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CBR Detail:

Sr. No.	App. Number	Ref. No./Application No.	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202531083158	TEMP/E-1/93229/2025-KOL	5760	10894	FORM 1	ADAPTIVE AI-POWERED VOMITING PREVENTION AND MOTION SICKNESS MANAGEMENT
2	E-106/2627/2025/KOL	202531083158	0	-----	FORM28	----
3	E-12/1727/2025/KOL	202531083158	2500	10894	FORM 9	----

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001742220	Online Bank Transfer	0209250011526	8260.00	1475001020000001

Total Amount : ₹ 8260.00

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(12) PATENT APPLICATION PUBLICATION

(19) INDIA

(22) Date of filing of Application :02/09/2025

(21) Application No.202531083158 A

(43) Publication Date : 12/09/2025

(54) Title of the invention : ADAPTIVE AI-POWERED VOMITING PREVENTION AND MOTION SICKNESS MANAGEMENT

(51) International classification	:G06F0003010000, G16H0050200000, A61B0005020500, G06Q0010040000, G06T0019000000
(86) International Application No Filing Date	:NA :NA
(87) International Publication No	: NA
(61) Patent of Addition to Application Number Filing Date	:NA :NA
(62) Divisional to Application Number Filing Date	:NA :NA

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(57) Abstract :
The present invention relates to an adaptive artificial intelligence-powered vomiting prevention and motion sickness management system designed for predicting, preventing, and managing motion sickness in passengers across moving vehicles and virtual environments comprising a wearable device integrated with a biosensor suite, vehicle motion sensors, and environmental sensors, operatively coupled to a data acquisition hub and a sensor fusion module for generating a unified dataset. A machine learning–based symptom inference model predicts motion sickness risk prior to onset, while a control policy engine dynamically selects personalized preventive interventions including visual stabilization, haptic feedback, guided breathing, aromatherapy, airflow and lighting control, seat orientation adjustment, and vibration damping. An adaptive learning module continuously updates passenger-specific profiles using real-time and historical data, enabling refinement of prediction accuracy and intervention effectiveness. The system supports multi-passenger deployment, distributed edge–cloud processing, clinician access, and emergency overrides, with provisions for OTA updates and data privacy safeguards. The invention further discloses a method for predicting and preventing motion sickness by integrating real-time physiological, motion, and environmental data with AI-driven prediction and personalized interventions, thereby proactively mitigating nausea and vomiting and enhancing passenger comfort and operational efficiency in diverse transport and immersive environments.

No. of Pages : 26 No. of Claims : 23

FORM 2

THE PATENTS ACT, 1970

(39 OF 1970)

AND

THE PATENTS RULES, 2003

COMPLETE SPECIFICATION

(*See* section 10; rule 13)

1. TITLE OF THE INVENTION

ADAPTIVE AI-POWERED VOMITING PREVENTION AND MOTION SICKNESS MANAGEMENT SYSTEM ACCDENT PREVENTION

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3. 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

The present invention pertains to the field of health technology and artificial intelligence, specifically focusing on systems and methods for predicting, preventing and managing motion sickness in passengers traveling in moving vehicles or virtual environments. The present invention more particularly integrates wearable biosensors, real-time vehicle motion data and adaptive machine learning algorithms to proactively detect and mitigate motion sickness through personalized, non-invasive interventions

BACKGROUND OF THE INVENTION

Motion sickness, clinically termed *kinetosis*, is a long-standing and prevalent physiological disorder that affects travelers across multiple modes of transportation, including road vehicles, trains, ships, and aircraft. The condition is caused by a sensory mismatch among the visual, vestibular, and proprioceptive systems, manifesting in symptoms such as nausea, dizziness, cold sweats, and, in severe cases, vomiting. The problem is particularly significant in rural and semi-urban regions of India, where individuals with limited exposure to frequent vehicular travel often demonstrate heightened susceptibility during journeys.

Conventional approaches for managing motion sickness are largely reactive in nature. Oral medications such as dimenhydrinate, meclizine, or scopolamine patches are commonly used, functioning by suppressing the nervous system's response to conflicting sensory inputs. However, these pharmacological solutions suffer from several drawbacks, including drowsiness, blurred vision, dry mouth, cognitive impairment, and unsuitability for vulnerable populations such as pregnant women, children, or individuals with certain medical conditions. Furthermore, such medications cannot provide real-time, personalized adjustments during travel.

Non-pharmacological solutions in prior art, such as acupressure wristbands or dietary modifications, also operate reactively. For example, acupressure devices target specific pressure points to alleviate nausea only after symptoms

have commenced. By the time such interventions are engaged, motion sickness has often escalated to vomiting, thereby reducing their effectiveness and significantly diminishing passenger comfort.

Attempts to integrate environmental monitoring into motion sickness devices have also proven inadequate. While certain systems detect vehicle motion parameters such as turbulence, acceleration, or directional changes, they typically fail to incorporate personalized physiological data. As a result, these systems cannot accurately assess how such environmental changes affect a particular individual's sensory system and susceptibility level. Predictions remain generalized, leading to inconsistent and unreliable outcomes.

Another major limitation of prior art lies in the absence of adaptive learning and personalization. Some prior devices may employ visual stabilization or auditory guidance techniques, yet these are static interventions that do not evolve with user-specific feedback. They lack artificial intelligence-driven adaptability, and therefore cannot refine preventive strategies based on historical travel data, physiological responses, or the effectiveness of previous interventions. Consequently, prevention remains generic and suboptimal for diverse users.

The integration and portability of prior solutions are further problematic. Many existing devices are standalone systems that are cumbersome to wear, require bulky hardware, or depend on wired connections, rendering them impractical for long-duration travel. Modern travelers demand lightweight, wearable, and user-friendly systems capable of seamlessly integrating into daily travel without causing additional discomfort.

Additionally, most prior solutions depend heavily on user compliance. Passengers are required to manually initiate interventions, such as pressing a button, changing posture, or activating devices, which is often impractical when the passenger is already experiencing nausea. The absence of automatic, pre-symptomatic interventions severely limits effectiveness.

Reliability in connected and offline environments is another gap in prior art. Many wearable and AI-based systems rely exclusively on internet connectivity for data processing and analytics, restricting their applicability in remote or

signal-deficient regions such as rural highways, maritime routes, or aircraft cabins.

