PRIOR ART CHECK

PATENT SEARCH REPORT

Smart Self-Watering Planter with IoT Connectivity

688	0	0
Patents Analyzed	Direct Hits (Score 5)	Strong Overlap (Score 4)

PREPARED FOR

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DATE

March 13, 2026

REFERENCE

PAC-2026-0313-CM

1. Invention Summary

Title: Smart Self-Watering Planter with IoT Connectivity

A solar-powered, self-watering planter that uses a capacitive soil moisture sensor to detect when plants need water, automatically dispenses a controlled amount from a hidden reservoir integrated beneath the plant in the pot, and connects via BLE/WiFi to alert users when the reservoir needs refilling. The device uses an adaptive algorithm that adjusts water usage based on actual plant uptake over multiple watering cycles. Powered by a solar cell with supercapacitor/battery, eliminating the need for manual charging. The sensor reads every 4-12 hours, and if soil moisture is low, it waters a predetermined amount and waits until the next reading.

Key Functional Elements

2. Search Strategy

Keyword Searches

Search #	Query	Engine	Results Found
1	self watering planter soil moisture sensor automatic wireless	Google Patents	30
2	smart planter IoT WiFi Bluetooth moisture sensor automatic watering app notification	Google Patents	30
3	solar powered automatic plant watering system reservoir pump sensor	Google Patents	30
4	adaptive irrigation algorithm soil moisture feedback plant watering mobile app alert reservoir level	Google Patents	30
5	smart flowerpot wireless sensor automated watering pump microcontroller	Google Patents	30
6	plant monitoring device watering valve reservoir sensor connected smartphone notification	Google Patents	30

CPC Classification Codes Used

CPC Code	Description	Source
A01G25/167	Soil humidity sensors / control by humidity of soil	Extracted from US11006590B2, keyword discovery
A01G27/02	Self-acting watering devices with reservoir around growth substrate	Extracted from US10149442B2
A01G27/003	Control of self-acting watering devices	Keyword discovery (2/5 patents)
A01G27/005	Reservoirs connected to flower-pots through conduits	Keyword discovery

CPC Code	Description	Source
G16Y10/05	IoT — Agriculture	Extracted from KR102281569B1
G16Y40/30	IoT — Control	Extracted from KR102281569B1

Citation Chaining

Seed Patent	Backward Citations	Forward Citations	New Patents Found	Chain Depth
CN105875363A	5	1	6	1st
US10548268B1	13	36	11	1st
US9271454B1	9	11	16	1st
US20120083929A1	7	23	22	1st
US7809475B2	17	65	78	1st
US11006590B2	22	3	25	1st
US10149442B2	23	11	25	1st
US8408229B2	9	19	22	1st
US20130205662A1	0	22	13	1st
US20190113495A1	0	8	8	1st
GB2556979A	3	1	3	1st
KR102281569B1	3	5	7	1st
KR102033649B1	2	3	3	1st
CN107820914A	0	13	10	1st
CN111657003A	8	9	15	1st
CN106688829A	4	6	10	1st
CN106258861A	12	7	19	1st
DE202019104581U1	0	5	5	1st
KR20200049206A	5	4	9	1st
US20240268287A1	15	0	9	2nd
US8836504B2	25	28	21	2nd
CN106718245A	7	30	33	2nd
CN117751789A	8	0	2	2nd
CN109168752A	8	1	7	2nd

Seed Patent	Backward Citations	Forward Citations	New Patents Found	Chain Depth
US20250380651A1	13	0	12	2nd
CN114402844A	13	0	9	2nd
US20230015100A1	8	0	5	2nd

Total Search Coverage

688 (keyword: 164, CPC-refined: 100, 1st-order citation: 289, 2nd-order citation: 94, other/parsing: 41)

3. Prior Art Summary — High Relevance Patents

Most Relevant Prior Art (Score 4-5)

