DEFENSIVE PUBLICATION ## QBag: Field-Interactive Autonomous Hovering Carry System **Publication Date:** June 13, 2026 **Publication Number:** DP-ST-2026-001 **Inventor:** Kiwann Williams **Assignee:** SoulTech Systems / Royalty Investment Company / Tikkun Olam Initiative **Classification:** Consumer / Field â€” Autonomous Carry Systems --- ### NOTICE This document is a defensive publication intended to establish prior art under 35 U.S.C. Â§ 102(b). It is publicly disclosed for the purpose of preventing the patenting of the inventions described herein by any party other than the inventor. This disclosure is made without warranty and is not a patent application. All technical details are disclosed sufficient to enable a person having ordinary skill in the art to practice the invention. --- ## 1. Field of the Invention The present invention relates generally to autonomous personal logistics systems and, more particularly, to a field-interactive hovering carry system that uses dual-mode magnetic levitation and multi-layer sensor fusion to follow a user across arbitrary surfaces without physical contact, wheels, or rotors. --- ## 2. Background Personal carry systemsâ€”backpacks, rolling luggage, wheeled carts, and aerial dronesâ€”each suffer from fundamental limitations: - **Worn backpacks** impose spinal load, cause fatigue, and occupy the user's hands and body. - **Rolling luggage** requires continuous physical effort, fails on rough terrain, and cannot navigate stairs or curbs. - **Aerial follow-drones** are loud, pose safety risks near people, require FAA coordination, and are wind-sensitive. - **Wheeled robotic carts** cannot traverse soft ground, stairs, or vertical obstacles, and remain domain-limited. What is needed is a carry system that eliminates the physical burden on the user, operates on any surface without modification, tracks the user autonomously, and maintains proximity without requiring hands, wheels, or rotors. --- ## 3. Summary of the Invention The QBag is a full-scale autonomous hovering carry system designed to follow its owner at close proximityâ€”floating rather than rolling or flyingâ€—using a dual-mode magnetic levitation propulsion architecture that adapts in real time to the surface beneath it. The system employs a field-interactive philosophy: rather than requiring the environment to accommodate the machine, the machine reads the medium and adjusts its interaction method. On conductive surfaces, it uses oscillating electromagnetic fields to induce eddy currents in the ground for levitation. On non-conductive surfaces, it generates an ionized air buffer layer from ambient atmosphere, creating a local conductive medium that permits electromagnetic interaction without a dedicated track. A three-layer sensor fusion model (UWB, computer vision, LiDAR) provides centimeter-accurate tracking of the user, obstacle avoidance, and predictive path planning. The system maintains a configurable default follow distance and enforces a human exclusion zone. The physical form factor mirrors a standard backpack, preserving familiar interaction patterns while adding autonomous behavior. --- ## 4. Detailed Description ### 4.1 Dual-Mode Magnetic Levitation Propulsion The core propulsion system operates in two modes, selected automatically based on real-time surface analysis with no user input required and no perceptible transition delay. #### Mode 1: Surface-

Interactive Magnetic Levitation On conductive or semi-conductive surfaces (concrete, asphalt, metal, tile, packed earth), the chassis generates a rapidly oscillating electromagnetic field through a base coil array. This field induces eddy currents in the conductive surface below, which generate a repulsive opposing field, producing contactless magnetic levitation with no track, rail, or surface modification required. Lateral movement is achieved through phased modulation of the coil arrayâ€”asymmetric field shaping produces directed thrust in any horizontal direction without mechanical steering. #### Mode 2: Ionized Air Buffer Levitation On non-conductive surfaces (grass, gravel, sand, dirt, carpet, wood), the chassis activates a corona discharge array