In summary, prior art fails to provide a comprehensive, predictive, and adaptive solution that holistically integrates biometric sensing, environmental monitoring, AI-based predictive analytics, adaptive multi-modal interventions, and continuous personalized learning into a unified platform. Existing solutions remain fragmented and reactive, addressing only isolated aspects of the problem without offering end-to-end management of motion sickness.

Accordingly, there exists a need for an intelligent, compact, and adaptive wearable system that can:

- predict the onset of motion sickness before symptom escalation,
- apply immediate, personalized, and non-invasive preventive interventions,
- adapt dynamically through continuous machine learning, and
- function reliably in both connected and offline travel environments.

The present invention has been developed to overcome the aforesaid limitations of prior art.

OBJECTS OF THE INVENTION

The primary object of the present invention is to provide an adaptive artificial intelligence-powered system capable of predicting and preventing motion sickness in passengers before the onset of symptoms such as nausea and vomiting.

Another object of the invention is to integrate a wearable device with biosensors for monitoring physiological parameters including heart rate variability, galvanic skin response, respiration rate, skin temperature, eye movements, and head tilt.

One other object is to acquire and process real-time vehicle motion data through inertial measurement units, GPS, and vibration sensors, along with environmental data such as temperature, humidity, and air quality.

Another object is to implement a sensor fusion module for aggregating and synchronizing multi-source data into a unified dataset for accurate analysis.

One other object is to employ machine learning algorithms trained on motion sickness datasets for early detection of motion sickness risk, preferably 5–15 minutes prior to vomiting onset.

Another object of the invention is to provide a control policy engine that dynamically selects, sequences, and optimizes preventive interventions based on passenger-specific profiles, risk severity, and environmental conditions.

Yet another of the invention is to enable multiple intervention modules such as visual stabilization, haptic feedback, guided breathing, aromatherapy, airflow and lighting control, haptic seat actuation, and seat orientation adjustment.

One other object of the invention is to provide an adaptive learning module for continuously refining passenger-specific motion sickness profiles using real-time responses and historical data.

Yet another object of the invention is to ensure scalability for multi-passenger environments by assigning unique sensor IDs and maintaining personalized prediction and intervention without cross-interference.

The object of the invention is also to support distributed edge–cloud processing for real-time operation, large-scale analytics, and long-term model enhancement.

The other object of the invention is to ensure system robustness by incorporating OTA updates, data logging, emergency overrides, and privacy safeguards.

The final object of the invention is to provide applicability of the system across diverse domains including road, rail, air, and sea transport, offshore operations, space missions, and virtual or augmented reality environments.

SUMMARY OF THE INVENTION

The present invention discloses an adaptive artificial intelligence-powered system for predicting and preventing motion sickness in passengers travelling in moving vehicles or virtual environments. The system integrates a wearable device embedded with biosensors, vehicle motion sensors, and environmental sensors to collect real-time physiological, motion, and ambient data. A data acquisition hub and sensor fusion module aggregate and synchronize the inputs, which are processed by a machine learning–based symptom inference model trained to predict nausea or vomiting before symptom onset.

Based on the predicted risk, a control policy engine dynamically activates personalized preventive interventions, including visual stabilization, haptic feedback, guided breathing, aromatherapy, airflow and lighting control, vibration damping, and seat orientation adjustment. An adaptive learning module refines prediction accuracy by continuously updating passenger-specific profiles using real-time responses and historical journey data.

The invention further enables multi-passenger deployment, edge–cloud distributed processing, OTA updates, clinician access, and data privacy safeguards. A corresponding method is also provided, comprising steps of data collection, sensor fusion, prediction of motion sickness risk, activation of interventions, and profile adaptation, thereby proactively preventing vomiting and enhancing passenger comfort across diverse transport modes and immersive environments.

BRIEF DESCRIPTION OF DRAWINGS

Fig 1: The flowchart illustrates the working process of the present invention

Fig 2: Detailed architecture of the invention

DETAILED DESCRIPTION OF INVENTION

The present invention addresses the limitations of existing technological solutions for motion sickness by providing an Adaptive AI-Powered Vomiting Prevention and Motion Sickness Management System specifically engineered for passengers in moving vehicles or virtual environments. Unlike conventional methods that reactively manage symptoms after onset of the

symptoms, this system employs an artificial intelligence-driven predictive approach to detect early signs of motion sickness and initiate targeted, non-invasive preventive measures before the onset of vomitting, thereby enhancing passenger comfort and mitigating other travel-related discomfort.

The core functionality of the present invention resides in its capability for real-time monitoring of physiological and environmental parameters. The system comprises a wearable device, which may be embodied as a wristband, headband, smart eyewear, earphones, or combinations thereof. The external form factor may resemble commonly available smart wearables, such as smart watches, earphones or AR/VR glasses. However, the internal configuration of sensors and the integration of artificial intelligence modules are specifically adapted for motion sickness management.

The wearable devices are equipped with a biosensor suite comprising sensors for monitoring heart rate and heart rate variability (HR/HRV), galvanic skin response (GSR), respiration rate, skin temperature, eye-tracking metrics, head tilt angle, and optionally electroencephalography (EEG). In addition, the wearable device may be integrated with auxiliary modules including aromatherapy release units, vibration control mechanisms, and environmental sensing components.

Simultaneously, vehicle motion parameters are acquired through inertial and positional sensing units comprising accelerometers, gyroscopes, and GPS modules. The physiological data streams and motion-related data streams are transmitted by wire or wireless communication protocol to a processing unit, where they are subjected to sensor fusion and analysis by machine learning models trained on datasets of motion sickness conditions. The models generate predictive outputs indicating the probability of nausea or vomiting prior to the actual onset of symptoms.

Upon identification of a high-risk state, the system is configured to initiate personalized preventive measures based on passenger-specific physiological parameters, risk severity, and prevailing environmental conditions. The interventions comprise a visual stabilization module, a haptic feedback

module, an audio and guided breathing module, and an aromatherapy diffusion module. The visual stabilization module employs augmented reality or virtual reality overlays to align visual and vestibular inputs, thereby reducing sensory mismatch. In certain embodiments, the visual stabilization may be provided by a standalone smart eyewear device incorporating integrated sensors and stabilization components, or alternatively by interfacing with commercially available AR/VR eyewear through application programming interfaces, enabling real-time delivery of visual stabilization overlays. The eyewear is optional and is activated only when visual stabilization interventions are required. The haptic feedback module provides vibration cues through a wristband, headband, or other wearable device to prompt posture adjustment or reorientation of gaze. The audio and guided breathing module delivers relaxation cues, breathing exercises, or audio alerts through earphones or a companion mobile application. The aromatherapy diffusion module enables controlled release of natural anti-nausea agents such as ginger, peppermint, or lavender, the diffuser being integrated either within the wearable device, such as a wristband, headband, or collar module, or within the vehicle seat module for targeted delivery towards the passenger. The diffuser unit is compact, non-intrusive, and incorporates safety mechanisms for regulated dosing. The modular system architecture allows deployment of one or more of the above interventions individually or in combination, thereby ensuring adaptability to passenger preferences and therapeutic requirements. The selection and intensity of these measures are dynamically adjusted in real time to in accordance to the passenger's specific physiological conditions, severity prediction and personal preferences to optimize efficacy.

