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(71)**Name of Applicant :**
1)SRJX RESEARCH AND INNOVATION LAB LLP
Address of Applicant :SRJX RESEARCH AND INNOVATION LAB LLP, Plot No - 3E/474, Sector-9, CDA, Post- Markat Nagar, Cuttack-753014, Odisha, India Cuttack Orissa India
(72)**Name of Inventor :**
1)DR. SOUMYA RANJAN JENA
2)MR. SANJOY SAHA
3)DR. SOHIT AGARWAL

(57) Abstract :
ABSTRACT SMART WEARABLE SYSTEM FOR WILDLIFE THREAT PREDICTION, ALERT AND DETERRING ATTACKS The present invention relates to a person-worn early warning and deterrence system designed to reduce human and wildlife conflict by predicting and mitigating close-range animal encounters. The device is housed in a compact, rugged module adapted for attachment to apparel and incorporates multiple sensing elements, including millimeter-wave radar, thermal micro-bolometer, passive infrared, time-of-flight depth sensing, directional microphones, an inertial measurement unit and satellite-based positioning. An on-board neural processor performs preprocessing and fusion of sensor data, estimates species likelihood, derives trajectory, range, bearing and approach velocity, and calculates a continuous threat index with hysteresis. A first threshold produces advisory alerts through haptic feedback, visual indicators and bone-conduction audio, while a second threshold activates controlled deterrence using eye-safe strobe emission and directional acoustic output, subject to safety interlocks and rate limits. A communication module enables encrypted alert sharing via short-range mesh and long-range networks, and the power subsystem combines a rechargeable battery with super capacitors for burst loads and multiple charging options. The disclosed method provide low-latency, personalized prediction and coordinated response in network-poor environments while minimizing disturbance to wildlife and enhancing safety in agricultural, forestry, trekking, and perimeter scenarios. Fig. 1

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FORM 2
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(39 of 1970)

&
THE PATENTS RULES, 2003
COMPLETE SPECIFICATION
(*Refer* Section 10 and Rule 13)

1. TITLE OF THE INVENTION

SMART WEARABLE SYSTEM FOR WILDLIFE THREAT PREDICTION, ALERT AND DETERRING ATTACKS

2. APPLICANT(S)

a) **SRJX RESEARCH AND INNOVATION LAB LLP**
b) Indian;
c) SRJX RESEARCH AND INNOVATION LAB LLP, Plot No - 3E/474, Sector-9, CDA, Post- Markat Nagar, Cuttack-753014, Odisha, India

PREAMBLE TO THE DESCRIPTION

The following specification particularly describes the invention and the manner in which it is to be performed.

FIELD OF THE INVENTION

[001] The present invention relates generally to wearable safety and monitoring systems, and more particularly to person-worn, edge-intelligent devices for predicting, alerting, and mitigating close-range encounters with hazardous wildlife. The invention integrates multi-modal sensing technologies including radar, thermal imaging, passive infrared, time-of-flight, inertial, magnetic, and acoustic sensors with on-device artificial intelligence and risk-scoring algorithms to provide real-time, predictive threat assessment and graded user alerts. In addition, the system of the present invention incorporates humane deterrence mechanisms, peer-to-peer coordination, privacy-preserving learning, and resilient power and communications architectures for operation in remote, network-poor, and dynamic outdoor environments. The present invention finds particular application in forestry, agriculture, trekking, outdoor work, and wildlife management, enabling earlier, safer, and personalized decision-making while minimizing disturbance to flora and fauna.

BACKGROUND OF THE INVENTION

[002] Human-wildlife conflict has intensified globally as urban expansion, agricultural activity, and protected habitats increasingly overlap. Individuals such as farmers, herders, forest guards, trekkers, and outdoor workers face sudden encounters with elephants, big cats, bears, boars, and other hazardous fauna.

[003] Existing mitigation strategies including fencing, trenches, static camera traps, watchtowers, village sirens, and vehicle-mounted searchlights are infrastructure-heavy, location-bound, and expensive to maintain. These installations protect fixed points rather than people who move through fields, trails, and forest edges, and they suffer from coverage gaps caused by terrain features such as bends, ravines, and dense canopy. Additionally, weather damage, vegetation growth, and the need for manual data retrieval from camera traps limit their timeliness and reliability, often resulting in alerts after an encounter has already occurred.

[004] Handheld deterrents such as whistles, flashlights, firecrackers, capsaicin spray, and generic ultrasonic devices require line-of-sight, user readiness under stress, and are typically deployed only after the animal is dangerously close. Many of these methods emit repetitive or broad-spectrum signals that wildlife quickly habituates to, reducing long-term effectiveness and in some

cases escalating aggression. Some handheld tools raise compliance, safety, or ethical concerns due to risks associated with fire, eye or ear hazards, and local wildlife regulations.

[005] Technologies based on single-sensor “smart” systems such as passive infrared (PIR), basic acoustic triggers, or visible-light cameras are prone to false positives and detection failures. PIR sensors are easily triggered by foliage and wind; microphones may confuse vehicle sounds, thunder, or domestic animals with wildlife; and visible cameras fail in fog, low light, or through vegetation. Low-resolution thermal imaging alone struggles with species differentiation. Without multi-sensor fusion or motion-intent analysis, such systems merely report generic movement and cannot infer approach trajectory, speed, or threat level information crucial for enabling a calm, strategic response.

[006] Cloud-based or static IoT solutions introduce additional shortcomings. Remote inference relies on network connectivity, which is intermittent or unavailable in forests, hills, and valleys. Streaming video or audio raises privacy concerns and drains power rapidly, leading to reduced field endurance. Communication latencies further undermine timely alerts. Most such systems lack graded, human-centered alert mechanisms, resulting in either silence until imminent danger or frequent non-actionable warnings that lead to alert fatigue. These solutions rarely support group coordination; meaning users cannot share threat intelligence, synchronize deterrence, or form collective safety perimeters.

[007] Existing approaches also neglect long-term adaptability, ethical operation, and system maintainability. Models are seldom tuned for specific species, seasons, or local soundscapes, leading to persistent false alarms. Provisions for on-device learning, user feedback loops, calibration, or secure over-the-air updates are limited or absent, resulting in static performance and security vulnerabilities. Deterrence methods often lack rate-limiting, directionality, and safety interlocks, increasing the risk of harm to wildlife and humans. User interfaces are frequently not glove-friendly, lack explainability, and do not provide auditable logs for post-incident review. Integration with village sirens, ranger control centers, or emergency services through APIs is typically unsupported.

[008] These cumulative gaps in portability, personalization, early prediction, response latency, power efficiency, privacy, coordination, maintainability, and humane operation demonstrate the need for a fundamentally different approach. There is a pressing requirement for a wearable

system that continuously senses the environment, predicts species-specific approach patterns, and communicates evolving threat levels directly to the individual at risk. Such a system should fuse multiple sensor modalities, provide intuitive and progressive alerts, support optional humane deterrence, coordinate situational awareness among groups, and function reliably in network-poor terrains.

[009] Recent technological advances make it feasible to shift from place-centric monitoring to person-centric prevention. Emerging low-power sensing technologies including mmWave/FMCW radar, thermal micro-bolometers, passive infrared, time-of-flight sensors, magnetometers, ultra-wideband modules, and directional MEMS microphone arrays can detect motion signatures, heat profiles, breathing patterns, footfall rhythms, and distress vocalizations in low light and through foliage, without relying on visible imagery. Edge AI capabilities have matured such that quantized convolutional models for thermal data, audio classifiers for species-specific vocalizations, and lightweight transformers for time-series analysis can now operate on microcontrollers and neural processing units at a few hundred milliwatts of power consumption.

[010] Multi-sensor fusion frameworks, using techniques such as Kalman or particle filters, and risk-scoring models can combine trajectory, heading, speed, and species likelihood into a continuous threat index. Performing inference locally reduces latency, preserves privacy, and lowers bandwidth demands. When escalation is warranted, short-range connectivity (e.g., Bluetooth® mesh) can alert nearby wearers, while long-range links (e.g., LoRa, NB-IoT, LTE-M, or satellite) can relay anonymized telemetry to base stations. Human-centric alerting through haptic cues, bone-conduction audio, and color-coded LEDs enables calm, context-aware decision-making without unnecessarily startling wildlife or revealing the user’s presence.