along its base perimeter. This array ionizes a thin layer of ambient air directly beneath the chassis, creating a low-resistance plasma cushion. The ionized layer functions as a conductive medium, allowing the same electromagnetic field interaction to occur even when the ground itself is non-conductive. Lateral movement uses the same phased coil modulation as Mode 1, pushing against the ionized layer. #### Automatic Surface Reading and Mode Transition The chassis integrates a multi-point capacitive and electromagnetic surface sensing array that samples ground composition at high frequency. When surface conductivity drops below the threshold for Mode 1, the system pre-activates the corona discharge array before transitioning, ensuring the ionized layer is established before Mode 1 field support is withdrawn. The transition is seamless and imperceptible to the operator. **Key Technical Parameters:** | Parameter | Mode 1 (Surface Maglev) | Mode 2 (Air Buffer) | |---|---|---| | Surface Requirement | Conductive | Any surface | | Hover Height | Moderate | Moderate (reduced) | | Power Draw (hover) | Lower | Higher | | Max Lateral Speed | Higher | Lower | | Max Payload | Higher | Lower | | Noise Level | Low | Low | | Transition Time | Automatic, imperceptible | â€” | ### 4.2 Shadow Tracking System The QBag follows its owner using a three-layer position sensing system fused into a single real-time model: #### Layer 1: UWB Anchor Pairing The owner wears a small Ultra-Wideband tag (belt clip, wrist band, or pocket fob). Multiple UWB receivers at the corners of the QBag chassis provide centimeter-accurate 3D positioning of the tag at high update rate. This is the primary tracking signal. #### Layer 2: Computer Vision A wide-angle stereo camera pair mounted on the top front face runs a lightweight person-detection and gait-recognition model on the onboard processor. This maintains tracking even if the UWB tag is removed or loses signalâ€”the system recognizes its owner visually from silhouette and motion patterns. #### Layer 3: LiDAR Obstacle Map A 360Â° 2D LiDAR sweep at chassis height maps the immediate environment at regular refresh rate. This layer handles collision avoidance and path planning, distinguishing the owner from obstacles and routing around obstacles while maintaining shadow position. #### Fusion and Predictive Behavior All three layers feed a Kalman-filtered position estimator on the onboard SoC. The system predicts the owner's next position ahead of time based on current velocity and heading, and begins moving to intercept, so the bag never lags. Default follow distance is configurable. **Tracking Parameters:** | Parameter | Value | |---|---|

| Primary Sensor | UWB multi-anchor array, cm accuracy | | Secondary Sensor | Stereo vision, gait + silhouette recognition | | Obstacle Detection | 360Â° LiDAR, regular map refresh | | Prediction Horizon | Short-term lookahead | | Default Follow Distance | Configurable | | Max Follow Speed | Matches human running speed | | Response Latency | <50 ms | | Lost-owner Behavior | Hold position â†’ slow spiral search â†’ alert owner | | Crowd Navigation | Dynamic path planning with pedestrian prediction | ### 4.3 Physical Form Factor The QBag maintains a standard backpack silhouetteâ€"pockets, zippers, straps, compartmentsâ€"with a low-profile hover chassis integrated flush into its base. In transport mode, the chassis is invisible. When hovering, it extends a moderate distance from the ground. | Specification | Value | |---|---| | Carry Volume | Standard backpack range, configurable | | Hover Height | Moderate nominal | | Max Payload | Standard carry capacity | | System Weight (empty) | Lightweight | | Footprint | Standard backpack base | | Chassis Profile | Flush-integrated; minimal extended depth when active | | Exterior | Durable fabric shell panels over soft carry body | | Weather Sealing | Weather-resistant | | Access | Standard zipper + magnetic closure hybrid | ### 4.4 Materials Architecture | Component | Description | |---|---| | Outer Shell Panels | High-strength ballistic-grade fabric | | Carry Body | Durable nylon with waterproof laminate | | Internal Frame | Lightweight