A distinguishing feature of the invention is its adaptive learning capability, wherein passenger data is continuously analyzed and stored with privacy safeguards to update individualized motion sickness profiles. The AI model refines its predictive accuracy and intervention effectiveness over time, ensuring increasingly precise and personalized outcomes. The system integrates edge computing for low-latency on-device processing with cloud-

based updates for long-term model enhancement, ensuring robust performance in both connected and offline scenarios.

The invention's versatility extends beyond standard passenger transport, with applications in environments where motion sickness poses operational challenges such as military transport, naval operations, offshore platforms, space missions and virtual reality or simulation-based training. By addressing motion sickness proactively through prediction and prevention, the system reduces reliance on pharmacological interventions, enhances travel comfort and improves operational efficiency. This innovation establishes a new paradigm in motion sickness management by merging real-time biometric sensing, predictive AI analytics, adaptive preventive measures, and continuous personalized learning into a portable, user-friendly platform, setting a benchmark in proactive health technology for dynamic travel environments.

Hardware and software modules:

The system integrates a sophisticated hardware and software framework that combines biometric sensing, environmental data collection, predictive AI analytics, adaptive multi-modal intervention mechanisms, and continuous self-learning capabilities to deliver a comprehensive, proactive, and personalized solution for motion sickness prevention.

The hardware architecture comprises a wearable device, configurable as a wristband, headband, AR/VR glasses or other portable form factors, embedded with advanced biosensors. These biosensors capture real-time physiological parameters, including heart rate and heart rate variability (HR/HRV) via photoplethysmography (PPG) sensors, galvanic skin response (GSR) for stress detection, respiratory rate sensors, skin temperature sensors,

The invention employs a multi-modal sensor suite, which can include (depending on the configuration):

- **Vehicle motion/environment sensors:**

- Inertial Measurement Unit (IMU): 3D accelerometer + 3D gyroscope + magnetometer (9-axis)
- GPS module for speed/geolocation
- Vibration sensors (seat-integrated)
- Environmental sensors: temperature, humidity, air composition, CO_2 concentration
- Camera module: external (scenery monitoring), internal (passenger face/posture tracking)

- Passenger biosensors (wearable or embedded):
  - Heart rate (HR) & heart rate variability (HRV) — via PPG
  - Galvanic skin response (GSR)
  - Respiratory rate sensors
  - Skin temperature sensor
  - Eye-tracking metrics (blink frequency, gaze stability, head tilt)
  - Optional EEG electrodes for advanced brainwave monitoring

Typical deployment: 8–12 distinct sensor categories (some with multiple sensing elements). Exact numbers may vary depending on the wearable form factor (e.g., wristband vs. eyewear vs. seat integration).

and infrared-based eye tracking for blink frequency and gaze stability. Additionally, a 9-axis inertial measurement unit (IMU), incorporating accelerometers, gyroscopes, and magnetometers, monitors head tilt, body posture, and movement patterns. The system also includes vehicle motion and environmental monitoring modules, utilizing GPS-based location tracking, accelerometers for detecting acceleration/deceleration patterns, gyroscopes for angular rotation, and sensors for ambient conditions such as temperature and air quality. All sensor data streams are transmitted in real time to an onboard processing unit, which may be integrated within the wearable device or interfaced via a companion mobile application.

The AI is integrated into the Symptom Inference Model and Control Policy Engine, running on a hybrid edge–cloud computational engine for real-time prediction, adaptive learning, and dynamic intervention execution. While commercial off-the-shelf wearables can be adapted, the invention envisions specialized devices tailored to this system. Existing earphones or smart watches may not have the required biosensor precision, real-time AI integration, or aromatherapy modules. Hence:

- Standard market devices can be partially integrated (e.g., using Bluetooth HR sensors from existing smart watches).
- Purpose-built system devices are preferred for full performance, ensuring all intervention modules (haptics, aromatherapy, AR/VR overlays) are seamlessly synchronized with the AI engine.

The AI-based prediction engine forms the core of the invention, employing advanced machine learning models such as recurrent neural networks (RNN), Long Short-Term Memory (LSTM) networks, transformer-based architectures, or ensemble learning methods. These models are trained on extensive datasets comprising labelled motion sickness events, physiological patterns, and environmental contexts, enabling the system to identify subtle pre-symptomatic changes indicative of nausea and vomiting risk. The prediction engine dynamically calculates a motion sickness probability score, often detecting risk 5–15 minutes prior to the onset of vomiting, and determines the optimal timing for initiating preventive interventions.

Upon detecting a high-risk state, the adaptive intervention module activates one or more personalized preventive strategies based on the passenger's physiological profile, risk severity, and environmental conditions. These interventions include:

1. **Visual Stabilization**: AR/VR-integrated eyewear provides visual overlays to synchronize virtual motion with real-world vehicle movement, mitigating sensory conflict between visual and vestibular inputs.

2. **Posture and Gaze Correction**: Haptic feedback, gentle vibration alerts, or audio instructions delivered through connected earphones or the mobile application prompt the passenger to adjust posture or gaze to reduce motion sickness triggers.
3. **Guided Breathing and Relaxation**: The companion mobile application delivers tailored breathing exercises and relaxation techniques to stabilize autonomic responses and alleviate nausea.
4. **Aromatherapy**: An integrated micro-diffuser that may be embedded in two locations:
    - Wearable modules (e.g., wristband/headband/collar) for localized and portable aromatherapy delivery.
    - Vehicle infrastructure (e.g., integrated into the passenger seat headrest or armrest) for larger-volume controlled release.

In both cases, diffuser placement ensures aromas are directed towards the passenger's breathing zone without affecting others in the cabin.

releases controlled doses of anti-nausea aromas, such as ginger, peppermint, or lavender, to provide sensory relief.

