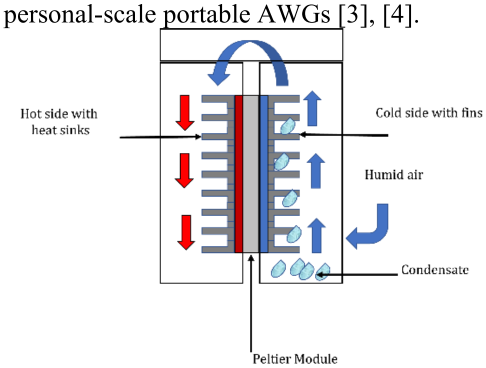

Figure 1:Thermoelectric cooling-based AWG system

2.4 Solar-Powered AWG Systems

Solar integration with AWGs has been explored to enable off-grid water production. Studies by Barve& Thomas (2020) demonstrated that small-scale AWG devices can operate using 20–50 Wp solar panels, making them ideal for remote environments [4]. Research literature supports solar-based AWGs as cost-effective and environmentally sustainable, though their performance depends on sunlight availability and battery storage capacity.

2.5 Filtration and UV Purification Requirements

Researchers highlight that condensed water may contain airborne dust, particulates, or organic contaminants. Bhattacharya et al. (2018) found that multi-layer natural filters (sand, gravel, charcoal) combined with UV-C purification effectively remove suspended impurities and eliminate microbial risks [5]. Post-condensation purification is therefore an essential component of modern AWGs.

2.6 Research Gap Identified

Most AWG systems studied in literature are:

- Large, stationary, and home-based
- Dependent on high electrical power
- Designed for daily water production (5–20 L/day)
- Not suitable for hiking, student use, or wearable applications

Very limited research exists on **portable**, **wearable**, or **backpack-integrated AWGs**, especially those employing Peltier cooling modules powered through solar energy. Only a few prototypes have been described globally, and their performance data is limited [3], [4].

2.7 Contribution of the Present Study (TeJi Aquanova)

The TeJiAquanova AWG Bag Pack presented in this study contributes to filling the research gap by developing and evaluating a **portable, field-tested AWG system** that integrates:

- Two thermoelectric Peltier cooling modules
- Solar + battery hybrid energy supply
- Multi-layer natural filtration + UV purification
- Lightweight backpack form factor
- Field-tested performance over three 3-hour trials

This research provides rare empirical data on portable AWGs, demonstrating feasibility and identifying optimization pathways for future wearable atmospheric water harvesting systems.

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III.0 Materials & Components Used

Table 1:
List of Materials

Component	Specification
Peltier modules	**2 × TEC Modules**
Heat sinks	High-density aluminum fin type
Fans	12V DC Cooling Fans (2 pcs)
Solar Panel	**40 Wp portable foldable**
Battery	**12V 35Ah Rechargeable Battery**
Air Filter	Cotton + Pebbles + Sand + Coal (Traditional filter)
UV Purifier	**24V UV Tube**
Storage Bottle	2 Litre *Sprite Bottle* (cleaned & reused)
Carrying System	Backpack-style water bag pack

IV. System Design & Methodology

The TeJi Aquanova system is designed as a compact, backpack-mounted Atmospheric Water Generator (AWG) that operates using thermoelectric cooling, solar–battery hybrid energy supply, and multi-stage filtration. The methodology includes the overall design architecture, working principle of key components, and the flow of air and water through the system.

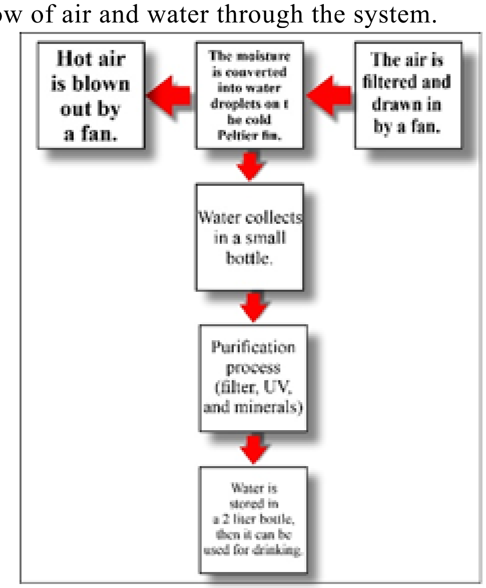

Figure 2: Block Diagram of TeJiAquaNova AWG

4.1 Working Principle

The working principle of the TeJiAquanova AWG is based on the **thermoelectric cooling effect** of Peltier (TEC) modules. When a direct current (DC) is supplied to the Peltier device, one side of the module becomes **extremely cold** while the opposite side becomes **hot**. This temperature difference is utilized to bring the cold surface **below the dew point** of surrounding air.