[011] Humane deterrence mechanisms such as directional strobe lights, narrowband acoustic bursts, species-specific sound profiles, or scent-based stimuli can be tuned to avoid habituation, ensure safety compliance, and reduce escalation. With modular, rugged hardware, IP-rated enclosures, shock isolation, glove-friendly controls, and mounting options for helmets, vests, belts, smart glasses or armbands, such a wearable can be suited to long shifts in harsh environments. Power resilience is supported through hybrid energy sources including high-density cells, solar or kinetic trickle charging, and super capacitor reserves for peak loads.

[012] Connectivity and coordination may be opportunistic and contextual: peer-to-peer alerts between nearby devices, integration with village sirens at settlement fringes, and cached geofenced black spots for offline functionality. Ethical operation demands that deterrence be preceded by avoidance guidance where possible, that alert logs be auditable, and that sensitive raw data not leave the device. Federated learning allows incremental model improvement without exposing private or location-precise data. Calibration tools, seasonal profiles, tamper detection, encryption, and role-based access further enhance long-term performance, safety, and trustworthiness.

[013] Accordingly, there exists a need for an integrated wearable system that unifies multi-modal sensing, edge AI inference, predictive risk scoring, intuitive alerts, humane deterrence, and resilient communication within a single, portable architecture. The present invention is directed to solving the persistent challenges of latency, mobility, personalization, privacy, and coordinated response that remain unaddressed by conventional place-based or single-modality deterrence systems.

SUMMARY OF THE INVENTION

[014] The present invention provides a person-worn, edge-intelligent system designed to predict and mitigate hazardous wildlife encounters through multi-modal sensing, on-device risk modeling, privacy-preserving learning, and humane deterrence. Unlike conventional single-sensor triggers, static installations, or post-event alert mechanisms, the present invention delivers anticipatory, user-centric threat detection and response in real time, without reliance on cloud connectivity.

[015] In one aspect, the invention employs a multi-modal perception stack that infers behavioural intent rather than merely detecting presence. mmWave/FMCW radar micro-Doppler signals, thermal micro-bolometer data, passive infrared sensing, time-of-flight ranging, inertial measurements, magnetometer inputs, and directional acoustic features are fused into a unified spatiotemporal model. A lightweight edge-AI pipeline computes a continuous Threat Index informed by species likelihood, relative bearing, range, closing velocity, and aggression cues such as charge or lunge signatures. Dual threshold bands with hysteresis prevent alert flicker and reduce user fatigue. A camera-optional mode enhances privacy and enables reliable operation in dense vegetation and low-light environments. Geofenced priors and habitat profiles further refine inference by incorporating region-specific species patterns and migratory corridors.

[016] In another aspect, the present invention enables on-device explainable inference and adaptive learning without compromising privacy. Threat assessments are executed locally on a neural accelerator or microcontroller under constrained power budgets. Each alert is accompanied by concise, human-readable justification that conveys dominant cues, confidence levels, trajectory trends, and suggested actions, thereby fostering user trust and situational clarity. To accommodate evolving field conditions, the system supports optional federated learning: devices fine-tune classification boundaries on approved datasets and exchange encrypted gradient updates rather than raw sensor frames. A peer-to-peer mesh allows cooperative sensing, wherein nearby wearables share anonymized threat vectors to triangulate directionality, increase detection confidence, and form a dynamic "moving perimeter" for groups such as patrol teams, farmers, or trekkers, a capability which is absent in prior art.

[017] In a further aspect, the present invention incorporates a humane and non-habituating deterrence subsystem. Rather than deploying broad or repetitive noisemakers, the device employs a policy-bounded engine that selects from directional acoustic bursts, narrowband ultrasound, and patterned, eye-safe strobe illumination. Frequency, duty cycle, and phasing are variably randomized within species-specific envelopes to reduce habituation. Deterrence activation is governed by multi-factor checks involving range, bearing stability, confidence scores, ambient noise, time-of-day constraints, and regulatory rules, with strict lockouts and rate limits to prevent overuse. In cooperative scenarios, multiple devices synchronize phase and directionality to establish a virtual barrier along the threat vector while concealing the wearer's precise location; when avoidance is preferable, the subsystem prioritizes quiet haptic guidance instead of active deterrence.

[018] In an additional aspect, the hardware, power management, and communications architecture are tailored to field deployment and graceful degradation. A hybrid power configuration combining high-density cells with solar and kinetic trickle-charging, supplemented by a super capacitor rail for short deterrence surges, ensures sustained sensing even when battery levels are low. Connectivity is opportunistic, utilizing Bluetooth® mesh for local coordination, followed by LoRa, NB-IoT, LTE-M, or satellite fallback when available. Core functions operate entirely offline to eliminate cloud-induced latency and dependency. The enclosure is ruggedized, IP-rated, glove-operable, tamper-evident, and modularly adaptable to helmets, vests, belts, or eyewear. Security features include signed firmware, secure boot, and encrypted logging, while an auditable

event record and standards-based API facilitate integration with village sirens, ranger dashboards, and emergency response systems.

[019] Collectively, these elements deliver a predictive, collaborative, ethical, and resilient wearable that addresses persistent shortcomings in latency, personalization, humane operation, and operational independence present in earlier solutions. The present invention thereby enables earlier, clearer, and safer human decision-making in environments where wildlife threats are unpredictable and mobile.

OBJECTIVES OF THE INVENTION

[020] The primary objective of the present invention is to provide a person-worn, real-time early warning system that detects approaching wildlife before a close encounter occurs.

[021] Another objective of the present invention is to reduce false positives and negatives by employing multi-sensor fusion, including radar, thermal imaging, and passive infrared, audio, and inertial measurements.

[022] Yet another objective of the present invention is to predict the intent and trajectory of animals using an on-device Threat Index, enabling timely and context-aware guidance for the user.

[023] Yet another objective of the present invention is to deliver intuitive, graded alerts through haptic pulses, color-coded LEDs, and bone-conduction audio to ensure comprehension under stress.

[024] Yet another objective of the present invention is to enable humane, configurable deterrence using directional light and sound modalities, incorporating safety lockouts and anti-habituation measures.

[025] Yet another objective of the present invention is to operate reliably in network-poor environments through edge AI and local decision-making, eliminating dependence on cloud connectivity.

[026] Yet another objective of the present invention is to support team safety and coordination by sharing peer-to-peer alerts and enabling orchestrated group responses.

[027] Yet another objective of the present invention is to ensure long battery life with hybrid power solutions, including efficient firmware, solar or kinetic trickle charging, and super capacitor support for deterrence bursts.

[028] Yet another objective of the present invention is to provide rugged, weather-proof, and lightweight form factors suitable for forestry, agriculture, trekking, and industrial fieldwork.

[029] Yet another objective of the present invention is to protect user privacy by minimizing or avoiding imagery and keeping all inference and data processing on-device.

[030] Yet another objective of the present invention is to adapt to species, seasonal, and regional variations via configurable profiles, calibration tools, and local retraining capabilities.

[031] Yet another objective of the present invention is to support secure over-the-air updates, signed firmware, and auditable event logs to ensure system integrity and traceability of incidents.

[032] Yet another objective of the present invention is to enable interoperability with village sirens, ranger dashboards, and emergency services through APIs or MQTT protocols.

[033] Yet another objective of the present invention is to maintain regulatory compliance, including eye and ear safety, RF emissions, wildlife protection guidelines, and electromagnetic compatibility standards.

[034] Yet another objective of the present invention is to provide explainable alerts that communicate key cues, confidence levels, and recommended actions to build trust in critical situations.

[035] Yet another objective of the present invention is to resist tampering and misuse through encryption, role-based access, self-checks, and secure hardware/software design.

[036] Yet another objective of the present invention is to facilitate economic scalability with modular hardware SKUs and open, maintainable software architectures.

