



Automated Desktop Herbal Garden

Technical Brief

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Technology Summary

The Automated Desktop Herbal Garden is a compact, smart gardening system designed to utilize RO (Reverse Osmosis) wastewater for cultivating herbs and small plants indoors. Equipped with soil moisture sensors, microcontrollers, GSM modules, and cloud-based analytics, the system automatically regulates irrigation, temperature, and humidity for optimal plant growth. By repurposing RO reject water, it promotes sustainability while improving workspace environments through greenery. The system has been validated and presented in a conference paper.

Background

Urban workspaces often lack greenery due to limited space and difficulty in maintaining plants. At the same time, significant volumes of RO reject water are wasted daily, adding to environmental stress. Traditional plant care methods are inconsistent, leading to poor plant survival. The Automated Desktop Herbal Garden addresses these issues by combining smart irrigation with resource reuse. It offers stress reduction, improved air quality, and enhanced well-being for users, while ensuring water conservation and sustainable living.

Technology Description

The system integrates soil moisture sensors, microcontrollers (Arduino), GSM modules, and cloud servers to monitor and control irrigation cycles automatically. Based on threshold values derived from historical plant data, water is supplied in precise amounts to ensure healthy growth. Temperature and humidity regulation, as well as adjustable artificial lighting, provide the ideal environment for plants indoors. The system repurposes RO wastewater for irrigation, ensuring efficient use of resources. Real-time alerts and pattern analysis are available via cloud connectivity, allowing users to monitor their garden remotely.

Market Potential / Proposed Deployment

- Global Indoor Gardening Market: USD 2.9B (2024) → USD 5.1B (2030) | CAGR ~9.8%
- Target Sectors: Offices, households, urban farming startups, CSR sustainability programs.
- Socio-Economic Impact:
- Saves water through RO wastewater utilization.
- Provides accessible greenery for urban lifestyles.
- Enhances workplace health, creativity, and productivity

Applications

- Workspaces & Offices: Improves air quality and reduces stress at desks.
- Households: Indoor herb gardening using recycled water.
- Educational Use: Demonstration tool for smart agriculture and IoT.
- Sustainability Programs: Promotes water reuse and urban greening initiatives.

Value Proposition

- Sustainable: Repurposes RO reject water for productive use.
- Automated Care: Reduces human effort with sensor-based irrigation.
- Compact & Scalable: Fits into small spaces while supporting multiple herbs.
- Health & Well-being: Improves indoor environment and productivity.
- Smart Integration: Cloud storage and GSM-based alerts for real-time monitoring.

Technology Status

- Technology Readiness Level (TRL): 5–6 (Prototype tested, research validated)
- Outcome: Validated through a conference paper; prototype system functional.
- IP Status: Not yet patented; potential for IP filing in IoT-enabled horticulture.