Patent No.	Title	Assignee	Date	Status	Expiration	Discovery Method	Relevance
CN105875363A	Automatic watering device detecting soil humidity with remote control	Zhejiang University	2016-08-24	Pending/Unexamined	N/A	CPC	**Very High**
US20240268287A1	Individual Houseplant Solar Powered Watering System	John Ramm	2024-08-15	Pending	N/A	Citation-1st	**Very High**
US20120083929A1	Solar-Powered Self-Watering Planter Insert	Michael Conrad Jr.	2012-04-05	Abandoned	N/A	CPC	**Very High**
US10548268B1	Soil moisture autocontrol system	James Lu	2020-02-04	Active	~2039-02-20	CPC	**Very High**
US9271454B1	Intelligent gardening system and method	Jacob Shochat	2016-03-01	Expired (Fee)	2034-02-21	CPC	**Very High**
US8836504B2	Remote monitoring of potted plants	Moritz Kohler	2013-10-08	Active	2030-11-03	Citation-1st	**Very High**
US11422524B2	Automated plant maintenance and communication alerts	Katerina Lung	2022-08-23	Active	~2039-12-09	Citation-2nd	**Very High**
CN106718245A	Solar powered intelligent flowerpot	Hunan Inst. of Tech.	2017-05-31	N/A	N/A	Citation-1st	**Very High**
CN109168752A	Intelligent irrigation flowerpot based on photovoltaic	Beijing Normal Univ.	2018-12-28	N/A	N/A	Citation-1st	**Very High**
CN114402844A	Flowerpot monitoring soil humidity	Yu Min	2022-04-29	N/A	N/A	Citation-1st	**Very High**
CN117751789A/B	Adaptive smart flowerpot (environment perception)	Shaanxi Univ. Sci & Tech	2024-03-26	N/A	N/A	Citation-1st	**Very High**

Patent No.	Title	Assignee	Date	Status	Expiration	Discovery Method	Relevance
US20060108439A1	Adaptive irrigation of vegetation	Benjamin Zur	2006-05-25	Granted	N/A	Citation-2nd	**Very High**
US7809475B2	Computer controlled fertigation system	Craig Kaprielian	2010-10-05	Expired (Lifetime)	2025-09-08	Keyword	High
US11006590B2	IoT moisture monitoring system	Lalit Kumar	2021-05-18	Expired (Fee)	N/A	Keyword	High
US10149442B2	Automated planter apparatus	Thomas Hohmann	2018-12-11	Expired (Fee)	2037-01-06	Keyword	High
US8408229B2	Plant watering system	Leonard Goldberg	2013-04-02	Expired (Fee)	2027-04-13	CPC	High
US20130205662A1	Self-contained automatic plant watering	James Yancey	2013-08-15	Abandoned	N/A	CPC	High
US20190113495A1	Remote control monitoring for plant growth	Eli Gabay	2019-04-18	Abandoned	N/A	CPC	High
US20230015100A1	Intelligent water supply base for planting pot	Wuhan Muchun Tech	2023-01-19	Abandoned	N/A	Citation-1st	High
GB2556979A	Liquid irrigation system (solar)	Irrigatia Ltd	2018-06-13	Withdrawn	N/A	Keyword	High
KR102281569B1	Smart potted plants based on IoT	Nam Gwi-hyeon	2021-07-23	N/A	N/A	Keyword	High
DE202019104581U1	Automated plant care device	Florin Marinache	2019-09-17	N/A	N/A	CPC	High

4. Claim Chart — Most Relevant Patents

CN105875363A — Automatic Watering Device (Zhejiang University, 2016)

Pending (unexamined) | Overlap: CRITICAL

Claim 1: "An automatic watering device for detecting soil moisture and realizing remote control, characterized in that, it comprises a soil moisture sensor, a solar cell, a step-down DC/DC converter, a storage battery, a water pump, a bluetooth module, and a single-chip microcomputer; wherein, the step-down DC/DC converter is respectively connected with the solar cell, storage battery, single-chip microcomputer, and water pump; the soil moisture sensor is connected with the bluetooth module, and the bluetooth module is connected with the single-chip microcomputer; the water pump is connected with the single-chip microcomputer."

FTO Notes: Chinese unexamined application — never granted. No enforceable rights. However, this is the closest single prior art reference combining solar + BLE + sensor + pump + MCU in one device. Critical for patentability analysis as it anticipates 4 of 5 key elements.