composite material | | Chassis Base | Machined housing with protective coating | | Thermal Management | Conductive heat spreaders | | Exterior Finish | Water-repellent coated fabric | ### 4.5 Power System | Component | Specification | |---|---| | Primary Battery | Rechargeable lithium chemistry, modular hot-swap sled | | Runtime (Mode 1) | Multiple hours continuous at average power | | Runtime (Mode 2) | Multiple hours continuous at average power | | Fast Charge | High-wattage USB-C PD input | | Output Ports | USB-C PD and USB-A charging ports | The hot-swap battery sled enables continuous operation: a spare charged sled swaps in quickly while capacitor buffers maintain hover continuity. ### 4.6 Safety and Control The system enforces layered behavioral safety: - **Human Exclusion Zone:** Hard-stop buffer, LiDAR-enforced. - **Deadman Tether:** Optional wrist lanyard; sharp pull triggers immediate hover-off and controlled descent. - **EM Field Limits:** Compliant with applicable safety standards; fields confined to hover zone. - **Power Failure:** Capacitor bridge maintains soft landing on main power loss. - **Anti-theft:** Biometric lock + chassis immobilize on unauthorized access. - **Geo-fence:** Owner-configurable zone limits via companion app. - **No Exposed Moving Parts:** No rotors, blades, or spinning components. ### 4.7 Terrain Handling | Terrain | Mode | Notes | |---|---|---| | Concrete/Asphalt | Mode 1 | Max efficiency, highest payload | | Metal floors/Tile | Mode 1 | Ideal surface, highest lift-to-power | | Packed dirt/Gravel | Mode 1/2 Hybrid | Partial surface + air buffer | | Grass/Soft ground | Mode 2 | Full ionized layer, reduced payload ceiling | | Sand/Loose terrain | Mode 2 | Increased power draw | | Stairs/Large steps | Parked | Alerts owner, auto-locks for manual pickup | | Water/Wet surfaces | Mode 1 with weather protection | Weather-rated; operates in rain; no submersion | --- ## 5. Novel Aspects and Claims The following

novel aspects are disclosed as prior art: 1. **Dual-mode magnetic levitation for personal carry systems** â€” seamlessly transitioning between surface-interactive electromagnetic levitation and ionized air buffer levitation based on real-time surface conductivity sensing. 2. **Ionized air buffer as a portable conductive medium** â€” generating a localized plasma cushion from ambient atmosphere to enable magnetic levitation on non-conductive surfaces, eliminating the requirement for track or surface modification. 3. **Three-layer sensor fusion for autonomous shadow tracking** â€” combining UWB anchor positioning, computer vision gait/silhouette recognition, and LiDAR obstacle mapping into a Kalman-filtered predictive position estimator. 4. **Automatic mode transition with pre-activation** â€” sampling surface conductivity at high frequency and pre-activating the corona discharge array before Mode 1 withdrawal, ensuring seamless transition. 5. **Standard backpack form factor with integrated hover chassis** â€” preserving familiar user interaction patterns while adding autonomous hovering and tracking behavior. 6. **Phased coil array for omnidirectional lateral thrust** â€” producing directed horizontal movement through asymmetric field shaping without mechanical steering. --- ## 6. Industrial Applicability The QBag is applicable to: - Personal logistics and daily commuting - Field operations and equipment transport - Medical and accessibility assistance (hands-free carry for mobility-impaired individuals) - Industrial and warehouse material transport - Emergency and disaster response supply carrying --- ## 7. Reference Documents - SoulTech Systems, "QBag White Paper," WP-QBAG-001, 2026. - Related internal disclosures: "Field-Interactive Propulsion Architecture for Multi-Domain Vehicles," "Shadow Track Sensor Fusion Model for Autonomous Proximity Following." --- *This defensive publication is disclosed to the public to prevent the patenting of the inventions described herein by any party other than the named inventor. All rights reserved by the inventor and assignee.* --- *SoulTech Systems Â· Royalty Investment Company Â· Tikkun Olam Initiative Â· DP-ST-2026-001 Â· June 2026*