[037] Yet another objective of the present invention is to enable post-event analytics to improve predictive models and inform habitat management, conservation planning, and safety protocols.

FIGURES OF THE INVENTION

Figure 1 of the present invention represents a schematic diagram of the person-worn smart wildlife early warning and deterrence system, illustrating the arrangement of key components including the mmWave radar sensor, thermal sensor, PIR array, time-of-flight range sensor, directional microphone array, neural processing unit with microcontroller, battery pack, GNSS antenna, haptic motor, bone-conduction transducers, deterrence cartridge with strobe/acoustic transducer, multi-color status LED, communication module, heat sink, weather-proof seal, and quick-release mounts.

Figure 2 of the present invention depicts flowchart of the system workflow.

DETAILED DESCRIPTION OF THE INVENTION

[038] The following description describes various features and functions of the disclosed system and method with reference to the accompanying figures. The terminology used herein is provided solely for the purpose of describing particular embodiments only and should not be construed as limiting the scope of the present invention. Variations, modifications, and equivalents that fall within the broader aspects of the disclosed embodiments are also considered part of the invention.

[039] The detailed description is construed as a description of the currently preferred embodiments of the present invention and does not represent the only form in which the present invention may be practiced. This is to be understood that the same or equivalent functions may be accomplished, in any order unless expressly and necessarily limited to a particular order, by different embodiments that are intended to be encompassed within the scope of the present invention.

[040] The embodiment is chosen and described to provide the best illustration of the principles of the invention and its practical application and to enable one of ordinary skill in the art to utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated.

[041] The present invention relates to a smart wearable system designed for real-time wildlife threat prediction, alert generation, and deterrence of animal attacks. The system integrates a plurality of sensors, processing modules, communication interfaces, user-feedback mechanisms,

and deterrence hardware within a compact, weather proof housing or enclosure suitable for mounting on a vest, belt, helmet, or other wearable gear. The device operates autonomously in remote, low-visibility, and high-risk environments, providing early warning and active deterrence against approaching wildlife to safeguard forest workers, patrollers, trekkers, farmers, and field personnel.

[042] As can be seen from the Figure 1 of the present invention in which the architecture of the system is shown. The device or system of the present system consists of a millimetre-wave radar sensor operating within the 60 to 77 GHz band is employed as a primary detection unit. This short-range radar estimates range, relative velocity, and micro-Doppler signatures such as gait or charging patterns. Owing to its ability to penetrate light foliage and function in darkness, it reliably differentiates between an approaching target and a non-threatening pass-by movement. Complementing the radar is a micro-bolometer based thermal imaging sensor functioning in the 8 to14 µm infrared spectrums. This thermal module detects heat contours of large mammals without capturing identifiable human imagery, thereby preserving privacy. The module is particularly effective in night conditions, fog, backlight, and dense vegetation, enhancing detection robustness.

[043] A passive infrared (PIR) sensor array comprising multiple sensing zones forms a low-power sentinel layer for motion detection. The PIR array serves as a guard or wake channel that activates higher-power modules and adds redundancy to reduce false alarms. For refining short-range distance estimation, a time-of-flight (ToF) sensor measures depth within a typical range of 0.2 to 5 meters. This near-field sensor confirms target proximity in the last meters and ensures that deterrence mechanisms are triggered only when the animal is sufficiently close and stationary or approaching predictably.

[044] In order to capture acoustic cues, a directional microphone array with beam forming capability is integrated into the system. This array detects vocalizations such as roars, grunts, and trumpets, as well as hoof or footfall patterns. The audio input is processed using digital signal processing (DSP) techniques and noise reduction filters that mitigate the effects of wind and environmental noise. All the sensor inputs are processed locally by a neural processing unit (NPU) integrated with a microcontroller unit (MCU). The NPU handles edge inference tasks including signal pre-processing, feature extraction, late fusion, and computation of species likelihoods, approach velocity, trajectory prediction, and generation of a Threat Index. The MCU supervises

power-state management, firmware execution, safety interlocks, event logging, radio control, and input/output operations.

[045] A modular communications subsystem is provided, featuring multi-protocol connectivity. Bluetooth Low Energy (BLE) enables peer-to-peer and mesh networking among multiple users in a team. Long-range communication may be established via LoRa, NB-IoT, or LTE-M technologies for backhaul connectivity with command centers or cloud platforms, while a satellite link is optionally supported for remote regions. The communication module primarily broadcasts anonymized alerts and receives over-the-air (OTA) firmware updates. The system's threat detection capability remains fully operational offline to ensure reliability in network-dark environments.

[046] The present invention incorporates a detachable deterrence cartridge positioned directionally on the device. This cartridge houses at least one strobe emitter and/or acoustic transducer for active deterrence. The strobe provides eye-safe light patterns, while the acoustic driver emits high-intensity bursts. The device or system firmware dynamically varies frequency, pattern, and duty cycle to minimize habituation by wildlife. Integrated hardware lockouts, rate limiters, and safety logic prevent inadvertent or excessive use of deterrence stimuli, ensuring compliance with regulation and user safety.

[047] For intuitive user feedback, a multi-color status light-emitting diode (LED) is mounted externally. The LED displays states such as armed, idle, advisory alert, critical alert, communication status, or charging fault using coded colors and blink patterns that correspond with haptic or audio signals. Bone-conduction transducers are embedded to provide spoken commands, directional cues, and tonal alerts without obstructing the user's ears, thereby preserving situational awareness. Guidance prompts may include instructions such as "pause," "group", "withdraw," or directional indicators like "front-left." To further reinforce alerts in noisy or muted conditions, haptic motors produce strong vibration signals perceptible even through gloves. Different vibration patterns are assigned to various alert levels or directions, and silent-mode advisories are also supported.

[048] The power system comprises a rechargeable lithium-ion battery pack equipped with an integrated battery management system (BMS). The pack is dimensioned for a typical full workday of continuous monitoring. The BMS provides cell balancing, overcurrent and thermal protection, fuel gauging, and supports multiple charging interfaces including USB-C, solar input, or kinetic

trickle charging modules. A dedicated super capacitor bank is connected in parallel to deliver high-current pulses for deterrence events, preventing voltage drops or brown-outs and allowing uninterrupted operation of sensors and processors.

[049] For geolocation-based functionalities, a global navigation satellite system (GNSS) antenna supports satellite constellations such as GPS, GLONASS, Galileo, and BeiDou. The GNSS data provides approximate positioning that can be correlated with geofenced zones, known wildlife corridors, or waterholes for predictive threat assessment. In case of emergency, the device can optionally share position data with applied privacy fuzzing to obscure precise coordinates.

[050] Thermal management is achieved through a heat sink and thermal pathway integrated into the housing of the system of present invention. This arrangement dissipates heat generated by the NPU, radio modules, and high-power deterrence components, ensuring user comfort and protecting electronic parts from overheating. The exterior housing is fitted with IP67-grade weather-proofing. Elastomeric gaskets and a membrane vent provide dust and water ingress protection while permitting pressure equalization. All external ports for the deterrence cartridge, haptics, and charging interfaces are sealed to prevent environmental damage.

[051] The housing of the system incorporates quick-release mounts engineered for tool-less attachment to wearable platforms such as vests, belts, or helmets. These mounts feature positive-lock latches to prevent accidental detachment and vibration-damping pads to absorb shocks during movement. The battery pack and super capacitor bank are located within a dedicated power bay that provides mechanical shock isolation, cable routing, and service access to internal circuitry.

[052] Finally, the user interface includes glove-operable status and control buttons positioned near the LED cluster. These buttons support functions such as arming or disarming the system, initiating self-tests, muting alerts, and triggering an SOS. Long-press sequences are implemented to avoid inadvertent activation during operation. Each control input is mapped to the corresponding feedback channel to confirm execution.

[053] Together, these components of the system form a synergistic smart wearable system capable of detecting wildlife presence, identifying threat trajectories, issuing graduated alerts to the wearer, and deploying active deterrence with minimal false triggers. The architecture maintains power efficiency, adaptability, user safety, and environmental resilience, thereby substantially reducing human-wildlife conflict and augmenting personal protection in high-risk zones.