Multi-user environments:

The system is designed for multi-passenger environments. Each passenger's wearable generates individual biometric streams transmitted to their own personalized AI profile stored locally (edge computing) or securely on the cloud. Key features include:

- Unique sensor ID mapping for each passenger's wearable/seat sensors.
- Passenger-specific prediction models, so interventions are triggered independently.
- Non-intrusive operation, ensuring interventions (e.g., vibration cues, airflow, aromatherapy dosing) are directed only to the target passenger.

Thus, multiple users can simultaneously benefit from the system without cross-interference.

A key innovation of the invention is its AI-driven predictive analytics capability, which enables early detection of motion sickness risk prior to the onset of symptoms like nausea or vomiting. By continuously processing multimodal data streams from biosensors, vehicle motion detectors, and environmental monitoring units, the system identifies subtle physiological patterns using advanced machine learning algorithms, shifting from a reactive to a proactive, preventive paradigm. This predictive approach maximizes the likelihood of avoiding vomiting altogether.

Another distinguishing feature is the system's continuous self-learning capability. The AI model maintains and updates a user-specific motion sickness profile by analyzing historical physiological responses, environmental triggers, and intervention success rates after each journey. This adaptive learning ensures that predictive thresholds and intervention strategies become increasingly accurate and customized to each passenger's unique motion sickness profile, unlike conventional technologies that rely on static, one-size-fits-all methods.

The invention introduces a dual-mode operational capability combining edge and cloud computing. The edge computing layer enables low-latency, on-device processing for real-time decision-making, ensuring uninterrupted performance in environments with limited or no internet connectivity, such as remote roads, offshore vessels, or aircraft. The cloud computing layer facilitates periodic model updates, large-scale data analytics, and integration with external health-monitoring platforms, providing a scalable and future-ready architecture.

Integration flexibility is a further novel aspect, allowing the system to be embedded in various form factors, including wristbands, headbands, AR/VR eyewear, or vehicle seating systems. This adaptability makes the system suitable for diverse transport environments, including public transport, personal vehicles, military operations, offshore work, space missions, and

immersive VR/AR training simulations where motion sickness can impair performance.

The holistic integration of biometric sensing, environmental monitoring, AI-based prediction, adaptive multi-modal interventions, and continuous personalized learning into a single, compact, and user-friendly platform represents a significant novelty. Unlike existing systems that rely on singular or reactive methods, this invention combines these functionalities into a seamless, automated solution that predicts and prevents vomiting with high efficacy across diverse travel and virtual environments.

Architecture of the invention:

The Adaptive AI-Powered Vomiting Prevention and Motion Sickness Management System comprises the following modules and components:

1. **Vehicle Inertial Measurement Unit (IMU):** The IMU collects data relating to acceleration, rotation, and orientation of the vehicle. It is critical for detecting motion dynamics such as sudden braking, sharp turns, and bumpy road conditions that are potential triggers of motion sickness. Said data is transmitted to the sensor fusion module for further analysis.

2. **Global Positioning System (GPS):** The GPS module provides precise geolocation and speed information. By tracking vehicle movement, the system can correlate geographical conditions, such as winding roads, sharp inclines, or turbulence-prone routes, with motion sickness likelihood. This allows predictive detection based on known motion-sickness-prone terrains.

3. **Camera Module:** Onboard cameras are employed for environmental as well as passenger monitoring. Environmental cameras capture external motion cues such as passing scenery, while passenger-facing cameras detect blink frequency, facial expressions, or posture changes indicative of discomfort.

4. **Seat Vibration Sensors:** Vibration sensors integrated into the passenger seat measure high-frequency and irregular vibrations. Excessive vibrations are known contributors to motion sickness. The system is configured to counteract such vibrations through haptic damping or seat adjustment mechanisms.

5. **Environmental Sensors:** Cabin environmental sensors measure temperature, humidity, air composition, and air quality (including CO_2 concentration). Poor ventilation or adverse air conditions can exacerbate motion sickness, and this data informs the airflow control module for corrective ventilation adjustments.

6. **Passenger Biosensors:** Wearable or embedded biosensors capture real-time passenger physiological data including:

- Heart Rate (HR) and Heart Rate Variability (HRV);
- Galvanic Skin Response (GSR);
- Skin temperature; and
- Optional Electroencephalography (EEG) sensors for advanced brainwave monitoring.

  These inputs provide passenger-specific indicators of stress and pre-symptomatic nausea.

7. **Power Management Module:** Ensures stable power delivery to all components from the vehicle's electrical system or a dedicated battery pack. Implements intelligent power-saving strategies during low activity periods to extend operational life.

8. **Data Acquisition Hub:** Serves as the central data node, aggregating and synchronizing inputs from all vehicle, environmental, and passenger sensors. It interfaces with the vehicle's Controller Area Network (CAN) bus for integrated control.

9. **Sensor Fusion Module:** Combines data from the IMU, GPS, cameras, vibration sensors, environmental sensors, and biosensors into a unified

dataset, enabling a holistic representation of both passenger state and motion environment.

10. **Symptom Inference Model:** An AI-driven predictive model that analyses the fused dataset to assess motion sickness risk. The model utilizes historical patterns, physiological signals, and environmental cues to identify early symptom indicators with high accuracy.
11. **Control Policy Engine:** Determines the most effective countermeasure strategies based on risk severity and passenger-specific conditions. Employs a decision-making framework to select interventions from available actuators.
12. **Control Inference Model:** Translates selected control policies into executable commands for actuators. Optimizes the timing, sequencing, and intensity of interventions for maximum efficacy.
13. **Visual Stabilization Module:** Adjusts visual stimuli within the passenger's environment. This includes projecting a stable horizon line, synchronizing AR/VR overlays with vehicle motion, or dynamically modifying screen refresh rates to reduce sensory conflict.
14. **Airflow Control Module:** Regulates ventilation, directing fresh air towards the passenger and maintaining optimal cabin temperature and airflow. Enhanced airflow improves comfort and reduces nausea.
15. **Lighting Control Module:** Adjusts cabin lighting intensity, spectrum, and colour temperature to create a calming environment and minimize discomfort due to sensory mismatch.
16. **Haptic Seat Module:** Incorporates actuators within the seat to counteract irregular vibrations. Generates counter-phase motion or damping signals to neutralize vibration frequencies known to aggravate motion sickness.
17. **Medication/Aromatherapy Dispenser (Optional):** Provides controlled release of antiemetic formulations or natural aromatherapy agents such

as peppermint or ginger, depending on symptom severity. Automated dosing is safety-regulated.

