ANNEXURE – I: A Non-Exhaustive Indicative List of Examples

The annexure provides a non-exhaustive indicative list of additional examples to further illustrate allowable/non-allowable claimed inventions under four limbs of section 3(k) of the Patents Act, 1970.

A. Mathematical method

21. Example. Method for Adaptive Noise Cancellation in Audio Devices

Claim:

A method for reducing background noise in an audio signal, comprising:

a) *receiving an audio input;*

b) *applying a Fast Fourier Transform (FFT) to convert the audio signal to the frequency domain;*

c) *identifying and attenuating frequency components corresponding to noise using a digital filter;*

d) *reconstructing the filtered audio signal using an inverse FFT;*

e) *outputting the noise-cancelled audio signal to a speaker.*

Stepwise analysis:

Step 1: The core objective is to reduce background noise in real-time audio devices. The invention uses mathematical tools (FFT, filtering) but the end result is a technically improved audio output.

Step 2: The solution uses mathematical processing (FFT, filtering), but these are **not the end goal**. They are **intermediate steps** within a broader technical process. The **primary objective** is not the mathematical computation itself, but its objective is to provide cleaner audio output for the user.

Step 3: The mathematical processing is **part of a larger technical process** (signal enhancement and real-time noise reduction). The output is not just a number or an abstract result, but a **technically improved audio signal** delivered to a physical device (speaker). Therefore, this invention **does not fall under the mathematical method exclusion**.

22. Example. System for Controlling an Autonomous Drone

Claim:

A system for autonomous drone navigation, comprising:

a) *sensors for detecting obstacles, wherein the drone is equipped with real-time proximity sensors (such as ultrasonic, LiDAR, or vision sensors) to collect environmental data;*

b) *a processor configured to calculate optimal flight paths using Dijkstra's algorithm, wherein the processor receives sensor data, constructs a dynamic map of the environment, and applies Dijkstra's algorithm to compute the shortest or safest path to the destination while avoiding obstacles;*

c) *generating control signals to adjust the drone's motors and avoid obstacles in real time, wherein the computed path is translated into real-time control commands for the drone's motors, enabling autonomous navigation and obstacle avoidance during flight.*

Stepwise analysis:

Step 1: The core objective is **autonomous navigation and real-time obstacle avoidance** for drones. The system uses mathematical path-finding (Dijkstra's algorithm) as a tool, but the end goal is to enable safe, autonomous movement in the physical world.

Step 2: The solution involves mathematical computation (Dijkstra's algorithm), but this is **not the ultimate aim**. The algorithm is an **intermediate step** within a broader technical process. The **primary objective** is not just the calculation of a path, but the real-time, physical control of a drone to avoid obstacles and reach a target.

Step 3: The mathematical step (path calculation) is **necessary for achieving a technical solution** —namely, safe, autonomous drone flight in a dynamic environment. The output is not a mere number or abstract result; it is **translated into control signals** that govern the drone's hardware. Therefore, this invention **does not fall under the mathematical method exclusion**. The mathematical computation is part of a larger technical process (autonomous navigation).

23. Example. Method for Image Enhancement in Medical Imaging Devices

Claim:

A method for enhancing MRI images, comprising:

a) *receiving raw image data, wherein raw magnetic resonance imaging (MRI) data is acquired from an MRI scanner and provided to a processing system;*

b) *applying a wavelet-based denoising algorithm, wherein the processing system decomposes the raw image data into wavelet coefficients, identifies and suppresses noise components while preserving anatomical features, and reconstructs the denoised data;*

c) *reconstructing the image, wherein the denoised wavelet coefficients are transformed back into the spatial domain to generate a noise-reduced image;*

d) *displaying the enhanced image for diagnostic use, wherein the improved image is rendered on a display device for interpretation by medical professionals.*

Stepwise analysis:

Step 1: The core objective is to **improve the quality of MRI images** for medical diagnostics. While a mathematical technique (wavelet-based denoising) is used, the invention's substance is the technical enhancement of medical images for more accurate diagnosis.

Step 2: The method employs **wavelet-based denoising**, a mathematical operation, as an **intermediate step**. The **primary objective** is not the computation itself, but the technical solution—clearer, more accurate MRI images for diagnostic purposes.

Step 3: The output is **not a mere numerical result** or abstract value; it is a **tangible, enhanced medical image** that can be used for real-world diagnostic decisions. The mathematical method is **embedded in a larger technical process**. Therefore, this invention **does not fall under the mathematical method exclusion** of Section 3(k), as the mathematical computation is an essential part of a broader technical process (improved diagnostic images).

24. Example. Method for Real-Time Vehicle Stability Control

Claim:

A method for controlling vehicle stability, comprising:

a) *receiving sensor data on wheel speed and steering angle, wherein a set of sensors continuously monitors each wheel's rotational speed and the steering angle, transmitting this data in real time to a vehicle control unit;*

b) *calculating slip ratios using mathematical formulas, wherein the control unit processes the sensor data to compute the slip ratio for each wheel, using established mathematical relationships between wheel speed, vehicle speed, and steering input to detect loss of traction or instability;*

c) *generating control signals to adjust braking and throttle for stability, wherein the system uses the calculated slip ratios to determine the optimal braking force and throttle adjustments, and transmits corresponding control signals to the vehicle's braking and engine management systems to maintain or restore stability during dynamic driving conditions.*

Stepwise analysis:

Step 1: The core objective is **maintaining or restoring vehicle stability** during operation, especially in dynamic or adverse conditions. While mathematical formulas are used to calculate slip ratios, the invention's substance is the real-time, automatic control of vehicle systems to ensure safe operation.

Step 2: The method employs **mathematical calculations** (slip ratios) as an **intermediate step**. The **primary objective** is not the computation itself, but the technical effect—real-time adjustment of braking and throttle to maintain vehicle stability.

Step 3: The output is **not a mere numerical result**; it is a set of **control signals** that directly affect the vehicle's hardware (brakes and throttle). The mathematical computation is **embedded in a larger technical process**. Therefore, this invention **does not fall under the mathematical method exclusion** of Section 3(k), as the mathematical computation is an essential part of a broader technical process (vehicle stability).

25. Example. Method for Calculating Compound Interest

Claim:

A method comprising:

a) *receiving principal, rate, and time, wherein a user or external system inputs the principal amount, interest rate, and time period for an investment or loan;*

b) *applying the compound interest formula to calculate the final amount, wherein the system processes the input values using the mathematical formula for compound interest as:*

   $A=P\times(1+r/n)^{nt}$

   where A is the final amount, P is the principal, r is the annual interest rate, n is the number of times interest is compounded per year, and t is the time in years;

c) *outputting the result, wherein the calculated final amount is displayed to the user or transmitted to another system.*

Stepwise analysis:

Step 1: The core objective of the invention is **to perform a financial calculation** specifically, to compute the final amount after applying the compound interest formula to user-provided values. The invention is about automating a mathematical calculation, not about solving a technical problem.