[054] In one embodiment, the system operates through a continuous monitoring loop initiated when the device is powered on or armed. The method or workflow as depicted in Figure 2, of the system disclosed begins with system initialization, during which firmware is booted and a sequence of self-tests is executed. The device or the system verifies the operational status of the sensing modules, wireless radios, storage, battery and battery management system (BMS), secure boot, and safety interlocks. If any component fails, the system enters a safe non-deterrence mode and issues a corresponding fault signal.

[055] Upon successful initialization, the system proceeds to a sensor sampling stage, wherein synchronized data is acquired continuously from multiple modalities. The millimetre-wave radar captures range, relative velocity, and micro-Doppler signatures. The thermal micro-bolometer records heat contours of nearby bodies. The passive infrared (PIR) array detects wide-field motion at very low power. The time-of-flight (ToF) sensor provides near-field distance measurements to refine last-meter proximity. A directional microphone array captures vocalizations and footfall patterns, while the inertial measurement unit (IMU) detects wearer posture and heading for bearing-aware guidance.

[056] The acquired sensor inputs are subjected to pre-processing, including timestamp synchronization, denoising, and clutter suppression. Environmental noise, such as wind and electrical interference, is filtered out, and background clutter in radar and thermal data is reduced. The pre-processed signals are converted into compact feature sets optimized for edge inference and reduced power consumption.

[057] The method then advances to a threat index computation and decision stage. An on-board artificial intelligence engine fuses the feature sets to estimate species likelihood, approach velocity, bearing, and range. A continuous Threat Index value is generated, and hysteresis or timeout logic is applied to prevent intermittent switching or “chatter.” If the Threat Index is below a defined advisory threshold, the process branches to an advisory alert routine. If the Threat Index meets or exceeds a critical threshold, the process advances to a deterrence evaluation routine.

[058] In the advisory alert stage, the device or the system issues graded, non-disruptive cues intended to facilitate early and calm avoidance. These alerts include vibration patterns delivered via haptic motors, coded indications on a status LED, and short guidance prompts via bone-

conduction transducers, such as directional notifications (“front-left”) or advisories to pause or withdraw. No deterrence stimuli are emitted at this stage.

[059] If the Threat Index is in the critical regime, the method proceeds to a policy and safety verification stage before activating deterrence. The system checks compliance with pre-set rules regarding distance confidence, eye and ear safety, quiet hours, local regulations, and target classification. Provided the interlocks are satisfied, the system drives a deterrence cartridge comprising an eye-safe strobe emitter and/or a directional acoustic transducer. Rate limits, cool-down intervals, and randomized duty cycles are imposed to prevent overuse and animal habituation.

[060] Following the advisory or deterrence branch, the method enters a communication and logging stage. First, anonymized threat information is broadcast via available networks, including Bluetooth mesh for nearby users and, where coverage permits, LoRa, NB-IoT/LTE-M or satellite links for remote or base systems. Second, the event is recorded in a cryptographically signed log including time, approximate GNSS radius, threat level, and actions taken. Third, if connectivity is available, encrypted federated learning updates may be transmitted to improve species or seasonal inference models without sharing raw sensor data. Finally, power management functions allocate energy among sensing, communication, and deterrence subsystems, drawing from the super capacitor bank for high-current bursts and managing trickle charging sources as applicable.

[061] The method then loops back to the sensor sampling stage, continuously reassessing environmental conditions in real time and updating alerts or deterrence actions as the threat context evolves.

[062] The foregoing description of the specific embodiments will so fully reveal the general nature of the objectives herein that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific objective without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed objectives.

We Claim:

1) A smart wearable system for wildlife threat prediction, alert and deterrence, the system comprising:

-a millimetre-wave radar sensor configured to operate in the 60 to 77 GHz band for detecting range, relative velocity and micro-Doppler signatures;

-a thermal micro-bolometer sensor configured to capture heat contours of animals;

-a passive infrared (PIR) array configured to detect wide-field motion at low power;

-a time-of-flight (ToF) sensor configured to determine short-range distance;

-a directional microphone array configured to capture vocalisations and footfall patterns;

-an inertial measurement unit (IMU) configured to determine wearer posture and heading;

-a neural processing unit (NPU) coupled with a microcontroller unit (MCU) configured to pre-process sensor inputs, perform sensor fusion, estimate species likelihood, compute range, bearing and approach velocity, and generate a continuous Threat Index with hysteresis;

-a deterrence cartridge comprising at least one eye-safe strobe and/or a directional acoustic transducer, subject to policy checks, safety interlocks, rate limits and cool-down controls;

-a communication module configured to transmit anonymised alerts via Bluetooth Low Energy (BLE) mesh and selectively via LoRa, NB-IoT, LTE-M or satellite networks;

-a power subsystem comprising a lithium-ion battery pack with a battery management system (BMS) and a super-capacitor bank for high-current deterrence bursts; and

-an user-feedback interface comprising a multi-colour status LED, at least one bone-conduction transducer, and at least one haptic motor.

2) The system as claimed in claim 1, wherein the NPU and MCU are configured to apply late-fusion edge inference with feature extraction, species classification and approach trajectory estimation.

3) The system as claimed in claim 1, wherein the deterrence cartridge is replaceable and forward-facing, and includes hardware lockouts and firmware-controlled duty cycling to minimise habituation.

4) The system as claimed in claim 1, wherein the communication module is configured for cryptographically signed logging and over-the-air (OTA) firmware updates.

5) The system as claimed in claim 1, wherein the global navigation satellite system (GNSS) antenna is adapted to provide coarse location with privacy-based radius fuzzing for alert broadcasts.

6) The system as claimed in claim 1, wherein the housing comprises IP67-rated weather proof seals with elastomer gaskets and a membrane vent for pressure equalisation.

7) The system as claimed in claim 1, wherein the mounting assembly comprises quick-release mounts with positive-lock latches and vibration-damping pads.

8) The system as claimed in claim 1, wherein the advisory alerts comprise vibration patterns, colour-coded LED signals and bone-conduction voice prompts indicating direction and avoidance guidance.

9) A method for predicting and mitigating wildlife threats using a smart wearable system, the method comprising the steps of:

-initiating a continuous monitoring loop upon powering or arming the device;

-performing system initialization including booting firmware, verifying sensor health, radio modules, storage, battery management system, secure boot and safety interlocks;

-acquiring synchronized sensor data from a millimetre-wave radar, a thermal micro-bolometer, a passive infrared array, a time-of-flight sensor, a directional microphone array, and an inertial measurement unit;

-pre-processing the acquired sensor data by timestamp alignment, denoising and clutter suppression to generate features for inference;

-computing a Threat Index by fusing pre-processed data to estimate species likelihood, range, bearing and approach speed, with hysteresis or timeout logic;

-triggering advisory alerts through haptic feedback, status LEDs and bone-conduction prompts when the Threat Index is below a critical threshold;

-activating the deterrence cartridge with the eye-safe strobe and/or directional acoustic burst when the Threat Index surpasses the critical threshold and policy and safety interlocks permit;

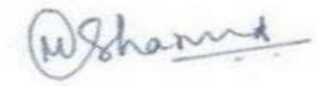
-broadcasting anonymised threat alerts via short-range or long-range communication networks;

-logging events with cryptographic signing including time, GNSS radius, threat score and action taken; and

-returning to the sensor acquisition step to continue real-time assessment.

10) The method as claimed in Claim 9, wherein communication and logging further comprise transmitting encrypted federated learning updates, prioritising power allocation, and utilising the super capacitor bank for deterrence-associated bursts.