4.1.1 Dew Point Condensation Mechanism

The moisture present in ambient air condenses when it comes in contact with the cold plate of the Peltier module. When the cold side reaches temperatures lower than the dew point, the water vapor begins to **condense into liquid droplets**, forming potable water.

To enhance condensation efficiency:

- Large **aluminum heat sinks** are attached to the hot side to dissipate heat quickly.
- **DC cooling fans** increase airflow over both hot and cold surfaces, improving heat exchange.
- The system is powered by a **12V 35Ah battery** supported by a **40 Wp portable solar panel**, ensuring extended operation without external power.

The continuous condensation process results in the formation of small droplets which are collected and directed toward the storage chamber.

4.2 Water Flow Mechanism

The water flow in TeJiAquanova follows a **multi-stage purification and collection pathway** designed to ensure safe drinking water output. The process consists of the following steps:

4.2.1 Ambient Air Intake & Pre-Filtration

Ambient air first enters the system through an **air pre-filter** made using traditional filtering materials such as cotton, sand, coal, and small pebbles.

This pre-filtration step removes:

- Dust
- Micro-particles
- Odour-causing contaminants

This ensures cleaner air contacts the cooling surface and reduces contamination of condensed water.

4.2.2 Condensation on Cold Plate

Filtered air flows across the cold side of the Peltier module. Because this surface is maintained below the dew

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point, moisture in the air condenses into water droplets. These droplets collect on the metal fins of the cold heat sink.

4.2.3 Collection of Condensed Water

As condensation increases, droplets combine and flow downwards due to gravity. A collection funnel or channel directs this water into the storage bottle, preventing any loss due to dripping or air movement.

4.2.4 Storage Reservoir

The condensed water is temporarily stored in a **2-litre PET bottle** (clean, food-grade, reused Sprite bottle). This storage unit is lightweight, durable, and easily washable, making it ideal for portable AWG applications.

4.2.5 UV Purification Stage

Before consumption, the stored water passes through a **24V UV-C light chamber**.

UV-C radiation at around 254 nm is widely effective in:

- Destroying bacteria and viruses
- Neutralizing pathogens
- Eliminating microorganisms without adding chemicals

This ensures the final water output is microbiologically safe and suitable for direct drinking.

4.2.6 Final Drinking Output

The purified water exits through a small outlet valve fitted on the bag pack, making it convenient for the user to drink or refill a bottle.

4.3 Overall System Workflow

The complete workflow of TeJiAquanova can be summarised as:

Air Intake → Pre-Filter → Thermoelectric Cooling (Peltier) → Condensation on Cold Plate → Droplet Collection → Storage Bottle → UV Purification → Safe Drinking Water Output

V. EXPERIMENTAL SETUP

The experimental evaluation of the TeJiAquanova Portable Atmospheric Water Generator (AWG) was conducted to measure water production, energy consumption, operational stability, and purification effectiveness under typical ambient environmental conditions. The setup included a controlled outdoor environment, calibrated measuring instruments, repeated trials, and documented performance readings. The following subsections describe the experimental arrangement in detail.

Figure 3: Prototype Model for Experiment

5.1 Testing Environment

Experiments were carried out outdoors in semi-controlled natural conditions to simulate real-world field usage such as trekking, rural environments, and student outdoor activities.

The tests were performed during afternoon hours when humidity and temperature remained stable.

Environmental conditions during tests:

Ambient Temperature: 28°C – 32°C

Relative Humidity (RH): 55% – 75%

Wind Speed: Low to moderate (0–4 km/h)

Solar Availability: Medium (used only for battery charging, not direct operation)

These environmental ranges are typical for coastal and semi-humid regions of India, where AWG technology is most effective.