Step 2: The method uses the **compound interest formula**. The computation is **the end goal**; the method simply automates the process of plugging values into a formula and producing a numerical result. There is **no technical process, transformation, or application** beyond the mathematical calculation itself.

Step 3: The output is **just a number**—the final amount after interest is applied. The method is **not embedded in any larger technical process** (such as automated fraud detection, or hardware control). There is **no** real-world action beyond the calculation. Therefore, this invention **falls under the mathematical method exclusion** of Section 3(k) of The Patents Act, as the claimed subject matter is nothing more than a mathematical computation, with no technical application.

26. Example. System for Statistical Data Analysis

Claim:

A system comprising:

a) *receiving a dataset, wherein the system accepts input data, such as numerical values or records, from a user or external source;*

b) *applying regression analysis to determine correlation coefficients, wherein the system processes the dataset using mathematical/statistical formulas to compute correlation coefficients that quantitatively describe the relationship between two or more variables;*

c) *outputting the coefficients, wherein the computed correlation coefficients are displayed to the user or exported for further use.*

Stepwise analysis:

Step 1: The core objective of the invention is to **perform a statistical computation**—specifically, to calculate correlation coefficients using regression analysis on a given dataset. The invention is about automating a mathematical/statistical calculation, not about solving a technical problem.

Step 2: The method uses **regression analysis**, which is a well-known mathematical/statistical technique for quantifying relationships between variables. The computation is **the end goal**; the method simply automates the process of applying mathematical formulas to data and producing a numerical/statistical result (correlation coefficients). There is **no technical process, transformation, or application** beyond the mathematical/statistical calculation itself.

Step 3: The output is **just a set of numbers**—the correlation coefficients. The method is **not embedded in any larger technical process** (such as automated system control, real-time signal processing, or physical device operation). There is **no technical application** or real-world action beyond the calculation. Therefore, this invention **falls under the mathematical method exclusion** of Section 3(k) of The Patents Act, as the claimed subject matter is nothing more than a mathematical/statistical computation, with no technical application.

27. Example. Method for Generating Random Numbers

Claim:

A method comprising:

a) *selecting a seed value, wherein a user or system provides an initial numerical value (seed) to initiate the random number generation process;*

b) *applying a mathematical formula to generate a sequence of random numbers, wherein the system uses a deterministic mathematical function or algorithm (such*

as a linear congruential generator or other pseudo-random number generator) to compute a sequence of numbers based on the seed;

c) *outputting the sequence, wherein the generated sequence of random numbers is provided to the user or another system for further use.*

Stepwise analysis:

Step 1: The core objective of the invention is to **generate a sequence of random numbers using a mathematical formula**. The invention is about automating a mathematical process for producing a sequence of numbers, not about solving a technical problem.

Step 2: The method uses a **mathematical formula or algorithm** to generate random numbers, which is a well-known mathematical process. The computation is **the end goal**; the method simply automates the process of applying a mathematical function to a seed value to produce a sequence of numbers. There is **no technical process, transformation, or application** beyond the mathematical calculation itself.

Step 3: The output is **just a sequence of numbers**—the random numbers generated by the formula. The method is **not embedded in any larger technical process** (such as cryptographic key generation in a secure hardware device, real-time modulation of a communication signal, or physical device control). There is **no technical application** or real-world action beyond the calculation. Therefore, this invention **falls squarely under the mathematical method exclusion** of Section 3(k) of The Patents Act, as the claimed subject matter is nothing more than a mathematical computation, with no technical application.

28. Example. Method for Solving Quadratic Equations

Claim:

A method comprising:

a) *receiving coefficients a, b, c, wherein a user or system provides the numerical coefficients of a quadratic equation of the form $ax^2+bx+c=0$;*

b) *applying the quadratic formula to determine the roots, wherein the system computes the values of xx using the mathematical formula*

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

to find the solutions (roots) of the equation;

c) *outputting the roots, wherein the computed roots are displayed to the user or transmitted to another system.*

Stepwise analysis:

Step 1: The core objective of the invention is to **solve a quadratic equation by applying a mathematical formula**. The invention automates the process of calculating the roots of a quadratic equation, which is a purely mathematical operation.

Step 2: The method uses the **quadratic formula**, a well-known mathematical equation, to compute the roots. The computation is **the end goal**; the method simply automates the process of solving the equation and producing the numerical results (roots). There is **no technical process, transformation, or application** beyond the mathematical calculation itself.

Step 3: The output is **just a set of numbers**—the roots of the quadratic equation. The method is **not embedded in any larger technical process** (such as real-time control of a device, signal processing, or hardware actuation). There is **no technical application** or real-world action beyond the calculation. Therefore, this invention **falls squarely under the mathematical method exclusion** of Section 3(k) of The Patents Act, as the claimed subject matter is nothing more than a mathematical computation, with no technical application.

B. Business method:

29. Example. Secure Data Transmission in Online Banking

Claim:

A method for securing data transmission in online banking, comprising:

a) *encrypting transaction data using a quantum-resistant cryptographic algorithm, wherein transaction data generated during an online banking session is processed using a cryptographic protocol designed to withstand quantum computing attacks, ensuring confidentiality and integrity of the data;*

b) *transmitting the encrypted data over a secure channel, wherein the encrypted transaction data is sent via a secure communication protocol (such as TLS 1.3 or a quantum-safe variant) to the recipient banking server;*

c) *authenticating the recipient using a multi-factor biometric protocol, wherein the recipient's identity is verified using at least two biometric modalities (such as fingerprint and facial recognition) in addition to standard credentials, before granting access to the decrypted transaction data.*

Stepwise analysis:

Step 1: The claimed invention aims to secure online banking transactions using quantum-resistant encryption and multi-factor biometric authentication, thereby improving the technical robustness of data transmission and access control. The invention aims to **provide technical security for online banking transactions**. It achieves this by introducing a quantum-resistant cryptographic algorithm for encrypting data, transmitting it securely, and authenticating the recipient using advanced, multi-factor biometric protocols. Focus of the claim is on **addressing technical challenges in data security and authentication** within the context of online banking.