18. **Seat Orientation Control Module:** Adjusts seat recline, tilt, or rotation to better align the passenger's vestibular system with the direction of travel, thereby reducing sensory mismatch.

19. **Data Logger:** Records operational data, environmental conditions, and physiological responses for post-trip analysis, AI model retraining, and compliance monitoring. Data is anonymized to ensure user privacy.

20. **Cloud Integration (Optional):** Provides remote connectivity for AI model updates, backup storage, large-scale analytics, and personalization across multiple journeys or passengers.

21. **Updates and Personalization Module:** Enables over-the-air (OTA) updates for system software and AI models. Provides customization features for individual passengers, including sensitivity levels and intervention preferences.

22. **Emergency Override:** Provides passengers or authorized personnel with manual override capability, enabling them to disable the system or trigger emergency actions if required.

23. **Clinician Portal (Optional):** Allows authorized healthcare professionals to access anonymized passenger data for medical evaluation, reporting, and adjustment of intervention protocols.

We claim:

1. An adaptive artificial intelligence-powered vomiting prevention and motion sickness management system for predicting and preventing motion sickness in passengers traveling in moving vehicles or virtual environments, comprising:

a. a wearable device configured as a wristband, headband, smart eyewear, earphones, seat-integrated module, or combinations thereof, embedded with a biosensor suite comprising one or more sensors selected from heart rate and heart rate variability (HR/HRV) sensors, galvanic skin response (GSR) sensors, respiratory rate sensors, skin temperature sensors, eye-tracking sensors, head tilt sensors, and optionally electroencephalography (EEG) sensors, for collecting real-time physiological data;

b. b. vehicle motion sensors comprising a 9-axis inertial measurement unit (IMU) with accelerometers, gyroscopes, and magnetometers, a global positioning system (GPS) module, and optionally seat vibration sensors, for acquiring real-time vehicle motion parameters;

c. environmental sensors configured to monitor one or more of cabin temperature, humidity, air quality, and carbon dioxide concentration;

d. a data acquisition hub operatively coupled to said biosensor suite, vehicle motion sensors, and environmental sensors, configured to aggregate and synchronize data streams;

e. a sensor fusion module configured to combine the aggregated data into a unified dataset;

f. a symptom inference model comprising machine learning algorithms trained on motion sickness datasets to predict the risk of nausea or vomiting prior to symptom onset;

g. a control policy engine configured to select and optimize preventive measures based on risk severity, passenger-specific physiological state, and environmental conditions;

h. one or more intervention modules actuated by the control policy engine, selected from a visual stabilization module, a haptic feedback module,

an audio and guided breathing module, an aromatherapy diffusion module, an airflow control module, a lighting control module, a haptic seat module, and a seat orientation control module; and

i. an adaptive learning module configured to continuously update passenger-specific motion sickness profiles by analyzing historical physiological responses, environmental triggers, and intervention outcomes, with privacy safeguards,

wherein the system proactively detects early signs of motion sickness and initiates personalized interventions to prevent vomiting, thereby enhancing passenger comfort and travel experience across diverse transport and virtual environments.

2. The system as claimed in claim 1, wherein the wearable device is configured to transmit real-time physiological data to an onboard processing unit or a companion mobile application through wired or wireless communication protocols.

3. The system as claimed in claim 1, wherein the visual stabilization module employs augmented reality (AR) or virtual reality (VR) overlays to align visual and vestibular inputs, implemented through standalone smart eyewear with integrated sensors and stabilization components or by interfacing with commercially available AR/VR eyewear via application programming interfaces (APIs).

4. The system as claimed in claim 1, wherein the haptic feedback module delivers vibration cues through actuators embedded in the wristband, headband, or seat to prompt passenger posture adjustment or gaze reorientation.

5. The system as claimed in claim 1, wherein the audio and guided breathing module delivers breathing exercises, relaxation cues, or audio alerts through earphones or the companion mobile application to stabilize autonomic responses.

6. The system as claimed in claim 1, wherein the aromatherapy diffusion module is configured to release controlled doses of anti-nausea aromas,

like ginger, peppermint, lavender or similar, embedded within the wearable device or a vehicle seat module.

7. The system as claimed in claim 1, wherein the airflow control module regulates cabin ventilation by directing fresh air towards the passenger and maintaining optimal airflow and temperature conditions to mitigate nausea.

8. The system as claimed in claim 1, wherein the lighting control module adjusts cabin lighting intensity, spectrum, and colour temperature to minimize sensory mismatch and enhance passenger comfort.

9. The system as claimed in claim 1, wherein the haptic seat module comprises actuators integrated within the seat to generate counter-phase motion or damping signals to neutralize vibrations that aggravate motion sickness.

10. The system as claimed in claim 1, wherein the seat orientation control module adjusts seat recline, tilt, or rotation to align the passenger's vestibular system with the direction of travel, thereby reducing sensory conflict.

11. The system as claimed in claim 1, wherein the symptom inference model employs machine learning architectures selected from recurrent neural networks (RNN), long short-term memory (LSTM) networks, transformer-based architectures, or ensemble learning models to predict motion sickness risk 5–15 minutes prior to vomiting onset.

12. The system as claimed in claim 1, wherein the control policy engine dynamically determines the timing, sequencing, and intensity of preventive measures to optimize intervention efficacy based on a motion sickness probability score.

13. The system as claimed in claim 1, wherein the adaptive learning module continuously refines predictive accuracy and intervention effectiveness by updating passenger-specific motion sickness profiles using real-time feedback and historical journey data.

14. The system as claimed in claim 1, wherein processing is distributed between an edge computing layer for low-latency, real-time operation and a cloud computing layer for periodic updates, large-scale analytics, and long-term model enhancement, ensuring robust performance in both connected and offline environments.

15. The system as claimed in claim 1, wherein the system is configured for multi-passenger environments, associating each passenger with a unique sensor ID mapping and personalized prediction model, enabling independent triggering of interventions without cross-interference.

16. The system as claimed in claim 1, further comprising a data logger configured to store operational data, environmental conditions, and physiological responses for post-trip analysis, model retraining, and compliance monitoring, with data anonymization to ensure user privacy.

17. The system as claimed in claim 1, further comprising an updates and personalization module configured to provide over-the-air (OTA) updates for software and artificial intelligence models and to enable customization of sensitivity levels and intervention preferences for individual passengers.