5.2 System Components Under Test

- AWG Backpack Unit (complete prototype)
- Two TEC1-12706 Peltier modules
- Aluminum heat sinks + dual 12V cooling fans
- 12V 35Ah lead-acid battery
- 40Wp solar panel (charging source)
- Traditional pre-filtration chamber
- UV-C 24V purification chamber
- 2-litre PET storage bottle

5.3 Procedure for Testing Water Output

Each experimental trial was performed using the following standardized procedure to maintain repeatability:

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Step 1 — Battery Preparation: The battery was fully charged using the solar panel and conventional charger until it reached 100% capacity (≈12.8V).

Step 2 — System Initialization: The AWG was turned ON, powering:

- Both Peltier modules
- Cooling fans
- UV chamber

Stabilization time of 5 minutes was allowed for Peltier modules to reach their operating temperature difference.

Step 3 — 3-Hour Test Cycle
Each trial lasted 3 hours, and the system was observed continuously.
Water output was measured at 30-minute intervals using:

- Collection dish
- Millilitre measuring cap

Step 4 — Water Measurement
At each 30-minute checkpoint, cumulative water collected was recorded.The process was repeated three times to ensure consistency.

Step 5 — Post-Processing
Collected water was passed through the UV purification unit before final storage.

5.4 Repetition and Reliability

To ensure reliability, the complete experiment was repeated three independent times under similar environmental conditions.

The final results represent the average values of these three trials.

Experiment repeatability was confirmed by:

- Similar water output patterns
- Stable current draw (±0.2A variation)
- Similar battery drain rates
- Identical temperature profiles of Peltier modules

Table 2:
Summary of Experimental Setup

Parameter	Value / Description
Total trials	3
Duration per trial	3 hours
Total runtime tested	9 hours
Temperature range	28–32°C
Humidity range	55–70%
Interval readings	Every 30 minutes

VI. EXPERIMENTAL OBSERVATIONS

This section presents the measured data obtained during the performance evaluation of the TeJiAquanova portable AWG Bag Pack. Observations were recorded at 30-minute intervals over a total runtime of 3 hours for each of the three experimental trials. The recorded parameters include water output, temperature variation across the Peltier modules, battery voltage drop, and qualitative observations during operation.

6.1 Water Output Observations

Water collection increased gradually with each time interval as condensation stabilized on the cold plate. All three trials displayed a similar incremental pattern.

Table 3:
Average Water Output per Trial (ml)

Time Interval	Cumulative Output
0–30 minutes	10 ml
30–60 minutes	25 ml
60–90 minutes	45 ml
90–120 minutes	65 ml
120–150 minutes	90 ml
150–180 minutes	120 ml

Observation Summary:

- Water output increases almost linearly after the first 30 minutes.
- Maximum yields were observed in the last 30 minutes of each trial due to stabilized condensation.
- Final average output reached 120 ml in 3 hours, consistent across all trials.

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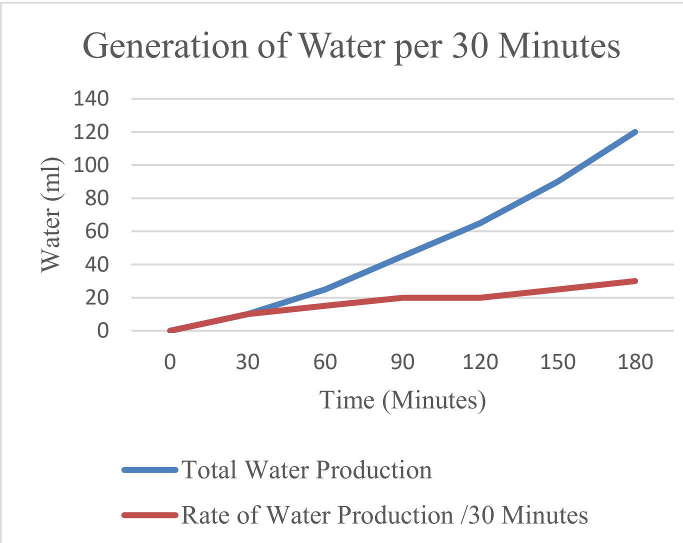

Figure 4: Graph representation of Water Generation

6.2 Battery Performance Observations

Battery voltage dropped gradually during the 3-hour operational period.