Dated this 04th day of October, 2025



MEENU SHARMA
(IN/PA-2856)
Patent Agent for the Applicant
SRJX RESEARCH AND INNOVATION LAB LLP

ABSTRACT

SMART WEARABLE SYSTEM FOR WILDLIFE THREAT PREDICTION, ALERT AND DETERRING ATTACKS

The present invention relates to a person-worn early warning and deterrence system designed to reduce human and wildlife conflict by predicting and mitigating close-range animal encounters. The device is housed in a compact, rugged module adapted for attachment to apparel and incorporates multiple sensing elements, including millimeter-wave radar, thermal micro-bolometer, passive infrared, time-of-flight depth sensing, directional microphones, an inertial measurement unit and satellite-based positioning. An on-board neural processor performs preprocessing and fusion of sensor data, estimates species likelihood, derives trajectory, range, bearing and approach velocity, and calculates a continuous threat index with hysteresis. A first threshold produces advisory alerts through haptic feedback, visual indicators and bone-conduction audio, while a second threshold activates controlled deterrence using eye-safe strobe emission and directional acoustic output, subject to safety interlocks and rate limits. A communication module enables encrypted alert sharing via short-range mesh and long-range networks, and the power subsystem combines a rechargeable battery with super capacitors for burst loads and multiple charging options. The disclosed method provide low-latency, personalized prediction and coordinated response in network-poor environments while minimizing disturbance to wildlife and enhancing safety in agricultural, forestry, trekking, and perimeter scenarios.

Fig. 1

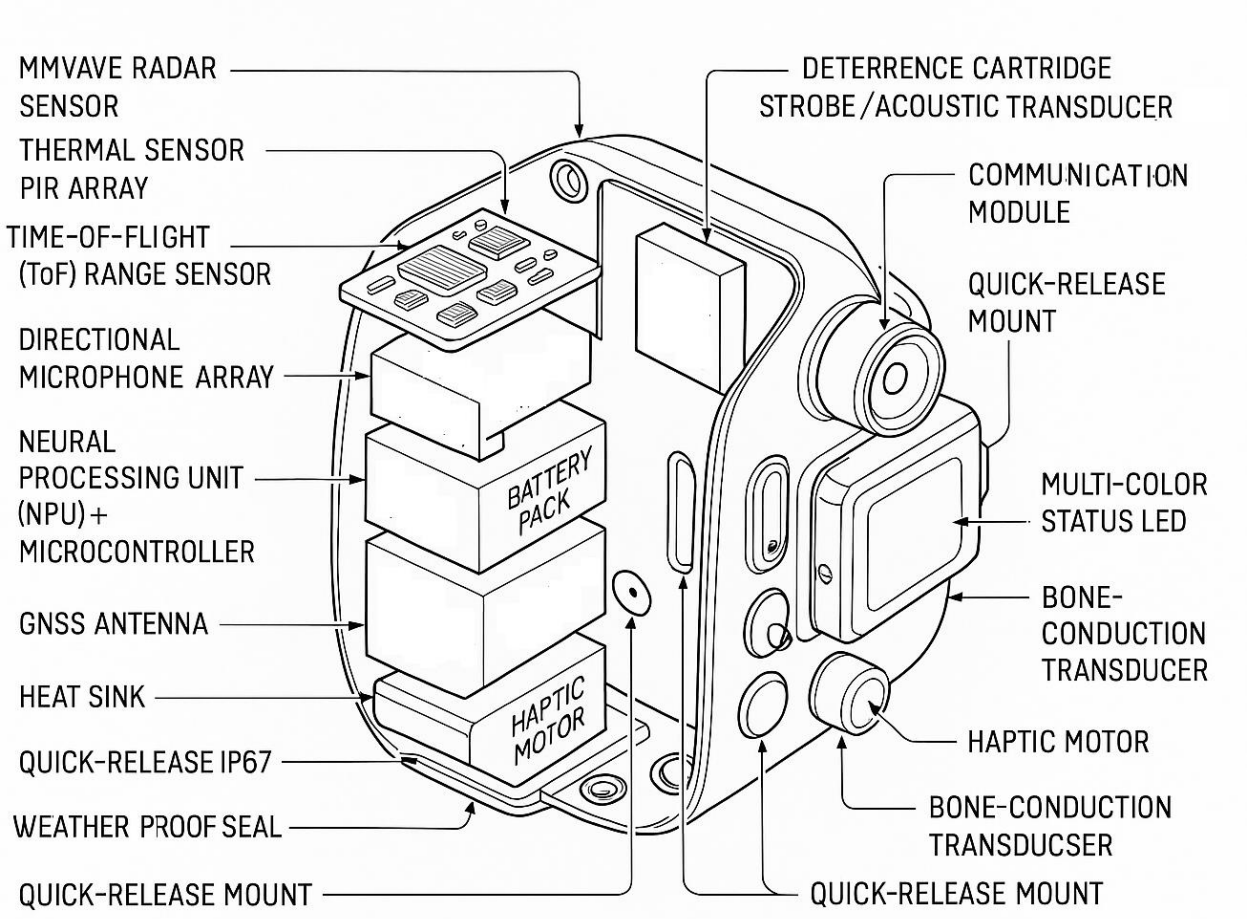


Figure 1: System Architecture

Meenu Sharma
IN/PA-2856
Patent Agent for the Applicant

Signature Not Verified
Digitally Signed.
Name: MEENU SHARMA
Date: 04-Oct-2025 17:12:07
Reason: Patent Efiling
Location: DELHI

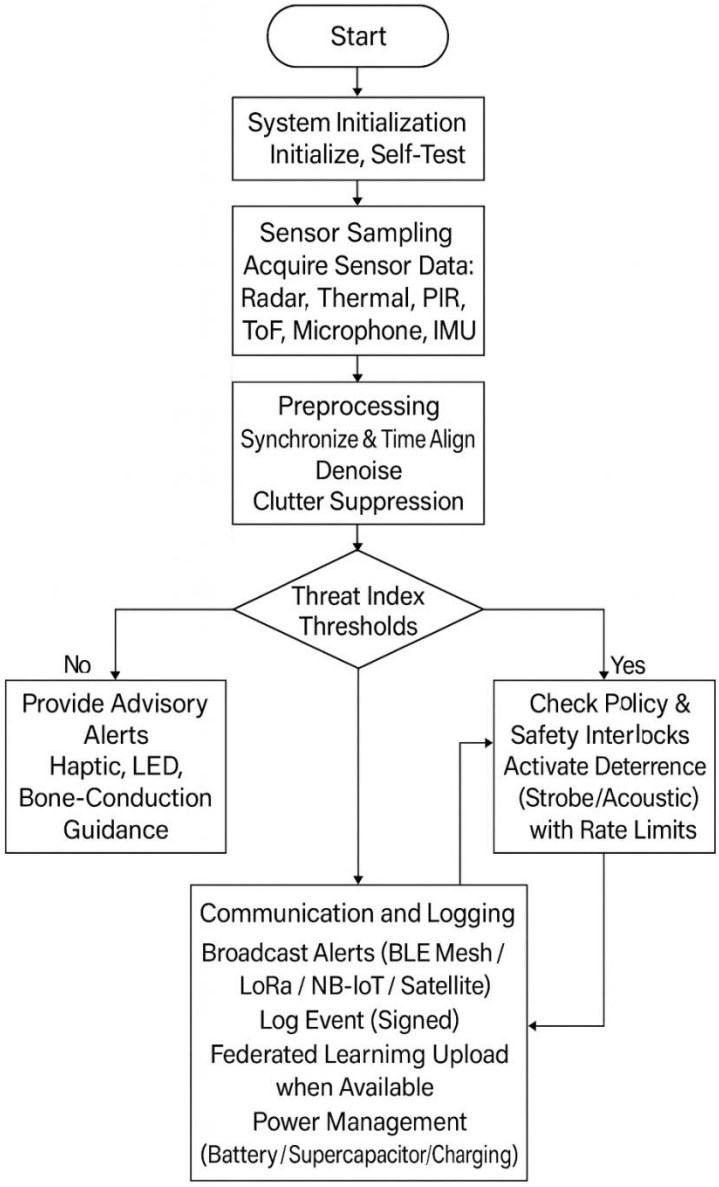


Figure 2: Workflow of the system

Meenu Sharma
IN/PA-2856
Patent Agent for the Applicant

FORM 5

THE PATENTS ACT, 1970

(39 of 1970)

&

THE PATENTS RULES, 2003

DECLARATION AS TO INVENTORSHIP

[See Section 10(6) and Rule 13(6)]