18. The system as claimed in claim 1, further comprising an emergency override module configured to allow passengers or authorized personnel to manually disable the system or trigger emergency actions as required.

19. The system as claimed in claim 1, further comprising a clinician portal configured to provide authorized healthcare professionals with access to anonymized passenger data for medical evaluation and adjustment of intervention protocols.

20. The system as claimed in claim 1, wherein the system is configured for deployment in diverse applications, including passenger transport, naval operations, offshore platforms, space missions, and virtual or augmented reality environments, to address motion sickness and enhance operational efficiency.

21. A method for predicting and preventing motion sickness in passengers using the system as claimed in claim 1, comprising the steps of:

a. collecting real-time physiological data through a wearable device, including heart rate variability, galvanic skin response, breathing rate, skin temperature, eye-tracking metrics, and head tilt angle;
b. acquiring vehicle motion and environmental data using accelerometers, gyroscopes, GPS modules, seat vibration sensors, and environmental sensors;
c. aggregating and synchronizing data streams through a data acquisition hub;
d. combining data into a unified dataset via a sensor fusion module;
e. analyzing the unified dataset using a symptom inference model to calculate a motion sickness probability score and detect early signs of nausea or vomiting risk;
f. selecting and activating personalized preventive interventions through a control policy engine, including visual stabilization, haptic feedback, guided breathing, aromatherapy, airflow control, lighting control, haptic seat adjustments, or seat orientation control;
g. updating passenger-specific motion sickness profiles through an adaptive learning module based on real-time feedback and historical data; and
h. recording operational, environmental, and physiological data for post-trip analysis and model retraining,

wherein the method proactively prevents vomiting by initiating tailored interventions prior to symptom onset.

22. The method as claimed in claim 21, wherein the symptom inference model detects motion sickness risk 5–15 minutes prior to vomiting onset, enabling timely activation of preventive measures.

23. The method as claimed in claim 21, wherein the preventive interventions are dynamically adjusted based on real-time physiological conditions,

risk severity, and user preferences to optimize efficacy and enhance passenger comfort.

Dated this 2nd day of September 2025

Sudarshana Bandyopadhyay

Regn. No.: IN/PA 2802
Agent for the applicant
Phn No. 9748818235
Email: bandyopadhyay.sudarshana@gmail.com

APPLICATION NO._____

ABSTRACT

ADAPTIVE AI-POWERED VOMITING PREVENTION AND MOTION SICKNESS MANAGEMENT SYSTEM

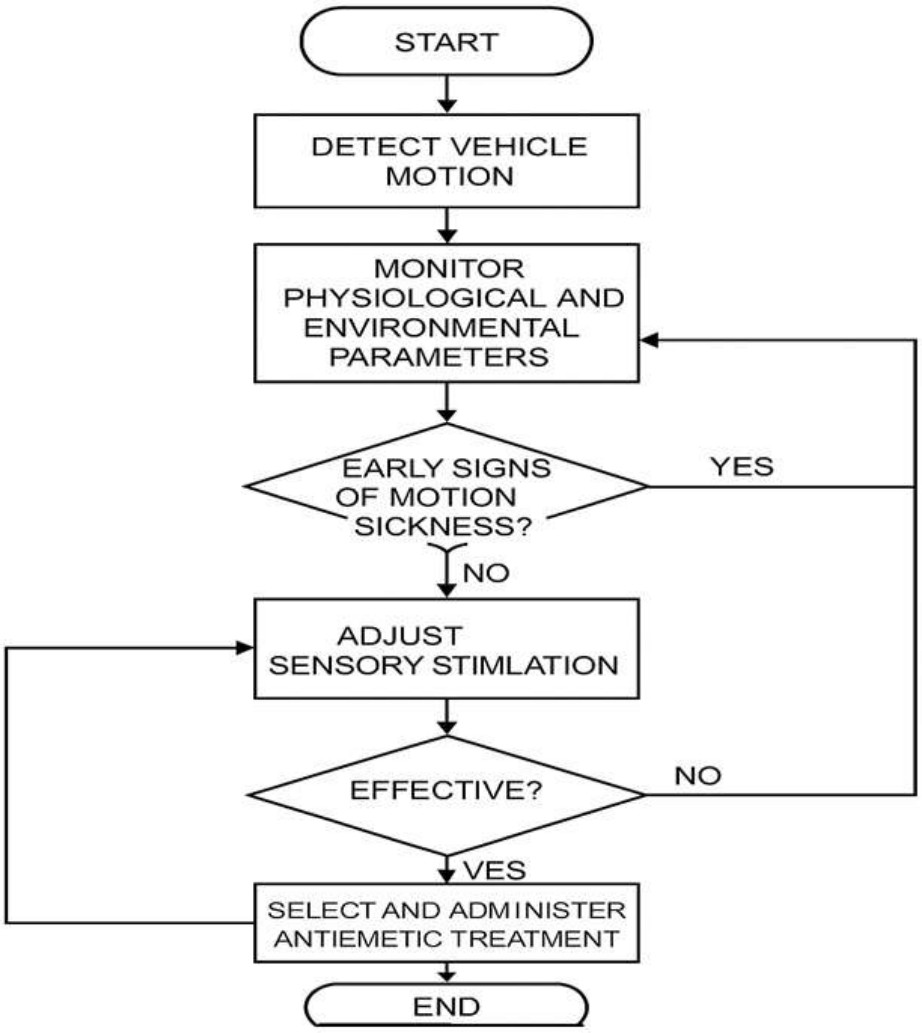
The present invention relates to an adaptive artificial intelligence-powered vomiting prevention and motion sickness management system designed for predicting, preventing, and managing motion sickness in passengers across moving vehicles and virtual environments comprising a wearable device integrated with a biosensor suite, vehicle motion sensors, and environmental sensors, operatively coupled to a data acquisition hub and a sensor fusion module for generating a unified dataset. A machine learning–based symptom inference model predicts motion sickness risk prior to onset, while a control policy engine dynamically selects personalized preventive interventions including visual stabilization, haptic feedback, guided breathing, aromatherapy, airflow and lighting control, seat orientation adjustment, and vibration damping. An adaptive learning module continuously updates passenger-specific profiles using real-time and historical data, enabling refinement of prediction accuracy and intervention effectiveness. The system supports multi-passenger deployment, distributed edge–cloud processing, clinician access, and emergency overrides, with provisions for OTA updates and data privacy safeguards. The invention further discloses a method for predicting and preventing motion sickness by integrating real-time physiological, motion, and environmental data with AI-driven prediction and personalized interventions, thereby proactively mitigating nausea and vomiting and enhancing passenger comfort and operational efficiency in diverse transport and immersive environments.