Step 2: The claim does not describe a financial scheme, business rule, or administrative process for managing transactions, customers, or revenue. The claim describes technical steps for encryption (quantum-resistant cryptography), secure data transmission, and multi-factor biometric authentication. These are engineering solutions to technical problems (data security and user authentication), not business strategies. The invention **focuses on a technical improvement/solution** to the underlying system or process, with the business context (online banking) merely serving as the application domain. The inventive step lies in the technical implementation, not in a business rule.

Step 3: The invention is **not a business method** as per Section 3(k) of The Patents Act. The claim is **directed to a technical solution** (enhanced security and authentication) and not to a commercial or administrative scheme. **Patentable**—the invention is a technical improvement in data security, not a business method.

30. Example. POS Terminal with Adaptive Signal Processing

Claim:

A point-of-sale (POS) terminal comprising:

- *a dynamic signal processing module that adapts to environmental noise to ensure reliable card reading, wherein the module continuously monitors ambient electromagnetic and acoustic interference, adjusts signal filtering parameters in real time, and dynamically optimizes the card reader's sensitivity and error thresholds to maximize the accuracy of card data capture;*
- *an error-correction protocol for data transmission between the card reader and the payment processor, wherein the protocol detects and corrects data transmission errors using redundancy checks, forward error correction codes, and automatic retransmission requests to ensure the integrity and reliability of payment data sent from the POS terminal to the payment processing system.*

Stepwise analysis:

Step 1: The claimed invention is directed to a POS terminal with enhanced technical capabilities for reliable card reading and robust data transmission, achieved through

adaptive signal processing and advanced error-correction protocols. The invention aims to **improve the technical reliability and robustness of POS terminals during electronic payment transactions**. It achieves this by introducing a dynamic signal processing module that adapts in real time to environmental noise, ensuring accurate card reading even in challenging conditions. Additionally, it employs an advanced error-correction protocol to maintain data integrity during communication between the card reader and the payment processor. The claim's focus is on **addressing technical challenges in signal processing and data transmission within the POS infrastructure**, not on defining or optimizing a business process or commercial strategy.

Step 2: The claim does not describe a business rule, commercial policy, or administrative process for managing transactions, pricing, or customer relationships. The claim describes technical steps for real-time signal adaptation and error correction, addressing engineering problems in POS terminal operation. These are technical solutions to technical problems—specifically, environmental noise and data transmission errors. The invention **focuses on a technical solution** to a technical problem, not a business or administrative strategy.

Step 3: The invention is **not a business method** as per Section 3(k) of The Patents Act. The claim is **directed to a technical solution** (real-time signal adaptation, error correction), not to a commercial or administrative scheme. **Patentable**—the invention is a technical enhancement of transaction infrastructure, not a business method.

31. Example. Optimized Server Load Balancing for E-Commerce Platforms

Claim:

A method for balancing server load in an e-commerce platform, comprising:

1. *monitoring real-time user activity and server status, wherein the system continuously collects data on user requests, session counts, server CPU/memory usage, and network latency from multiple distributed servers within the platform;*

2. *dynamically allocating server resources using a predictive analytics engine, wherein the system analyzes the monitored data using machine learning or statistical models to forecast imminent load spikes or bottlenecks, and automatically adjusts the allocation of computational resources (such as spinning up new instances, redistributing sessions, or scaling bandwidth) across the server cluster;*

3. *automatically rerouting user requests to optimize response time, wherein the system intelligently directs incoming user requests to the least-loaded or geographically optimal server node, thereby minimizing latency and ensuring consistent, high-speed user experience during peak demand.*

Stepwise analysis:

Step 1: The claimed invention is directed to a technical method for real-time, intelligent server load balancing in an e-commerce platform, using predictive analytics and automated resource management to optimize infrastructure performance. The invention aims to **optimize the technical performance and reliability of an e-commerce platform's server infrastructure**. It achieves this by continuously monitoring both user activity and server status, using predictive analytics to anticipate load changes, and dynamically reallocating resources and rerouting requests to maintain optimal response times and system stability. The claim's focus is on **addressing technical challenges in distributed server management and real-time load balancing**, not on defining or optimizing a business process or commercial strategy.

Step 2: The claim does not describe a business rule, commercial policy, or administrative process for managing transactions, pricing, or customer relationships. The claim describes technical steps for real-time monitoring, predictive analytics, and automated server resource management. These are technical solutions to technical problems—specifically, infrastructure optimization and performance reliability in distributed computing. The invention **focuses on a technical solution** to a technical problem, not a business or administrative strategy.

Step 3: The invention is **not a business method** as per Section 3(k) of The Patents Act. The claim is **directed to a technical solution** (real-time, predictive server load balancing and resource optimization), not to a commercial or administrative scheme. **Patentable**—the invention is a technical improvement in infrastructure management, not a business method.

32. Example. Tiered Bank Service Fee Calculation

Claim:

A method for calculating and applying tiered service fees in a bank, comprising:

a) *determining a customer's account balance and transaction volume, wherein the bank's system retrieves the current balance and the number or value of transactions conducted by the customer within a specific period;*

b) *applying a tiered fee structure based on predefined business rules, wherein the system references a set of business-defined thresholds and rules to select the appropriate fee tier (for example, higher balances may qualify for lower fees, or increased transaction volumes may trigger higher or lower fees based on the bank's policy);*

c) *debiting the calculated fee from the customer's account, wherein the system automatically deducts the determined fee amount from the customer's account and records the transaction.*

Stepwise analysis:

Step 1: The claimed invention aims to calculate and apply tiered service fees to bank customers based on their account activity, using business-defined rules to manage revenue and customer relationships. The invention's core objective is to **implement a scheme for revenue generation and customer management by charging customers service fees based on their account activity**. It achieves this by classifying customers into fee tiers according to their account balance and transaction volume, using a set of business rules to determine the fee, and then debiting the calculated fee from their account. The claim's focus is on **organizing and automating a commercial**

process for managing bank fees and customer segmentation, not on solving a technical challenge or improving the technical operation of the banking system.

Step 2: The claim describes a business strategy for revenue generation and customer management, specifically through the application of tiered service fees based on account activity. The claim does not describe any technical innovation or improvement to the bank's infrastructure, data processing, or transaction security. The use of a computer or automated system is incidental and serves only to implement the business rules more efficiently. The invention **focuses on a business method**—an organized administrative and financial strategy for charging customers, not a technical improvement.

Step 3: The invention is **a business method** as per Section 3(k) of The Patents Act. The claim is **directed to a commercial/administrative scheme** (tiered fee calculation and application), not to a technical solution or improvement. **Not patentable**—the invention is a pure business method, excluded from patentability in India.