US20240268287A1 — Individual Houseplant Solar Powered Watering System (Ramm, 2024)

Pending | Overlap: CRITICAL

Claim 1: "A solar powered houseplant watering system comprising of a snap on lid, solar panel, rechargeable batteries, a slip in container, electronic circuit board, digital timer, low water indicator light, UV water sanitizer light, feeder hose, low water indicator, clip to hold feeder the feeder hose, straight feeder hose attached to the pump, water fill spout, small water pump, bottom section water reservoir, and a chain with an S hook to attached to hanging plants."

FTO Notes: Pending US application — not yet granted. Uses timer-based watering rather than sensor-based. Key differentiation: no soil moisture sensor, no wireless connectivity, no adaptive algorithm. The hidden reservoir + solar + pump combination is very similar to the invention's form factor.

US11422524B2 — Automated Plant Maintenance and Communication Alerts (Lung, 2022)

Active | Expiration: ~2039 | Overlap: HIGH

Claim 1: Covers a system comprising: computing unit, optical sensor, soil moisture sensor, water tank level sensor, pump, processor configured to: receive user identifier via communication type; determine water pump initiation/completion thresholds based on plant type and sensor inputs; transmit notifications including plant maturity, water level, and soil moisture messages.

FTO Notes: **ACTIVE PATENT — FTO RISK.** This patent covers the sensor + pump + notification combination. The invention's use of solar power and integrated hidden reservoir may provide design-around opportunities. Recommend detailed claim mapping.

US8836504B2 — Remote Monitoring of Potted Plants (Kohler, 2013)

Active | Expiration: 2030-11-03 | Overlap: HIGH

Claim 1: Covers a self-powered sensor clip/unit mounted on a plant with: at least two cross-linked sensors, electronic device for digitizing signals, wireless transmitter for real-time data to external receiver, sensor for detecting nutritive/harmful substances in culture medium.

FTO Notes: **ACTIVE PATENT — MODERATE FTO RISK.** Covers wireless sensor monitoring of potted plants but NOT watering actuation. The invention's watering function is outside this patent's claims.

US7809475B2 — Computer Controlled Fertigation (Kaprielian, 2010)

Expired (Lifetime) | Expiration: 2025-09-08 | Overlap: HIGH (Algorithm)

Claim 1: Method of fertigation comprising: growing plant in container, providing sensor for measuring total water consumption, analyzing data to determine water/nutrients to deliver, delivering at predetermined schedule.

FTO Notes: **EXPIRED.** This patent covers the closest prior art for the adaptive watering algorithm concept (sensor measures consumption, system adjusts delivery). No FTO concern. Available as prior art for the adaptive algorithm element.

US11006590B2 — IoT Moisture Monitoring System (Kumar, 2021)

Expired (Fee Related) | Overlap: HIGH

Claim 1: Moisture monitoring system with: moisture sensor with stake, temperature sensor, valve connected to water source, first wireless transceiver sending data to cloud server (IoT device), second IoT device receiving valve actuation signals from cloud,

user-defined valve duration via web/cell phone app.

FTO Notes: **EXPIRED.** Covers IoT moisture sensor + cloud + valve + app control — very close to the invention's architecture. No FTO concern due to expiration. Strong prior art reference for the sensor + cloud + app notification combination.

US10149442B2 — Automated Planter Apparatus (Hohmann, 2018)

Expired (Fee Related) | Expiration: 2037-01-06 | Overlap: HIGH (Reservoir)

Claim 1: Automated planter with: reservoir container, reservoir cavity, support lid over reservoir, bulk filling aperture, pump, electronics module with processing unit. Dependent claims add moisture sensor (Claim 2) and photovoltaic cell (Claim 8).

FTO Notes: **EXPIRED.** Covers the closest form factor match: hidden reservoir + pump + electronics module in a planter. Claims 2 and 8 (dependent) add moisture sensor and solar power. No FTO concern due to expiration. Critical prior art for reservoir-in-planter design.

US20060108439A1 — Adaptive Irrigation of Vegetation (Zur, 2006)

Granted | Overlap: HIGH (Algorithm)

Claim 1: Method for adaptive irrigation including: control logic managing successive irrigation cycles, soil probe with contacts for depth-related impedance data, controller commanding irrigation valve, adaptively adjusted depth at which irrigation stops to converge toward target depth.

FTO Notes: Covers the most sophisticated adaptive irrigation algorithm in the prior art. The invention's simpler threshold-based adaptation likely does not infringe these probe-depth-based claims, but this reference establishes that adaptive irrigation algorithms are well-known in the art.