Applicant Name: SRJX RESEARCH AND INNOVATION LAB LLP

Total No. of Sheets: 2

Appl No. -

Sheet 1 of 2



Detailed Flowchart

Figure 1

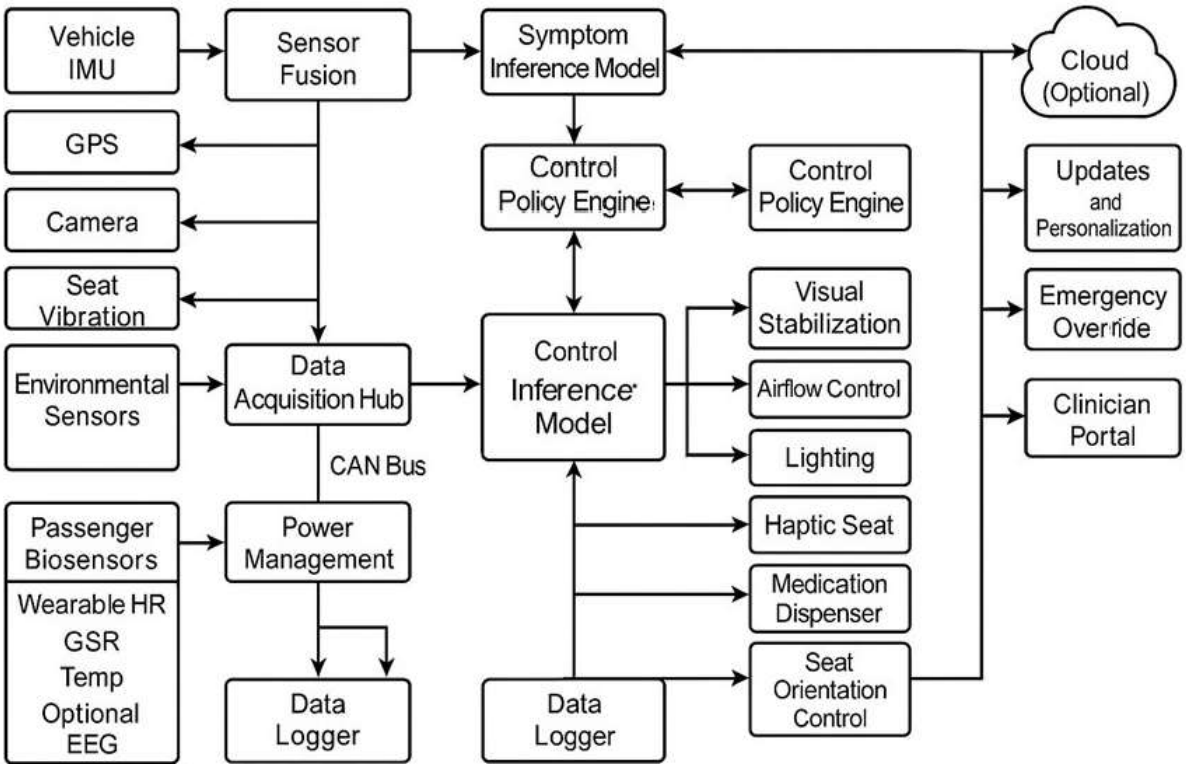
Sudarshana Bandyopadhyay
Regn No.: IN/PA 2802
Agent for the Applicants

Applicant Name: SRJX RESEARCH AND INNOVATION LAB LLP

Total No. of Sheets: 2

Appl No. -

Figure 2 of 2



Detailed Architecture

Figure 2

Sudarshana Bandyopadhyay
Regn No.: IN/PA 2802
Agent for the Applicants

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 inventor(s) of the invention disclosed in the complete specification filed in pursuance of our application numbered _____ dated 2 September 2025 are:

2. **INVENTORS:**

I. a) Name: **DR SOUMYA RANJAN JENA**
b) Nationality: An Indian National
c) Address: Plot No - 3E/474, Sector-9, CDA, Post- Markat Nagar, Cuttack-753014, Odisha, India

II. a) Name: **MR SANJOY SAHA**
b) Nationality: An Indian National
c) Address: Flat No - 63/1, Thakur Para Road, P.O.- Naihati, North 24 Parganas, West Bengal-743165, India

III. a) Name: **DR. SOHIT AGARWAL**
b) Nationality: Indian
c) Address: D 388, Sarvanand Marg, Malviya Nagar, Jaipur-302017, Rajasthan, India

Dated this 2nd day of September 2025

Sudarshana

Name of the signatory:

Signature Not Verified
Digitally Signed.
Name: Sudarshana Bandyopadhyay
Date: 02-Sep-2025 11:14:21
Reason: Patent Efiling

Dated this 2nd day of September 2025

Sudarshana Bandyopadhyay
Regn No.: IN/PA 2802
Agent for the Applicants
Email: bandyopadhyay.sudarshana@gmail.com
Phn No: 9748818235

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

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 and 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(S)					
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 ( )	Others ()	
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 inventor(s)

Name in Full	Nationality	Country of Residence	Address of the Inventor
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

ADAPTIVE AI-POWERED VOMITING PREVENTION AND MOTION SICKNESS MANAGEMENT

6. AUTHORISED REGISTERED PATENT AGENT(S)	IN/PA No.	2802
	Name	Sudarshana Bandyopadhyay
	Mobile No.	9748818235
7. ADDRESS FOR SERVICE OF APPLICANT IN INDIA	Name	**SUDARSHANA BANDYOPADHYAY**
	Postal Address	Ground Floor, S-456, LGF, Greater Kailash – II, New Delhi – 110048, India
	Telephone No.	NA
	Mobile No.	97488 18235
	Fax No.	NA
	E-mail ID	bandyopadhyay.sudarshana@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)

N.A.					

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
N.A.	

11. IN CASE OF PATENT OF ADDITION FILED UNDER SECTION 54, PARTICULARS OF MAIN	
Main application/patent No.	Date of filing of main application
N.A.	N.A.