33. Example. Loyalty Rewards Program Management

Claim:

A method for managing a loyalty rewards program, comprising:

a) *awarding points based on purchase frequency and value, wherein the system tracks each customer's purchases, calculates points earned according to the number and value of transactions, and updates the customer's rewards account accordingly;*

b) *offering membership levels with varying benefits, wherein customers are assigned to different membership tiers (e.g., Silver, Gold, Platinum) based on accumulated points or purchase history, with each tier providing a distinct set of benefits;*

c) *providing exclusive discounts to higher-tier members, wherein customers in higher membership levels are granted access to special discounts, offers, or privileges not available to lower-tier members.*

Stepwise analysis:

Step 1: The claimed invention aims to manage a loyalty rewards program by awarding points, segmenting customers into tiers, and providing exclusive benefits—thereby implementing a strategic marketing and customer retention plan. The invention's core objective is to **structure and operate a customer retention and engagement strategy** through a loyalty rewards program. It achieves this by awarding points for purchases, segmenting customers into tiers, and offering exclusive benefits to incentivize repeat business and higher spending. The claim's focus is on **organizing and automating a marketing strategy for customer engagement and loyalty**, not on solving a technical challenge or improving the technical operation of the rewards system.

Step 2: The claim describes a marketing and customer engagement strategy, specifically for structuring a loyalty rewards program to encourage repeat purchases and increase customer retention. The claim does not describe any technical innovation or improvement to the infrastructure, data processing, or system security. The use of a computer or automated system is incidental and serves only to implement the business rules more efficiently. The invention **focuses on a business method**—an organized marketing and administrative strategy for customer engagement, not a technical improvement.

Step 3: The invention is **a business method** as per Section 3(k) of The Patents Act. The claim is **directed to a commercial/marketing scheme** (loyalty points, tiered benefits, discounts), not to a technical solution or improvement. **Not patentable**—the invention is a business method for customer engagement, which is excluded from patentability in India.

34. Example. Dynamic Pricing Strategy for Ride-Sharing Services

Claim:

A method for dynamically adjusting ride fares, comprising:

a) *monitoring real-time demand and supply of vehicles, wherein the system continuously collects data on the number of active ride requests and available vehicles in specific geographic regions at different times;*

b) *applying business rules to set surge pricing rates, wherein the system references predefined commercial rules and thresholds (such as demand-supply ratios, time of day, and historical pricing patterns) to determine when and how much to increase fares above the base rate;*

c) *updating fare quotes for users in the app, wherein the system automatically recalculates and displays the adjusted fare to users before they confirm a ride, ensuring that the quoted price reflects current demand and supply conditions.*

Stepwise analysis:

Step 1: The claimed invention aims to maximize revenue and balance demand by adjusting ride fares dynamically through business-defined rules based on real-time demand and supply data. The invention's core objective is to **optimize revenue and manage demand in a ride-hailing platform through dynamic pricing**. It achieves this by monitoring real-time demand and supply, applying commercial rules to determine surge pricing, and updating fare quotes for users accordingly. The claim's focus is on **automating and optimizing a commercial process—pricing strategy for rides—based on business logic and market conditions**, not on solving a technical challenge or improving the technical operation of the ride-hailing system.

Step 2: The claim describes a commercial strategy for revenue optimization—specifically, setting ride fares based on business rules that respond to demand and supply fluctuations. The claim does not describe any technical innovation or improvement to the infrastructure, data processing, or system security. The use of a computer or automated system is incidental and serves only to implement the business rules more efficiently. The invention **focuses on a business method**—an organized commercial strategy for pricing and revenue optimization, not a technical improvement.

Step 3: The invention is **a business method** as per Section 3(k) of The Patents Act. The claim is **directed to a commercial/marketing scheme** (dynamic pricing based on

business rules), not to a technical solution or improvement. **Not patentable**—the invention is a business method for pricing, which is excluded from patentability in India.

C. Algorithm:

35. Example. Secure Biometric Authentication for Mobile Devices

Claim:

A method for authenticating users on a mobile device, comprising:

a) capturing a live fingerprint image using an embedded capacitive sensor integrated within the mobile device;

b) extracting a feature vector from the fingerprint image using a convolutional neural network (CNN) algorithm executed within a secure enclave processor isolated from the main operating system,wherein the CNN comprises: i) an input layer configured to receive the preprocessed grayscale fingerprint image normalized to pixel values between 0 and 1; ii) at least two convolutional layers, each with a plurality of filters of size 3x3, applying ReLU activation and followed by 2x2 max pooling to reduce spatial dimensions; iii) a fully connected layer outputting a fixed-length feature vector of 128 to 256 dimensions representing unique fingerprint characteristics, such as ridge patterns and minutiae; iv) the CNN being trained on a dataset of diverse fingerprint images using a triplet loss function to minimize the distance between feature vectors of matching fingerprints and maximize the distance for non-matching fingerprints;

c) encrypting the extracted feature vector using a hardware-based Advanced Encryption Standard (AES) engine embedded in the secure enclave to protect biometric data confidentiality;

d) matching the encrypted feature vector against stored encrypted fingerprint templates maintained securely within the enclave;

e) granting or denying user access to the mobile device based on the result of the encrypted feature vector matching.

Stepwise analysis:

Step 1: The claim describes a structured, sequential process involving fingerprint capture, feature extraction via CNN, encryption, matching, and access control. This is a technical workflow that processes biometric data securely on a mobile device.

Step 2: The claim specifies technical components and implementation details:

- Use of an embedded capacitive fingerprint sensor for data acquisition.
- Execution of a convolutional neural network within a secure enclave processor, ensuring isolation and security.
- Use of a hardware AES encryption engine to protect biometric data.
- Storage and matching of encrypted biometric templates within the secure enclave, ensuring data confidentiality and integrity.

These details demonstrate that the algorithm is not an abstract mathematical concept but is technically realized through specific hardware and software components. The claim addresses the real-world technical problem of securely authenticating users on mobile devices, protecting sensitive biometric data from unauthorized access or tampering.

Step 3: Patentable—the claim details technical components and their interaction, providing a technical solution to a real-world security problem.

36. Example. Real-Time Video Compression in Surveillance Cameras

Claim:

A method for compressing video streams in a surveillance camera, comprising:

a) capturing raw video frames via a CMOS sensor, wherein the surveillance camera's CMOS sensor continuously acquires uncompressed video frames from the monitored environment;

b) applying a motion estimation algorithm in an FPGA-based hardware accelerator, wherein the raw frames are processed in real time by a field-programmable gate array (FPGA) configured to execute a motion estimation algorithm that identifies and encodes moving objects and background regions for optimal compression;

c) encoding the frames using H.265 codec parameters optimized for low-latency streaming, wherein the FPGA or an associated video processor encodes the motion-compensated frames using H.265 (HEVC) codec settings specifically tuned for minimal transmission delay and efficient bandwidth utilization;

d) transmitting the compressed video over a wireless network to a remote monitoring server, wherein the encoded video stream is wirelessly transmitted, in real time, to a remote server for monitoring, storage, or further analysis.