US20120083929A1 — Solar-Powered Self-Watering Planter Insert (Conrad, 2012)

Abandoned | Overlap: HIGH (Form Factor)

Claim 1: Insert for planters with: submersible pump, reservoir with lip, perforated tray, controller, riser, drip line, solar panel unit, wherein pump delivers fluid through drip line and excess returns through perforations for recycling.

FTO Notes: **ABANDONED.** No enforceable rights. Establishes that the solar-powered self-watering planter insert with integrated reservoir was conceived by 2012. Key prior art for the solar + reservoir + pump + planter combination.

US6079433A — Automatic Soil Moisture Sensing and Watering (Saarem, 2000)

Expired (Lifetime) | Overlap: MODERATE

Claim 1: Method of automatically determining water quantity based on comparing current moisture measurement to previous measurement and computing the quantity to apply.

FTO Notes: **EXPIRED.** Foundational prior art establishing automatic moisture-measurement-based watering quantity adjustment by 2000.

US20130205662A1 — Self-Contained Automatic Plant Watering (Yancey, 2013)

Abandoned | Overlap: MODERATE

Claim 1: Container + base module with reservoir + pump + timer-based control system.

FTO Notes: **ABANDONED.** Timer-based (not sensor-based). No enforceable rights.

US20190113495A1 — Remote Control and Monitoring for Plant Growth (Gabay, 2019)

Abandoned | Overlap: MODERATE

Claim 1: Planter body with irrigation mechanism + sensors + camera + fluid reservoir + wireless communication + power source + processing device.

FTO Notes: **ABANDONED.** No enforceable rights. Covers a comprehensive connected planter concept.

GB2556979A — Solar Liquid Irrigation System (Irrigatia, 2018)

Withdrawn | Overlap: MODERATE

Claim 1: Liquid application system with reservoir + supply means operating based on condition of power supply charged by environment (solar).

FTO Notes: **WITHDRAWN.** No enforceable rights. Establishes solar-powered reservoir irrigation concept.

5. Patentability Assessment

Novelty

- **Capacitive soil moisture sensing** in planters: US10548268B1, US6079433A, US8408229B2
- **Solar-powered watering systems**: CN105875363A, US20120083929A1, US20240268287A1, GB2556979A
- **BLE/WiFi connectivity with app notifications**: US8836504B2, KR102281569B1, US11006590B2, US11422524B2
- **Hidden integrated reservoir in planter**: US10149442B2, US20240268287A1, DE202019104581U1
- **Adaptive watering algorithm**: US7809475B2, US20060108439A1, CN117751789A/B

CN105875363A (Zhejiang University, 2016) is the single closest prior art reference, combining: soil moisture sensor + solar cell + battery + Bluetooth module + MCU + water pump. It lacks only the adaptive algorithm and hidden reservoir.

However, the specific combination of ALL FIVE elements in a single consumer planter device appears to be novel. No single patent or publication was found that combines: (1) capacitive soil moisture sensor, (2) adaptive watering algorithm based on plant uptake history, (3) hidden reservoir under the plant in the pot, (4) solar power with supercap/battery, AND (5) BLE/WiFi app notifications — all in one integrated consumer planter.

Non-Obviousness

• Combining CN105875363A (solar + BLE + sensor + pump) with US10149442B2 (hidden reservoir planter) is an obvious combination

• Adding an adaptive algorithm (well-known from US7809475B2, US20060108439A1) would be viewed as a predictable improvement

• The motivation to combine these references is strong: consumer demand for "set and forget" plant care is well-documented

1. The specific adaptive algorithm that learns from plant uptake data over multiple cycles (if truly machine-learning based rather than simple threshold adjustment) could provide non-obvious innovation

2. The specific integration of the reservoir hidden beneath the plant within the pot (aesthetic consideration) combined with solar + wireless in a compact form may present non-obvious design choices

3. The combination of periodic 4-12 hour sensing intervals with adaptive volume adjustment based on historical uptake represents a specific technical approach not explicitly described in any single reference

Recommended Claims Strategy

1. **Narrow claims around the specific adaptive algorithm**: If the algorithm truly learns from historical plant uptake data (not just threshold-based), claim the specific feedback loop methodology