12. DECLARATIONS

(i) Declaration by the inventor(s)

(**In case the applicant is an assignee**: the inventor(s) may sign herein below or the applicant 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 inventor(s) is/are the true & first inventor(s) for this Invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date:
(b) Signature:
(c) Name: **Dr Soumya Ranjan Jena**

(a) Date
(b) Signature(s):
(c) Name: **Mr Sanjoy Saha**

(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(s)

(c) Name(s) of the signatory

(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.

[**x**] 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 me/us before the grant of patent to me/us.

[✓] There is no lawful ground of objection(s) to the grant of the Patent to us.

[**x**] We are the true & first inventor(s).

[✓] We are the assignee or legal representative of true & first inventor(s).

[**x**] 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 my invention(s).

[**x**] We claim the priority from the above mentioned application(s) 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 I derive the title.

[**x**] Our application in India is based on international application under Patent Cooperation Treaty (PCT) as mentioned in Paragraph-9.

[**x**] The application is divided out of my /our application particulars of which is given in Paragraph-10 and pray that this application may be treated as deemed to have been filed on DD/MM/YYYY under section 16 of the Act.

[**x**] 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/ provisional specification	No. of pages: 17	1600	Including Form 2, description,
No. of Claim(s)	No. of Claims = 23 No. of Pages = 6	-	Claim pages
Abstract	1		Abstract page
No. of Drawing(s)	No. of drawings = 2 and No. of pages = 2		Drawing sheets

In case of a complete specification, if the applicant desires to adopt the drawings filed with his provisional specification as the drawings or part of the drawings for the complete specification under rule 13(4), the number of such pages filed with the provisional specification are required to be mentioned here.

b. Form 3: Statement and Undertaking
c. Form 5: Declaration as to inventorship
d. Power of Attorney
e. Form 28
f. Form 9

Total fee ₹ 8260/- is being paid online through electronic portal

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 2nd day of September 2025.

Signature:

Name: Sudarshana Bandyopadhyay
(Regn No: IN/PA 2802)
Agent for the Applicant
Phn no.: 97488 18235
email: bandyopadhyay.sudarshana@gmail.com

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

FORM 28

THE PATENTS ACT,

1970 (39 of 1970)

AND

THE PATENTS RULES, 2003

TO BE SUBMITTED BY A SMALL ENTITY /STARTUP/EDUCATIONAL INSTITUTION

[See rules 2 (fa), 2(fb), 2(ca) and 7]

1	Name, address and nationality.	We, SRJX RESEARCH AND INNOVATION LAB LLP, of the address Plot No - 3E/474, Sector-9, CDA, Post- Markat Nagar, Cuttack-753014, Odisha, India, applicant in respect of the patent application no. _____ dated 2 September 2025 hereby declare that we are a micro entity in accordance with rule 2(fa) and submit the following document as a proof :
2	Documents to be submitted	
	i. For claiming the status of a **micro** entity:	
	A. For an Indian applicant: Evidence of registration under the Micro, Small and Medium Enterprises Act, 2006 (27 of 2006).	
3	To be signed by the applicant(s) / patentee (s) / authorised registered patent agent.	The information provided herein is correct to the best of my/our knowledge and belief. Dated this 2nd day of September 2025
4	Name of the natural person who has signed.	Signature: Sudarshana

Signature Not Verified

Digitally Signed.
Name: Sudarshana Bandyopadhyay
Date: 02-Sep-2025 11:32:08
Reason: Patent Efiling

	Designation and official seal, if any, of the person who has signed.	Sudarshana Bandyopadhyay Regn. No.: IN/PA 2802 Agent for the applicant Phn No. 9748818235 Email: bandyopadhyay.sudarshana@gmail.com To The Controller of Patents, The Patent Office, At Kolkata

FORM 9

THE PATENTS ACT, 1970

(39 of 1970)

&

THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See Section 11A(2); Rule 24A]

We, SRJX RESEARCH AND INNOVATION LAB LLP, of the address Plot No - 3E/474, Sector-9, CDA, Post- Markat Nagar, Cuttack-753014, Odisha, India, hereby request for an early publication of our Patent Application No. _____ filed on 2 September 2025 under Section 11A(2) of the Act.

Dated this 2nd day of September 2025

Sudarshana Bandyopadhyay
Regn No.: IN/PA 2802
Agent for the Applicants
Email: bandyopadhyay.sudarshana@gmail.com
Phn No: 9748818235

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)

₹100₹100₹100₹100

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: Sudarshana Bandyopadhyay
Date: 02-Sep-2025 11:12:24
Reason: Patent Filing

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 PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See Section 11A(2); Rule 24A]

We, SRJX RESEARCH AND INNOVATION LAB LLP, of the address Plot No - 3E/474, Sector-9, CDA, Post- Markat Nagar, Cuttack-753014, Odisha, India, hereby request for an early publication of our Patent Application No. _____ filed on 2 September 2025 under Section 11A(2) of the Act.

Dated this 2nd day of September 2025

Sudarshana Bandyopadhyay
Regn No.: IN/PA 2802
Agent for the Applicants
Email: bandyopadhyay.sudarshana@gmail.com
Phn No: 9748818235

FORM 3

THE PATENTS ACT,

1970 (39 of 1970)

and

THE PATENTS RULES,
2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

1. Name of the applicant(s).	We, SRJX RESEARCH AND INNOVATION LAB LLP, Plot No - 3E/474, Sector-9, CDA, Post-Markat Nagar, Cuttack-753014, Odisha, India hereby declare:
2. 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 Or (ii) that we who have made this application No date 2nd September 2025 alone/~~jointly~~ ~~with~~ ....., made for the same/ substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:

Name of the country	Date of application	Application No.	Status of the application	Date of publication	Date of grant
N.A.					

3. Name and address of the assignee	(iii) that the rights in the application(s) have been assigned to SRJX RESEARCH AND INNOVATION LAB LLP, Plot No - 3E/474, Sector-9, CDA, Post-Markat Nagar, Cuttack-753014, Odisha, India

Signature Not Verified

Digitally Signed.
Name: Sudarshana Bandyopadhyay
Date: 02-Sep-2025 11:12:24
Reason: Patent Efiling

	that we undertake that upto 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 2nd day of September 2025
4. To be signed by the applicant or his authorized registered patent agent.	 Signature. .....
5. Name of the natural person who has signed.	Sudarshana Bandyopadhyay Regn. No.: IN/PA 2802 Agent for the applicant Phn No. 9748818235 Email: bandyopadhyay.sudarshana@gmail.com
	To The Controller of Patents, The Patent Office, at Kolkata
Note.- Strike out whichever is not applicable;	