Stepwise analysis:

Step 1: The claim describes a clear, stepwise technical workflow:

1. Video capture → 2. Hardware-accelerated motion estimation → 3. Codec-based encoding → 4. Wireless transmission.

Step 2: The process is not merely a set of abstract algorithmic steps. Each step is grounded in specific technical component (CMOS sensor, FPGA, video processor) and real-world application (surveillance video streaming).

- **Technical Specifics:**
    - **CMOS sensor** for physical video capture.
    - **FPGA-based hardware accelerator** for real-time motion estimation—this is not a generic algorithm but a hardware-implemented, real-time solution.
    - **H.265 codec parameters** are specifically optimized for low-latency streaming, addressing the technical challenge of minimizing delay in surveillance.
    - **Wireless transmission** to a remote server, enabling practical deployment in real surveillance systems.

The invention addresses the technical challenge of efficiently compressing and streaming high-resolution surveillance video over bandwidth-limited wireless networks, ensuring low latency for real-time monitoring. The motion estimation algorithm is not claimed in the abstract, but as part of a hardware-accelerated, end-to-end technical process for a concrete surveillance application.

Step 3: The claim is not an algorithm or abstract sequence of steps. It is a technically enabled solution, specifying how the algorithm is implemented in hardware and integrated into a real surveillance system. Patentable: The invention provides a technical solution to a real-world problem (bandwidth-efficient, low-latency video streaming for surveillance), and is thus patentable.

37. Example. Adaptive Noise Cancellation for Hearing Aids

Claim:

A hearing aid device comprising:

a) a microphone array configured to capture ambient audio signals, wherein multiple spatially distributed microphones are integrated into the hearing aid to acquire audio input from the user's environment, enabling spatial filtering and directional sensitivity;

b) a digital signal processor (DSP) executing an adaptive filtering algorithm to suppress background noise based on real-time environmental analysis, wherein the DSP continuously analyzes the incoming audio signals, identifies noise patterns, and dynamically adjusts filter coefficients using an adaptive noise cancellation algorithm (such as LMS or RLS) to enhance speech intelligibility while minimizing environmental noise;

c) an amplifier and speaker to deliver the processed audio to the user, wherein the filtered and amplified audio signal is output to the user's ear via a miniaturized speaker, providing improved clarity and comfort in noisy environments.

Stepwise analysis:

Step 1: The primary objective is to improve the real-world performance of hearing aids in noisy environments by technically suppressing background noise and enhancing desired sounds (such as speech). This is achieved through a structured technical workflow: capturing ambient sound (microphone array) → real-time adaptive digital signal processing (DSP and algorithm) → amplification and audio delivery. The claim is not about an administrative, commercial, or business process, but about a technical enhancement to a medical device. The claimed invention provides a technical solution for real-time noise suppression and improved audio clarity in hearing aids using a microphone array, adaptive DSP algorithms, and audio amplification.

Step 2: The claim specifies concrete technical components (microphone array, DSP, amplifier, speaker) and the technical realization of the adaptive filtering algorithm within the DSP. The adaptive filtering algorithm is not presented as a generic sequence of mathematical steps, but as a real-time, technically enabled process that interacts directly with hardware to solve the practical problem of background noise in hearing aids. The device is described in terms of its technical architecture and operational context, not as an abstract or hypothetical process. The invention addresses the technical challenge of distinguishing speech from noise and delivering clear audio to users in dynamic, noisy environments—a well-recognized problem in hearing aid technology.

Step 3: The claim is not an abstract algorithm . It is a technical invention with specific hardware and software integration, providing a tangible improvement in hearing aid performance. The invention is patentable under Indian law, as it is a technical solution to a real-world problem and is not excluded under Section 3(k) of the Patents Act, 1970.

38. Example. Low-Latency Packet Routing in 5G Networks

Claim:

A method for routing data packets in a 5G network, comprising:

a) receiving packets at a base station router, wherein incoming data packets from user devices are received at a 5G base station equipped with a high-speed network router;

b) applying a dynamic shortest-path algorithm using real-time network congestion metrics collected from distributed edge nodes, wherein the base station router continuously gathers congestion, latency, and bandwidth data from multiple edge nodes across the network and dynamically computes the optimal path for each packet using a shortest-path algorithm that adapts to current network conditions;

c) forwarding packets along the path with the lowest estimated latency, wherein the router transmits each packet through the selected route, prioritizing paths that minimize end-to-end delay and avoid congested network segments;

d) updating routing tables in response to network topology changes, wherein the router automatically revises its internal routing tables based on detected changes in network topology, such as node failures, new connections, or shifting congestion patterns, ensuring ongoing optimal packet delivery.

Stepwise analysis:

Step 1: The invention's core objective is to provide a technical solution for low-latency, congestion-aware packet routing in a 5G network. It achieves this by using real-time network metrics from distributed edge nodes, dynamically applying a shortest-path algorithm, and continuously updating routing tables in response to network changes. The claim's focus is on solving the technical problem of efficient, adaptive data routing in high-speed, large-scale 5G networks. The claimed invention provides a technical method for dynamically routing data packets in a 5G network using real-time congestion metrics and adaptive shortest-path algorithms for optimal performance.

Step 2: The claim does not simply describe an abstract sequence of steps for path computation. Instead, it specifies:

- Integration with real 5G network infrastructure (base station routers, edge nodes).
- Use of real-time network metrics (congestion, latency, bandwidth).
- Dynamic adaptation to network topology changes.
- Practical, real-world application: live packet routing in a telecommunications network.

The claim is not an abstract algorithm; it is a technically enabled process implemented in a specific network context.

Step 3: The claim is not an excluded algorithm (it is technically enabled and solves a real-world network problem). The invention is a technical solution to a technical problem and is thus patentable.

39. Example. Generic Sorting Algorithm

Claim:

A method for sorting a list of numbers, comprising:

a) selecting a pivot element from the list;

b) partitioning the list into sublists based on the pivot, wherein elements less than the pivot are placed in one sublist and elements greater than or equal to the pivot are placed in another sublist;

c) recursively sorting the sublists by repeating steps (a) and (b) for each sublist until each sublist contains only one element or is empty;

d) combining the sorted sublists to form the final sorted list.