1. NAME OF APPLICANT:

SRJX RESEARCH AND INNOVATION LAB LLP

hereby declare that the true and first inventors of the invention disclosed in the complete specification filed in pursuance of our application numbered_____dated October 04, 2025 is as under:-

2. INVENTOR(S)

a) **DR. SOUMYA RANJAN JENA**
b) Indian;
c) Plot No - 3E/474, Sector-9, CDA, Post- Markat Nagar, Cuttack-753014, Odisha, India;

a) MR. SANJOY SAHA
b) Indian;
c) 63/1, Thakur Para Road, P.O.- Naihati, North 24 Parganas, West Bengal-743165, India; and

a) **DR. SOHIT AGARWAL**
b) Indian;
c) D 388, Sarvanand Marg, Malviya Nagar, Jaipur-302017, Rajasthan, India

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT IN THE CONVENTION COUNTRY:

We, the applicant in the convention country hereby declare that our right to apply for a patent in India is by way of assignment from the true and first inventor. **NA**

Dated this 04th day of October, 2025

MEENU SHARMA
(IN/PA-2856)
Patent Agent for the Applicant
SRJX RESEARCH AND INNOVATION LAB LLP

To,
The Controller of Patents,
The Patent Office,
at New Delhi

Signature Not Verified
Digitally Signed.
Name: MEENU SHARMA
Date: 04-Oct-2025 17:12:07
Reason: Patent Efiling
Location: DELHI

UDYAM REGISTRATION CERTIFICATE

UDYAM REGISTRATION NUMBER	**UDYAM-OD-07-0095836**
NAME OF ENTERPRISE	**SRJX RESEARCH AND INNOVATION LAB LLP**

TYPE OF ENTERPRISE *

SNo.	Classification Year	Enterprise Type	Classification Date
1	2025-26	Micro	16/08/2025

MAJOR ACTIVITY — **SERVICES**

SOCIAL CATEGORY OF ENTREPRENEUR — **GENERAL**

NAME OF UNIT(S)

S.No.	Name of Unit(s)
1	SRJX RESEARCH AND INNOVATION LAB LLP

OFFICAL ADDRESS OF ENTERPRISE

Flat/Door/Block No.	PLOT NO-3E/474	Name of Premises/ Building	SECTOR-9
Village/Town	CDA CUTTACK	Block	NA
Road/Street/Lane	Avinab Bidanasi	City	Cuttack Sadar
State	ODISHA	District	CUTTACK , Pin 753014
Mobile	9090255155	Email:	soumyajena1989@gmail.com

DATE OF INCORPORATION / REGISTRATION OF ENTERPRISE	**05/05/2025**
DATE OF COMMENCEMENT OF PRODUCTION/BUSINESS	**05/05/2025**

NATIONAL INDUSTRY CLASSIFICATION CODE(S)

SNo.	NIC 2 Digit	NIC 4 Digit	NIC 5 Digit	Activity
1	72 - Scientific research and development	7210 - Research and experimental development on natural sciences and engineering	72100 - Research and experimental development on natural sciences and engineering	Services

DATE OF UDYAM REGISTRATION	**16/08/2025**

* **In case of graduation (upward/reverse) of status of an enterprise, the benefit of the Government Schemes will be availed as per the provisions of Notification No. S.O. 2119(E) dated 26.06.2020 issued by the M/o MSME.**

For any assistance, you may contact:

1. District Industries Centre: CUTTACK (ODISHA)

2. MSME-DFO: CUTTACK (ODISHA)

Udyam Registration Number : UDYAM-OD-07-0095836

Type of Enterprise	MICRO	**Major Activity**	Services
Type of Organisation	Limited Liability Partnership	**Name of Enterprise**	SRJX RESEARCH AND INNOVATION LAB LLP
Owner Name	SRJX RESEARCH AND INNOVATION LAB LLP	**PAN**	AFPFS4480L
Do you have GSTIN	No	**Mobile No.**	9090255155
Email Id	soumyajena1989@gmail.com	**Social Category**	General
Gender	Male	**Specially Abled(DIVYANG)**	No
Date of Incorporation	05/05/2025	**Date of Commencement of Production/Business**	05/05/2025

Bank Details

Bank Name	IFS Code	Bank Account Number
Punjab national bank	PUNB0787800	7878002100002490

Employment Details

Male	Female	Other	Total
3	2	0	5

Investment in Plant and Machinery OR Equipment (in Rs.)

S.No.	Financial Year	Enterprise Type	Written Down Value (WDV)	Exclusion of cost of Pollution Control, Research & Development and Industrial Safety Devices	Net Investment in Plant and Machinery OR Equipment[(A)-(B)]	Total Turnover (A)	Export Turnover (B)	Net Turnover [(A)-(B)]	Is ITR Filled?	ITR Type
1	2023-24	Micro	0.00	0.00	0.00	0.00	0.00	0.00	No	NA

Unit(s) Details

SN	Unit Name	Flat	Building	Village/Town	Block	Road	City	Pin	State	District
1	SRJX RESEARCH AND INNOVATION LAB LLP	PLOT NO-3E/474	SECTOR-9	CDA CUTTACK	NA	Avinab Bidanasi	Cuttack Sadar	753014	ODISHA	CUTTACK

Official address of Enterprise

Flat/Door/Block No.	PLOT NO-3E/474	**Name of Premises/ Building**	SECTOR-9
Village/Town	CDA CUTTACK	**Block**	NA
Road/Street/Lane	Avinab Bidanasi	**City**	Cuttack Sadar
State	ODISHA	**District**	CUTTACK , **Pin :** 753014
Mobile	9090255155	**Email:**	soumyajena1989@gmail.com
Latitude	20.5021859203546	**Longitude:**	85.88860428847029

National Industry Classification Code(S)

SNo.	Nic 2 Digit	Nic 4 Digit	Nic 5 Digit	Activity
1	72 - Scientific research and development	7210 - Research and experimental development on natural sciences and engineering	72100 - Research and experimental development on natural sciences and engineering	Services

Are you interested to get registered on Government e-Market (GeM) Portal	No
Are you interested to get registered on TReDS Portals(one or more)	No
Are you interested to get registered on National Career Service(NCS) Portal	No
Are you interested to get registered on NSIC B2B Portal	No
Are you interested in availing Free .IN Domain and a business email ID	N/A
Are you interested in getting registered on Skill India Digital Portal	No
District Industries Centre	CUTTACK (ODISHA)
MSME-DFO	CUTTACK (ODISHA)
Date of Udyam Registration	16/08/2025
Date of Printing	16/08/2025

IEC Details	
IEC Number	
IEC Status	Inactive
IEC Registration Date	
IEC Modification Date	

FORM 1 THE PATENTS ACT, 1970 (39 of 1970) and THE PATENTS RULES, 2003 **APPLICATION FOR GRANT OF PATENT** (See Section 7, 54 & 135 and sub-rule (1) of Rule 20)				(FOR OFFICE USE ONLY)	
				Application No.	
				Filing date:	
				Amount of Fee paid:	
				CBR No:	
				Signature:	
1. APPLICANT'S REFERENCE/ IDENTIFICATION NO. (AS ALLOTTED BY OFFICE)					
2. TYPE OF APPLICATION [Please tick () at the appropriate category]					
Ordinary (✓)		Convention ( )		PCT-NP ()	
Divisional ( )	Patent of Addition ( )	Divisional ( )	Patent of Addition ( )	Divisional ( )	Patent of Addition( )
3A. APPLICANT					
Name in Full		Nationality	Country of Residence	Address of the Applicant	
SRJX RESEARCH AND INNOVATION LAB LLP		Indian	India	SRJX RESEARCH AND INNOVATION LAB LLP, Plot No - 3E/474, Sector-9, CDA, Post- Markat Nagar, Cuttack-753014, Odisha, India	
3B. CATEGORY OF APPLICANT [Please tick (✓) at the appropriate category]					
Natural Person ()		Other than Natural Person			
		Small Entity (✓)	Startup ( )	Country	
4. INVENTOR(S) [Please tick (✓) at the appropriate category]					
Are all the inventor(s) same as the applicant(s) named above?		Yes ( )		No (✓)	
If "No" , furnish the details of the inventors					
Name in Full		Nationality	Country of Residence	Address of the Inventors	
DR. SOUMYA RANJAN JENA		Indian	India	Plot No - 3E/474, Sector-9, CDA, Post-Markat Nagar, Cuttack-753014, Odisha, India	
MR. SANJOY SAHA		Indian	India	63/1, Thakur Para Road, P.O.- Naihati, North 24 Parganas, West Bengal-743165, India	