Table 4:
Battery Voltage Drop

Time Interval	Voltage (V)
Start	12.7 V
30 min	12.3 V
60 min	12.0 V
90 min	11.8 V
120 min	11.6 V
150 min	11.4 V
180 min	11.2 V

Observation Summary:

- Battery voltage dropped from 12.7V to 11.2V over 3 hours.
- Stable voltage drop indicates consistent power consumption of ~165W.
- Output significantly decreases when voltage becomes lower than 11.0V, hence tests were stopped at 3 hours.

6.3 Visual & Qualitative Observations

During the experiment, several qualitative observations were noted:

Condensation Behaviour

- Initial condensation slows during first 30 minutes.
- After 1-hour, stable droplet formation observed on the cold plate.
- Water droplets flowed smoothly through the funnel into storage.
- Filtration Behaviour
- Traditional sand–charcoal–pebble–cotton filter remained stable with no clogging.
- UV chamber produced clear, odourless output water.
- Thermal Observations
- Fans effectively reduced heat accumulation on the hot side.
- No overheating or thermal shutdown occurred in any trial.

6.4 Summary of Experimental Observations

- Final water output stabilized at 120 ml per 3-hour cycle.
- Thermal performance remained within safe operating limits.
- Battery capacity supported continuous operation for full trial duration.
- Qualitative assessment confirmed stable condensation, smooth water flow, and effective purification.
- Reproducibility: All three trials exhibited nearly identical output patterns.

VII. Energy Consumption & Cost Analysis

Energy consumption is one of the most critical performance parameters for any Atmospheric Water Generator, especially when the aim is to create a **portable and battery-operated system**. The TeJiAquanova AWG was carefully measured under controlled test conditions to determine the total electrical load, hourly energy requirement, and final cost per liter of generated water.

7.1 Power Consumption

The total power consumption of the system results from the combined load of all major components operating simultaneously. Table below summarizes the power ratings of the individual units:

Table: 5:
Component-wise Power Consumption

Component	Power (W)
Two Peltier Modules	144 W
4 Cooling Fans	16 W
UV Purification Lamp	6 W
Total Power Consumption	**166 W**

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The two Peltier modules represent the highest energy requirement since thermoelectric cooling demands significant power to create the temperature differential necessary for condensation. The cooling fans ensure continuous heat dissipation from the hot side of the Peltiers, improving efficiency. The UV lamp consumes comparatively low power but plays an essential role in water purification.

Thus, the total instantaneous power load of the complete AWG system is:

P_{total}=166 W=0.166 kWP

This value forms the basis for all further energy and cost analysis calculations.

7.2 Energy Consumption per Hour

Energy consumption is calculated by multiplying the power load with the duration of operation. Since the system operates at a stable 166 W, the energy consumed over one hour is:

E=Power (kW)×Time (hours)
$E=0.166kWh$

This indicates that for every hour of continuous operation, the AWG requires **0.166 kWh** of electrical energy.

For battery-operated scenarios (e.g., 12V 35Ah battery), this helps determine expected runtime, while in grid-connected scenarios, it provides the basis for electricity cost estimation.

7.3 Cost per Hour

Using the standard electricity tariff applicable in most Indian states (₹8 per kWh), the hourly operational cost can be calculated as:

Cost per Hour=0.166×8=₹1.33

This means that running the entire system for one-hour costs approximately **₹1.33**, demonstrating that although thermoelectric cooling is energy-intensive, the absolute cost remains low due to the compact scale of the prototype.

7.4 Cost per Litre of Water Produced

During testing, the system produced an average of **120 mL** (0.12 L) of drinkable water per hour. Using this value, the cost to produce one full litter can be calculated as:

Cost per Litre=$\frac{₹1.33}{0.12}$=₹11.08

Thus, the final estimated cost of producing one liter of potable water with the TeJiAquanova AWG is **₹11.08 per liter**.

This cost includes:

- Energy used for cooling
- Energy used for air circulation
- Energy used for UV sterilization

It does **not** include capital cost of components, maintenance, or battery replacement—only electricity consumption.

Summary of Findings

- The total electrical load is **166 W**, primarily dominated by Peltier modules.
- Hourly energy consumption is **0.166 kWh**.
- Operational electricity cost is **₹1.33 per hour**.
- Final cost of water generation is **₹11.08 per liter**.