Stepwise analysis:

Step 1: The claim's objective is to provide a method for sorting a list of numbers, using a structured, sequential process that follows the well-known quicksort algorithm. The steps involve selecting a pivot, partitioning, recursively sorting, and combining, all of which are algorithmic instructions for ordering data. The claimed invention aims to sort a list of numbers by partitioning around a pivot and recursively sorting sublists, following a classic algorithmic approach.

Step 2: The claim is a sequence of abstract steps that process input (a list of numbers) to produce output (a sorted list). The claim does not specify any technical implementation details, such as how the algorithm is realized in hardware, integrated with a specific system, or used to solve a real-world technical problem (e.g., optimizing database performance in a cloud environment, or reducing latency in a real-time embedded system). The claim is detached from any practical technical context and does not detail a technical framework or infrastructure. The claim simply describes the logical flow of a sorting algorithm, without connecting it to a concrete technical application or improvement.

Step 3: The claim is considered an algorithm as it describes a sequential process at a high level of abstraction and fails to detail the specific technical implementation that results in a concrete technical solution to a real-world problem. Not patentable under Section 3(k) of The Patents Act, 1970, as it is a pure algorithm without technical enablement or application.

40. Example. Text Tokenization Algorithm

Claim:

A method for tokenizing a text string, comprising:

a) scanning the string for delimiter characters;
b) splitting the string into tokens at each delimiter;
c) outputting the list of tokens.

Stepwise analysis:

Step 1: The claim's objective is to break a text string into smaller units (tokens) by identifying delimiter characters (such as spaces, commas, or semicolons) and splitting thestring at each delimiter.
The steps are: scan for delimiters → split at delimiters → output tokens. The claimed invention aims to tokenize a text string by splitting it at delimiter characters, following a classic text processing algorithmic approach.

Step 2: The claim describes a sequence of abstract steps for processing input (text string) to produce output (tokens). The claim does not specify:

- Any technical implementation details (e.g., hardware, specific software modules, integration with a particular system),
- How the tokenization is used in a technical context (e.g., as part of a real-time speech recognition engine, or an embedded device for natural language processing),
- Any technical framework or infrastructure for carrying out the process.

The claim simply describes the logical flow of a tokenization algorithm, without connecting it to a concrete technical application or improvement. There is no mention of how this method solves a specific technical challenge (such as optimizing parsing in a constrained embedded environment, or enabling secure text transmission).

Step 3: The claim is considered an algorithm as it describes a sequential process at a high level of abstraction and fails to detail the specific technical implementation that results in a concrete technical solution to a real-world problem. Not patentable under Section 3(k) of The Patents Act, 1970, as it is a pure algorithm without technical enablement or application.

D. Computer programme per se:

41. Example. System for Adaptive Traffic Signal Control

Claim:

A system for adaptive traffic signal control, comprising:

a) *a plurality of image sensors positioned at multiple intersections, each configured to continuously capture real-time video streams of vehicular and pedestrian traffic conditions within their respective fields of view;*

b) *a central processor operatively coupled to the image sensors, the processor comprising:*

   i. *a memory storing instructions and a trained artificial neural network model;*

   ii. *an image data acquisition module configured to receive and preprocess image data from each sensor, including vehicle detection and counting using object recognition algorithms;*

   iii. *a traffic analysis module configured to analyze vehicle density, queue length, and movement patterns at each intersection using the neural network;*

iv. *a congestion prediction module configured to forecast near-future congestion levels at each intersection based on historical and real-time data;*

v. *a signal control module configured to dynamically calculate and adjust the timing of traffic signals (including green, yellow, and red phases) at each intersection in response to the predicted congestion patterns, with the objective of optimizing overall traffic flow across the network of intersections;*

c) wherein the system operates in a closed feedback loop, continuously updating signal timings in real time as traffic conditions change, and is further configured to prioritize emergency vehicle passage and pedestrian safety based on sensor inputs.

Stepwise analysis:

Step 1: The invention is a comprehensive adaptive traffic management system that leverages real-time sensor data and advanced AI algorithms to dynamically control traffic signals across a network of intersections. The system's core objective is to optimize urban traffic flow, minimize congestion, and enhance safety for both vehicles and pedestrians. This is not merely a computer program for scheduling or information display, but a technical solution that interacts with and governs external physical infrastructure in real time. Following are essential technical features (ETFs) of the claimed invention:

- Real-time image sensors deployed at intersections (hardware for data acquisition).
- Central processor with memory and specialized modules for image preprocessing, neural network-based analysis, and prediction.
- Neural network model trained to interpret traffic patterns and forecast congestion.

- Dynamic signal control module that issues real-time commands to traffic lights based on AI predictions.
- Closed feedback loop for continuous adaptation to changing traffic and emergency conditions.

These ETFs are indispensable for the system's operation, and their synergy is critical for achieving the intended technical outcome.

Step 2: Technical Problem: Urban traffic congestion, inefficient static signal timings, and the inability to respond dynamically to real-time traffic fluctuations and emergencies.

Technical Solution: The system integrates hardware (sensors), advanced AI (neural network), and real-time control logic to analyze, predict, and adapt signal timings in response to actual and predicted traffic conditions.

The technicality arises from the system's ability to process real-world sensor data, generate actionable control signals for physical infrastructure, and continuously optimize the system's performance in a dynamic environment. The ETFs work together to deliver a technical solution to a technical problem, not merely automating a manual process or presenting data.

Step 3: The system produces a technical effect by directly controlling and optimizing the operation of traffic lights, leading to measurable improvements such as reduced vehicle wait times, decreased fuel consumption, lower emissions, and increased throughput at intersections. The continuous feedback loop and AI-driven prediction enable the system to adapt to unforeseen events (e.g., accidents, emergency vehicles), further enhancing its technical impact. These effects are not incidental; they result from the novel integration of hardware and intelligent software, producing a tangible improvement in the operation of a physical system.

Step 4: The claimed invention does **not** fall under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It provides a technical

solution to a technical problem using a combination of hardware and intelligent software, resulting in a technical effect that goes beyond mere automation or data processing.