DR. SOHIT AGARWAL	Indian	India	D 388, Sarvanand Marg, Malviya Nagar, Jaipur-302017, Rajasthan, India

5. TITLE OF THE INVENTION

SMART WEARABLE SYSTEM FOR WILDLIFE THREAT PREDICTION, ALERT AND DETERRING ATTACKS

6. AUTHORISED REGISTERED PATENT AGENT(S)	IN/PA No.	2856
	Name	Meenu Sharma
	Mobile No.	9953170519
7. ADDRESS FOR SERVICE OF APPLICANT IN INDIA	Name	**MEENU SHARMA**
	Postal Address	Ground Floor, S-456, LGF, Greater Kailash – II, New Delhi – 110048, India
	Telephone No.	NA
	Mobile No.	9953170519
	Fax No.	NA
	E-mail ID	meenusharma345@gmail.com

8. IN CASE OF APPLICATION CLAIMING PRIORITY OF APPLICATION FILED IN CONVENTION COUNTRY, PARTICULARS OF CONVENTION APPLICATION

Country	Application Number	Filing date	Name of the applicant	Title of the invention	IPC (as classified in the convention country)

9. IN CASE OF PCT NATIONAL PHASE APPLICATION, PARTICULARS OF INTERNATIONAL APPLICATION FILED UNDER PATENT CO-OPERATION TREATY(PCT)

International application number	**International filing date**

10. IN CASE OF DIVISIONAL APPLICATION FILED UNDER SECTION 16, PARTICULARS OF ORIGINAL (FIRST) APPLICATION

Original (first) application No.	Date of filing of original (first) application
NIL	NIL

11. IN CASE OF PATENT OF ADDITION FILED UNDER SECTION 54, PARTICULARS OF MAIN APPLICATION OR PATENT

Main application /patent No.	Date of filing of main application
NIL	NIL

12. DECLARATIONS

(i) Declaration by the inventor(s)

(In case the applicant is an assignee: the inventors may sign herein below or the applicant(s) may upload the assignment or enclose the assignment with this application for patent or send the assignment by post /electronic transmission duly authenticated within the prescribed period).

We, the above named inventors are the true & first inventors for this invention and declare that the applicant herein is my assignee or legal representative.

(a) Date:

(b) Signature:

(c) Name: Dr. Soumya Ranjan Jena

(a) Date:

(b) Signature:

(c) Name: Mr. Sanjoy Saha

and

(a) Date:

(b) Signature:

(c) Name: Dr. Sohit Agarwal

(ii) Declaration by the applicant(s) in the convention country

(In case the applicant in India is different than the applicant in the convention country: the applicant in the convention country may sign herein below or applicant in India may upload the assignment from the applicant in the convention country or enclose the said assignment with this application for patent or send the assignment by post /electronic transmission duly authenticated within the prescribed period).

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are/my/our assignee or legal representative. **N.A.**

(a) Date

(b) Signature:

(c) Name:

(iii) Declaration by the applicant

We, the applicant hereby declare that: -

☑ We are in possession of the above-mentioned invention.
☑ The complete specification relating to the invention is filed with this application.
☐ ~~The invention as disclosed in the specification uses the biological material from India and the necessary permission from the competent authority shall be submitted by us before the grant of patent to us.~~
☑ There is no lawful ground of objections to the grant of the Patent to us.
☐ ~~We are the true & first inventor.~~
☑ We are the assignee or legal representative of true & first inventors.
☐ ~~The application or each of the applications, particulars of which are given in Paragraph 8, was the first application in convention country in respect of our invention.~~
☐ ~~We claim the priority from the above mentioned application filed in convention Country/Countries and state that no application for protection in respect of the invention had been made in a convention country before that date by us or by any person from which we derive the title.~~
☐ ~~Our application in India is based on international application under Patent Cooperation Treaty (PCT) as mentioned in Paragraph 9.~~
☐ ~~The application is divided out of our application particulars of which are given in Paragraph 10 and pray that this application may be treated as deemed to have been filed on ……under Section 16 of the act.~~
☐ ~~The said invention is an improvement in or modification of the invention particulars of which are given in Paragraph 11.~~

13. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION

(a) Form 2

Item	*Details*	*Fee*	*Remarks*
Complete specification	No. of pages: 14	**1600**	**Including claims, abstract and drawings**
No. of Claims	No. of Claims: 10 and No. of pages: 03		
Abstract	No. of page: 01	-	-
No. of Drawings	No. of drawing: 0 2 and No. of pages: 02	-	-

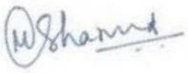
(b) Complete specification along with drawing;
(c) Statement and undertaking on Form 3;
(d) Declaration as to Inventorship on Form 5;
(e) Form 28;
(f) Form 9; and
(g) General Power of Authority.

Total fee INR 1600/- submitted online through electronic portal of State Bank of India.

We hereby declare that to the best of our knowledge, information and belief the fact and matters stated herein are correct and we request that a patent may be granted to us for the said invention.

Dated this 04th day of October, 2025

Name: Meenu Sharma



Signature:
To,
The Controller of Patents,
New Delhi

FORM 28
THE PATENTS ACT, 1970
(39 of 1970)
AND
THE PATENTS RULES, 2003
TO BE SUBMITTED BY A SMALL ENTITY
[See rules 2 (fa), 2(fb), 2(ca) and 7]

We,

a) **SRJX RESEARCH AND INNOVATION LAB LLP**

b) Indian;

c) SRJX RESEARCH AND INNOVATION LAB LLP, Plot No - 3E/474, Sector-9, CDA, Post- Markat Nagar, Cuttack-753014, Odisha, India

applicant in respect of the patent application no._____ dated October 04, 2025 hereby declare that we are a small entity in accordance with rule 2(fa) and submit following document as a proof:

For claiming the status of a small entity: - Evidence of registration under the Micro, Small and Medium Enterprises Act, 2006 (27 of 2006).

The information provided herein is correct to the best of our knowledge and belief.

Dated this 04th day of October, 2025

Meenu Sharma
IN/PA-2856
Agent for the Applicant
SRJX RESEARCH AND INNOVATION LAB LLP

To,
The Controller of Patents,
The Patent Office,
At New Delhi

FORM 9
THE PATENTS ACT,
1970 (39 of 1970)
&
The Patent Rules, 2003
REQUEST FOR PUBLICATION
(See Section 11A (2); rule 24A)

We, **SRJX RESEARCH AND INNOVATION LAB LLP**, Indian, of the address SRJX RESEARCH AND INNOVATION LAB LLP, Plot No - 3E/474, Sector-9, CDA, Post- Markat Nagar, Cuttack-753014, Odisha, India hereby request for early publication of our patent application……dated **October 04, 2025** titled "**SMART WEARABLE SYSTEM FOR WILDLIFE THREAT PREDICTION, ALERT AND DETERRING ATTACKS**" under section 11A(2) of the Act.

Dated this 04th day of October, 2025

MEENU SHARMA
(IN/PA-2856)
Patent Agent for the Applicant
SRJX RESEARCH AND INNOVATION LAB LLP

To,
The Controller of Patents,
The Patent Office,
New Delhi

Signature Not Verified
Digitally Signed.
Name: MEENU SHARMA
Date: 04-Oct-2025 17:18:50
Reason: Patent Efiling
Location: DELHI

FORM 28
THE PATENTS ACT, 1970
(39 of 1970)
AND
THE PATENTS RULES, 2003
TO BE SUBMITTED BY A SMALL ENTITY
[See rules 2 (fa), 2(fb), 2(ca) and 7]

We,

a) **SRJX RESEARCH AND INNOVATION LAB LLP**

b) Indian;

c) SRJX RESEARCH AND INNOVATION LAB LLP, Plot No - 3E/474, Sector-9, CDA, Post- Markat Nagar, Cuttack-753014, Odisha, India

applicant in respect of the patent application no._____ dated October 04, 2025 hereby declare that we are a small entity in accordance with rule 2(fa) and submit following document as a proof:

For claiming the status of a small entity: - Evidence of registration under the Micro, Small and Medium Enterprises Act, 2006 (27 of 2006).