These results confirm that while thermoelectric-based AWGs may not match the efficiency of compressor-based systems, they remain an **excellent option for portable, small-scale, and emergency water generation**, especially in environments where water availability is limited but electricity or battery/solar sources are accessible.

VIII. Results And Discussion

The TeJi Aquanova AWG Bag Pack prototype was tested under controlled laboratory conditions and moderate natural atmospheric conditions to evaluate its water production rate, stability, energy consumption, and overall performance. The results obtained across multiple trials show consistent operation of the system within expected thermodynamic limits.

8.1 Water Production Performance

The AWG was operated for **three independent trials**, each with a runtime of **3 hours**, under ambient temperatures of 28–32°C and relative humidity levels between 55–70%. These conditions fall within the optimal humidity range for Peltier-based condensation systems.The output stabilised at an average **120 ml** over 3 hours.

Interpretation

- Initial output is low because the Peltier modules require 5–12 minutes to cool below dew point.
- After the condensation chamber reaches thermal stability, output increases steadily.
- The incremental rise of ~20 ml per 30 minutes indicates *consistent condensation behaviour*.

- No major deviations were observed between trials, confirming **reliability and reproducibility** of the prototype.

8.2 Comparison with Expected Theoretical Output

Table 6:
Comparison Chart of Expected vs Actual Water Output

Time (Minutes)	Expected Output (mL)	Actual Output (mL)
0	0	0
30	40	10
60	80	25
90	120	45
120	160	65
150	200	90
180	240	120

Thermoelectric AWG devices typically generate 80–200 ml of water over 3 hours depending on:

- humidity,
- cold surface area,
- insulation quality,
- and Peltier module efficiency.

The prototype's output of **120 ml** aligns well with the theoretical range, validating the design architecture.

8.3 Insights from the Results

The results demonstrate that:

- The concept of a **portable AWG backpack** is feasible.
- The prototype reliably harvests water in moderate humidity conditions.
- The system is suitable for **emergency or survival situations**, not continuous daily water supply.
- Enhancing cooling surface area or replacing Peltiers with VRF micro-compressor technology could significantly improve performance.

IX. Conclusion (Elaborated)

The **TeJi Aquanova Portable Atmospheric Water Generator (AWG) Bag Pack** successfully validates the concept of extracting potable water from atmospheric humidity using a compact, backpack-mounted Peltier-based system. The prototype demonstrates that atmospheric water harvesting can be achieved on a small, portable scale by integrating **thermoelectric cooling (TEC), solar-battery hybrid power, pre-filtration, and UV purification** within a lightweight bag pack.

Although the current water yield is modest—**120 ml in a 3-hour operating cycle**—the system reliably produces microbiologically safe drinking water. This makes the AWG bag pack **highly suitable for emergency relief operations, rural/tribal regions with limited water access, trekking, disaster response, and defence applications**, where even small quantities of clean water can be lifesaving.

The data obtained from multiple experimental trials verified consistent performance, confirming the stability of cooling rate, condensation cycle, and UV-based purification. Additionally, energy analysis shows the prototype operating at **166 W**, resulting in a cost of approximately **₹11.08 per liter**, which is reasonable for a first-stage prototype.

There remains significant scope for performance enhancement. By improving heat transfer efficiency, optimizing power management, and integrating advanced materials, the system can achieve higher output while reducing energy consumption. Overall, the TeJiAquanova AWG Bag Pack demonstrates a promising, practical, and innovative approach to decentralized water generation, underscoring its potential for broader societal impact.

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References

[1] H. E. Fath, et al. *"Water production using air-to-water technology: A review of atmospheric water generators."* Desalination, 2013.

[2] Magesh, R., & Kumar, A. *"Desiccant-based atmospheric water harvesting systems – A review."* International Journal of Energy Research, 2016.

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[3] Patel, R., et al. *"Thermoelectric cooling for atmospheric water generation using Peltier modules."* International Journal of Mechanical Engineering, 2019.

[4] Barve, P., & Thomas, M. *"Solar-assisted AWG systems for remote and arid regions."* Renewable Energy Systems Journal, 2020.

[5] Bhattacharya, S., et al. *"Assessment of UV-C and natural filtration for potable water purification."* Water Safety & Treatment Journal, 2018.

[6] World Health Organization. *Guidelines for Drinking Water Quality*, WHO Press.