42. Example. Method for Data Compression in Cloud Storage

Claim:

A method for compressing data in a cloud storage system, comprising:

a) *segmenting incoming data streams using a processor, wherein the data streams are divided into discrete blocks or segments based on content type, size, or user-defined parameters;*

b) *applying a context-aware compression algorithm to each data segment, wherein the algorithm dynamically selects between a plurality of lossy and lossless compression techniques in real time, based on the detected data type (such as text, image, audio, or video), historical access patterns, and required fidelity;*

c) *storing the compressed data in a distributed storage cluster, wherein the storage nodes are selected based on current network load, redundancy requirements, and access latency, and wherein metadata regarding compression method and segment mapping is maintained for efficient retrieval and decompression.*

Stepwise analysis:

Step 1: This invention is directed to a technical solution for improving the efficiency of cloud storage systems. It does so by intelligently segmenting incoming data streams and applying the most suitable compression algorithm (lossy or lossless) for each segment, based on context, before distributing the compressed data across a cloud storage cluster. The invention is not merely a computer programme per se; rather, it is a technical process that enhances the performance and resource utilization of cloud storage infrastructure. Following are essential technical features (ETFs) of the claimed invention:

- Data segmentation module: Divides incoming streams into blocks for optimized processing.

- Context-aware compression algorithm: Dynamically selects and applies the most appropriate compression method for each segment, using real-time analysis of data type and usage context.

- Distributed storage logic: Stores compressed data across multiple nodes, optimizing for network load and redundancy, and maintains metadata for efficient access and decompression.

These features interact synergistically to realize the technical purpose of the invention.

Step 2: Technical Problem: Inefficient use of storage and bandwidth in cloud environments, leading to higher costs, slower access, and increased energy consumption.

Technical Solution: The invention provides a technical solution by combining intelligent data segmentation, context-aware compression selection, and optimized distributed storage.

The technicality arises from the way these features interact: the system not only compresses data but does so adaptively and contextually, directly impacting the efficiency of the underlying storage hardware and network. The technicality lies in how the system achieves efficiency—through real-time, adaptive, context-aware compression and storage management, which improves the functioning of the storage infrastructure itself.

Step 3: The proposed solution (method) produces following technical effects:

- Reduced storage space: By tailoring compression to data type and context, the system achieves higher compression ratios than generic, one-size-fits-all algorithms.

- Bandwidth optimization: Lossy compression for less critical data and lossless for sensitive data means less network traffic for equivalent user experience.

- Faster access and retrieval: Metadata management and distributed storage logic enable quick decompression and data delivery, reducing latency.

- Lower energy consumption: Less data stored and transmitted means less power used by servers and network equipment.

These are measurable, technical improvements to the operation of the cloud storage system, not merely incidental effects of using a computer.

Step 4: The invention does not fall under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It provides a technical solution to a technical problem (cloud storage efficiency) through a novel combination of data segmentation, context-aware compression, and distributed storage management. The invention produces a technical effect—improved storage efficiency, bandwidth optimization, and reduced latency—which goes beyond mere automation or data processing.

43. Example. Method for Error Correction in Wireless Communication

Claim:

A method for correcting transmission errors in wireless communication, comprising:

a) *encoding data packets with an adaptive error-correcting code, wherein a processor dynamically selects and applies an error-correcting code (such as Reed-Solomon, LDPC, or Turbo codes) based on current channel quality metrics, packet size, and real-time network conditions to maximize error resilience and throughput;*

b) *detecting transmission errors using a parity-check module, wherein the receiving device analyzes incoming packets using parity-check algorithms to identify corrupted bits or segments, and generates error reports specifying the location and severity of detected errors;*

c) *retransmitting only erroneous segments based on feedback, wherein a feedback mechanism communicates the identified error locations back to the transmitting device, which then selectively retransmits only those segments of the original data packet that were received with errors, thereby minimizing redundant data transmission and reducing overall network congestion.*

Stepwise Analysis:

Step 1: The invention provides a technical solution for improving the reliability and efficiency of wireless data transmission. By integrating adaptive error-correcting coding, intelligent error detection, and selective retransmission, the method ensures that only corrupted data segments are resent, reducing bandwidth usage and latency. This is not merely a computer program for data handling, but a technical process that directly enhances the performance of wireless communication systems. Following are essential technical features (ETFs) of the claimed invention:

- **Adaptive error-correcting code selection:** The system dynamically chooses the most suitable error-correcting code based on real-time network and channel conditions, rather than using a fixed coding scheme.
- **Parity-check module for error detection:** Hardware or software module at the receiver end that performs parity checks to accurately locate and characterize transmission errors.
- **Selective retransmission mechanism:** Feedback-driven process that enables the transmitter to resend only the specific segments that were corrupted, rather than the entire packet.

These features are indispensable for the system's operation and collectively achieve the claimed technical purpose.

Step 2: Technical Problem: Wireless communication channels are inherently unreliable due to noise, interference, and variable signal quality, leading to data loss and the need for frequent retransmissions, which in turn cause network congestion and reduced throughput.

Technical Solution: The invention addresses this problem by:

- Dynamically adapting error correction to current channel conditions for optimal protection;
- Detecting errors precisely at the segment level;
- Minimizing retransmission by sending only the erroneous segments, not the entire data packet.

The technicality lies in the synergy of these features, which together provide a technical solution (improved error correction and retransmission efficiency) to a technical problem (data loss in wireless networks). The method directly improves the operation of the communication system at the protocol and hardware levels.

Step 3: The proposed solution (method) produces following technical effects:

- **Reduced retransmission overhead:** By retransmitting only erroneous segments, the method significantly lowers the amount of redundant data sent over the network.
- **Improved network efficiency:** Bandwidth is conserved, and network congestion is reduced, leading to higher overall throughput and lower latency for all users.
- **Enhanced reliability:** Adaptive error correction ensures robust data delivery even in challenging wireless environments.
- **Energy savings:** Less data transmission means lower energy consumption for both transmitting and receiving devices, which is especially important for battery-powered mobile devices and IoT nodes.

These technical effects are measurable and go well beyond the incidental effect of using a computer; they directly enhance the functioning of wireless communication systems.

Step 4: The invention does **not** fall under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It provides a technical solution to a technical

problem (unreliable wireless transmission and data loss) through a novel combination of adaptive coding, precise error detection, and selective retransmission. The invention produces a technical effect—higher efficiency, reduced retransmissions, improved reliability, and energy savings—which goes beyond mere automation or data processing.