The information provided herein is correct to the best of our knowledge and belief.

Dated this 04th day of October, 2025

Meenu Sharma
IN/PA-2856
Agent for the Applicant
SRJX RESEARCH AND INNOVATION LAB LLP

To,
The Controller of Patents,
The Patent Office,
At New Delhi

सत्यमेव जयते

INDIA NON JUDICIAL

Government of National Capital Territory of Delhi

₹100

e-Stamp

Certificate No.	:	IN-DL35961746213944X
Certificate Issued Date	:	16-Aug-2025 11:10 AM
Account Reference	:	IMPACC (IV)/ dl962703/ DELHI/ DL-ESD
Unique Doc. Reference	:	SUBIN-DLDL96270305293890128756X
Purchased by	:	SRJX RESEARCH AND INNOVATION LAB LLP
Description of Document	:	Article 48(c) Power of attorney - GPA
Property Description	:	Not Applicable
Consideration Price (Rs.)	:	0 (Zero)
First Party	:	SRJX RESEARCH AND INNOVATION LAB LLP
Second Party	:	ZAINAB SYED AND ASSOCIATES
Stamp Duty Paid By	:	SRJX RESEARCH AND INNOVATION LAB LLP
Stamp Duty Amount(Rs.)	:	100 (One Hundred only)

NOTARY R.V. Singh Advocate Reg. No.2262 Commission Expire On 24-10-2027 Area-Delhi GOVT. OF INDIA

Please write or type below this line IN-DL35961746213944X

NOTARY R.V. Singh Advocate Reg. No.2262 Commission Expire On 24-10-2027 Area-Delhi GOVT. OF INDIA

Statutory Alert:

1. The authenticity of this Stamp certificate should be verified at 'www.shcilestamp.com' or using e-Stamp Mobile App of Stock Holding Any discrepancy in the details on this Certificate and as available on the website / Mobile App renders it invalid.
2. The onus of checking the legitimacy is on the users of the certificate
3. In case of any discrepancy please inform the Competent Authority.

Signature Not Verified
Digitally Signed
Name: MEENU SHARMA
Date: 04-Oct-2025 17:12:07
Reason: Patent Filing
Location: DELHI

FORM-26
The Patents Act, 1970
(39 of 1970)
FORM FOR AUTHORIZATION OF A PATENT AGENT/OR ANY PERSON IN A MATTER OR PROCEEDING UNDER THE ACT
[See Sections 127 and 132; Rule 135]

I, **SRJX RESEARCH AND INNOVATION LAB LLP**, Indian, of the address SRJX RESEARCH AND INNOVATION LAB LLP, Plot No - 3E/474, Sector-9, CDA, Post- Markat Nagar, Cuttack-753014, Odisha, India, hereby authorize **Zainab Syed & Associates** having address 3E, Nawab Bhagwanpora, Lal Bazar, Srinagar, Jammu & Kashmir, 190023, India **(Mobile No.: +91 9748818235, Email: bandyopadhyay.sudarshana@gmail.com)** through **Ms. Sudarshana Bandyopadhyay (IN/PA 2802)** and **Ms. Meenu Sharma (IN/PA-2856),** registered Indian Patent Agents, to act on our behalf and to further appoint attorney(s)/agent(s) in connection with the filing and prosecution of our patent applications for grant of Letters Patent, filing of request for examination, filing request for amendment, recordal of change of name and address, ownership, change of address of service in India, renewal of patent, recordal of assignments, filing and defending oppositions and infringement actions, restoration of patents, registration of documents and such other actions and all proceedings under the Patents Act, 1970 and the Patent Rules, 2003 and all such proceedings before the Patent Office or the Government of India or any Court in India and all acts and things as the said attorney may deem necessary or expedient in connection therewith or incidental thereto.

We further request that all notices, requisitions and communication relating thereto may be sent to such person/s at the corresponding address mentioned below:

Ground Floor, S-456, LGF, Greater Kailash – II, New Delhi – 110048, India,

(Contact No.: +91 9748818235; Email: bandyopadhyay.sudarshana@gmail.com)

We, hereby, revoke all previous authorizations, if any, in respect of the proceedings.

NOTARY
R.V. Singh
Advocate
Reg. No.2282
Commission
Expire On
24-10-2027
Area-Delhi
GOVT. OF INDIA

We, hereby, assent to the action already taken by the said person/s in the above matter.

Dated this **14th day of August, 2025**

SRJX RESEARCH AND INNOVATION LAB LLP
Through:

Signature: Soumya Ranjan Jena

Name: Dr. Soumya Ranjan Jena

Company Seal: SRJX Research and Innovation Lab LLP
LLPIN: ACO-1435

To,
The Controller of Patents,
The Patent Office,
Kolkata

NOTARY
R.V. Singh
Advocate
Reg. No.2282
Commission
Expire On
24-10-2027
Area-Delhi
GOVT. OF INDIA

ATTESTED
Notary Public Delhi

16 AUG 2025

FORM 9
THE PATENTS ACT,
1970 (39 of 1970)
&
The Patent Rules, 2003
REQUEST FOR PUBLICATION
(See Section 11A (2); rule 24A)

We, **SRJX RESEARCH AND INNOVATION LAB LLP**, Indian, of the address SRJX RESEARCH AND INNOVATION LAB LLP, Plot No - 3E/474, Sector-9, CDA, Post- Markat Nagar, Cuttack-753014, Odisha, India hereby request for early publication of our patent application……dated **October 04, 2025** titled "**SMART WEARABLE SYSTEM FOR WILDLIFE THREAT PREDICTION, ALERT AND DETERRING ATTACKS**" under section 11A(2) of the Act.

Dated this 04th day of October, 2025

MEENU SHARMA
(IN/PA-2856)
Patent Agent for the Applicant
SRJX RESEARCH AND INNOVATION LAB LLP

To,
The Controller of Patents,
The Patent Office,
New Delhi

Signature Not Verified
Digitally Signed.
Name: MEENU SHARMA
Date: 04-Oct-2025 17:10:49
Reason: Patent Efiling
Location: DELHI

FORM 3

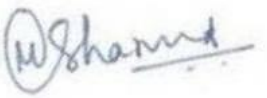
THE PATENTS ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8, rule 12)

Name of the Applicant	We, a) **SRJX RESEARCH AND INNOVATION LAB LLP** b) Indian; c) SRJX RESEARCH AND INNOVATION LAB LLP, Plot No - 3E/474, Sector-9, CDA, Post- Markat Nagar, Cuttack-753014, Odisha, India hereby declare:
Name, address and nationality of the joint applicant.	(i) that we have not made any application for the same / substantially the same invention outside India

Name of the Country	**Date of application**	**Application No.**	**Status of the application**	**Date of publication**	**Date of grant**
NIL	NIL	NIL	NIL	NIL	NIL

Name and address of the assignee	(iii) that the rights in the application have been assigned to: a) **SRJX RESEARCH AND INNOVATION LAB LLP** b) Indian; c) SRJX RESEARCH AND INNOVATION LAB LLP, Plot No - 3E/474, Sector-9, CDA, Post- Markat Nagar, Cuttack-753014, Odisha, India that we undertake that up to the date of grant of the patent by the Controller, we would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application. **Dated this 04th day of October, 2025**
To be signed by applicant or his authorized registered patent agent.	
Name of the natural person who has signed.	**Meenu Sharma** **(IN/PA-2856)** **Patent Agent for the Applicant**
	To, The Controller of Patents, The Patent Office, at New Delhi