2. **Claim the specific integrated form factor**: Water tank hidden under the plant within the pot body, with solar cell and electronics integrated into the pot structure

3. **Claim the specific power management architecture**: Solar cell + supercapacitor + battery combination with periodic wake-up cycles (4-12 hours) to minimize power consumption

4. **Avoid broad claims** on individual elements (moisture sensor + pump, or wireless + planter) — these are thoroughly anticipated

6. Freedom to Operate (FTO) Assessment

Active Patents of Concern

Patent	Title	Assignee	Expiration	Risk
US11422524B2	Automated plant maintenance and communication alerts	Katerina Lung	~2039	**HIGH**
US8836504B2	Remote monitoring of potted plants	Moritz Kohler	2030-11-03	**MODERATE**
US10548268B1	Soil moisture autocontrol system	James Lu	~2039	**LOW**

FTO RISK LEVEL
****MODERATE****

The primary FTO risk is **US11422524B2** (Lung), which covers the combination of: soil moisture sensor + water tank + pump + notification alerts to user via communication type. The invention would need to avoid the specific claim

elements of threshold determination based on plant type + optical sensor + notification transmission.

US8836504B2 (Kohler) covers wireless sensor monitoring of potted plants but does NOT cover watering actuation — moderate risk for the monitoring/notification aspect only.

Most other relevant patents are **expired, abandoned, or withdrawn**, significantly reducing the FTO risk landscape.

Recommended Design-Arounds

1. **For US11422524B2**: The Lung patent requires an "optical sensor" as a claim element. If the invention does NOT use an optical/camera sensor, the claim may not be infringed. Focus on soil moisture + water level sensors only.

2. **For US8836504B2**: The Kohler patent requires "at least two cross-linked sensors" detecting "nutritive and/or harmful substances." If the invention uses a single moisture sensor type, this claim may not be infringed.

3. **General**: The invention's use of solar power with supercapacitor is NOT covered by any active patent identified. This remains a strong differentiating feature.

7. Patent Landscape

CPC Classification Map

CPC Code	Description	Key Patents
A01G25/167	Soil humidity sensors	US11006590B2, US10548268B1, US6079433A, US8408229B2, CN105875363A
A01G27/02	Self-acting watering with reservoir around substrate	US10149442B2, US20120083929A1, GB2556979A, DE202019104581U1
A01G27/003	Control of self-acting watering devices	US20240268287A1, US20130205662A1, US20060108439A1, CN105875363A
A01G27/005	Reservoirs connected to flower-pots	US11422524B2, US10149442B2, US20240268287A1
A01G9/02	Receptacles / flower-pots	KR102281569B1, US20120083929A1
G16Y10/05	IoT — Agriculture	KR102281569B1, KR20220070607A
Y02P60/12	Agriculture using renewable energies	US20120083929A1, GB2556979A, CN105875363A

Technology Clusters

8. Recommendations & Next Steps

1. **Provisional patent application**: File a provisional focusing on the SPECIFIC COMBINATION of all five elements, with emphasis on the adaptive algorithm and the integrated solar/supercap power management architecture. Individual elements are anticipated, but the specific integration may be patentable.

2. **Deepen the adaptive algorithm**: If the watering algorithm uses machine learning or a true feedback loop (not just static thresholds), document this thoroughly. This is the most likely source of patentable novelty. Consider: Does the algorithm track historical water uptake curves? Does it adjust for seasonal changes? Does it learn plant-specific watering profiles?

3. **FTO clearance for US11422524B2**: Obtain a formal FTO opinion from a patent attorney regarding the Lung patent. The key question is whether the invention's architecture (without an optical sensor) falls outside the claim scope.

4. **Consider design patent**: The aesthetic aspect of the hidden reservoir (water tank concealed beneath the plant in the pot) may be protectable as a design patent, independent of utility patent considerations.

5. **Monitor US20240268287A1**: The Ramm "Individual Houseplant Solar Powered Watering System" application is still pending. If it grants with broad claims covering solar + reservoir + pump in a planter, it could create FTO issues. Set up a patent watch.

6. **International filing strategy**: The heaviest prior art activity is in China and Korea. Consider whether international protection is needed, as the Chinese smart planter market appears crowded with utility models.