44. Example. Method for Efficient Memory Management in Embedded Systems

Claim:

A method for managing memory in an embedded device, comprising:

a) *monitoring memory usage patterns in real time by continuously tracking allocation, deallocation, and access frequency of memory blocks within the device's memory, using a monitoring module integrated into the device's operating system or firmware;*

b) *dynamically reallocating memory blocks based on predicted demand, wherein a processor executes a predictive algorithm that analyzes historical and current memory usage data to forecast future memory requirements for various processes or applications, and reallocates memory blocks accordingly to ensure optimal availability and prevent memory starvation or over-allocation;*

c) *minimizing fragmentation using a compaction algorithm, wherein the processor periodically or event-drivenly reorganizes memory blocks by relocating active data and consolidating free memory spaces, thereby reducing fragmentation and improving the efficiency of memory utilization within the embedded device.*

Stepwise analysis:

Step 1: The invention provides a technical solution for optimizing memory utilization in embedded devices, which are typically constrained by limited physical memory and processing resources. It achieves this by combining real-time monitoring, predictive memory allocation, and dynamic compaction to maintain efficient, low-fragmentation memory usage. This is not merely a computer program for tracking memory, but a technical process that directly improves the operation of embedded hardware and

system software. Following are essential technical features (ETFs) of the claimed invention:

- **Real-time memory monitoring module:** Continuously tracks memory usage and access patterns at a granular level within the embedded system.
- **Predictive allocation algorithm:** Uses historical and real-time data to forecast future memory needs and proactively reallocates memory to prevent bottlenecks.
- **Dynamic compaction algorithm:** Periodically reorganizes memory to reduce fragmentation, consolidating free space and relocating active data as needed.

These features are indispensable for the method's operation and work together to deliver the claimed technical result.

Step 2: Technical Problem: Embedded devices often suffer from memory fragmentation and inefficient allocation, leading to wasted memory, reduced performance, and even system crashes or premature device failure.

Technical Solution: The invention addresses this by providing a technical approach—real-time monitoring, predictive allocation, and dynamic compaction—that ensures memory is used efficiently, fragmentation is minimized, and system performance is maintained even as workloads change.

The technicality arises from the synergy of these ETFs, which together provide a technical solution (efficient, adaptive memory management) to a technical problem (fragmentation and inefficiency in embedded memory systems). The method directly impacts the functioning of the embedded device's hardware and software, improving performance and reliability.

Step 3: The proposed solution (method) produces following technical effects:

- **Optimized memory utilization:** Reduces wasted memory and maximizes available space for applications and processes.

- **Reduced fragmentation:** Maintains contiguous free memory blocks, enabling efficient allocation and reducing the likelihood of allocation failures.
- **Improved device performance and reliability:** Ensures smooth operation even under varying workloads, extending device life and reducing the risk of crashes.
- **Lower power consumption:** Efficient memory management can reduce CPU cycles spent on memory allocation and garbage collection, saving energy in battery-powered devices.

These technical effects are concrete, measurable improvements to the functioning of the embedded device, not merely incidental effects of using a computer.

Step 4: The invention does **not** fall under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It provides a technical solution to a technical problem (memory fragmentation and inefficiency) through a novel integration of real-time monitoring, predictive allocation, and dynamic compaction. The invention produces a technical effect—optimized memory use, reduced fragmentation, improved device performance, and extended device life—which goes beyond mere automation or data processing.

45. Example. Method for Secure IoT Device Communication

Claim:

A method for securing communication between IoT devices, comprising:

a) *establishing a device authentication protocol using public key infrastructure (PKI), wherein each IoT device is provisioned with a unique digital certificate and private key, and mutual authentication is performed at the initiation of communication by exchanging and verifying digital certificates and signatures through a secure handshake process;*

b) *encrypting data packets with a lightweight cryptographic algorithm, wherein each data packet transmitted between authenticated IoT devices is encrypted using a resource-efficient symmetric or asymmetric cryptographic algorithm (such as*

elliptic curve cryptography or lightweight block ciphers) suitable for low-power, constrained environments, thereby ensuring confidentiality and integrity of the transmitted data;

c) *periodically rotating encryption keys to prevent replay attacks, wherein the system implements a key management protocol that automatically generates and distributes new session keys to IoT devices at predefined intervals or upon detection of suspicious activity, and old keys are securely retired, thus mitigating the risk of key compromise and replay or spoofing attacks.*

Stepwise analysis:

Step 1: The invention provides a technical solution for securing communication between IoT devices, which are typically resource-constrained and vulnerable to cyberattacks. By integrating robust device authentication, lightweight encryption, and proactive key management, the method ensures that only authorized devices can communicate, data remains confidential and tamper-proof, and the system is resilient against replay and spoofing attacks. This is not merely a computer program for data exchange, but a technical process that fundamentally improves the security and reliability of IoT networks at the protocol and device level. Following are essential technical features (ETFs) of the claimed invention:

- **PKI-based device authentication:** Ensures only legitimate devices can participate in the network, using digital certificates and cryptographic handshakes.
- **Lightweight cryptographic encryption:** Protects data confidentiality and integrity using algorithms optimized for low-power, low-memory devices.
- **Periodic encryption key rotation:** Proactively updates cryptographic keys to prevent replay attacks and limit damage from key compromise, with secure key distribution and retirement mechanisms.

These features are indispensable for the method's operation and work together to deliver the claimed technical result.

Step 2: Technical Problem: IoT devices are especially vulnerable to unauthorized access, data interception, and replay attacks due to limited computational resources and lack of robust built-in security.

Technical Solution: The invention addresses this by providing a technical approach—strong, scalable authentication, efficient encryption, and dynamic key management—that ensures secure, authenticated, and tamper-resistant communication between IoT devices, even in constrained environments.

The technicality arises from the synergy of these ETFs, which together provide a technical solution (robust, adaptive security for IoT networks) to a technical problem (insecure device communication and vulnerability to attacks). The method directly improves the functioning of the IoT system, not just the software running on it.

Step 3: The proposed solution (method) produces following technical effects:

- **Prevents unauthorized access:** Only authenticated devices can join and communicate, blocking rogue or compromised nodes.
- **Ensures confidentiality and integrity:** Lightweight encryption ensures that data cannot be intercepted or altered in transit, even if the network is compromised.
- **Mitigates replay and spoofing attacks:** Regular key rotation and secure key management limit the window of opportunity for attackers, making the system resilient to common IoT attacks.
- **Enables secure, scalable IoT deployments:** The method is suitable for large-scale, heterogeneous IoT networks, supporting millions of devices with minimal resource overhead.

These technical effects are concrete, measurable improvements to the functioning and security of IoT systems, not merely incidental effects of using a computer.

Step 4: The invention does **not** fall under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It provides a technical solution to a technical

problem (IoT device security and secure communication) through a novel integration of PKI authentication, lightweight encryption, and dynamic key management. The invention produces a technical effect—preventing unauthorized access, ensuring confidentiality, and mitigating replay attacks—which goes beyond mere automation or data processing.

46. Example. System for Automated Drone-Based Crop Monitoring

Claim:

A system for automated crop monitoring, comprising:

a) a drone equipped with multispectral cameras, wherein the cameras are configured to capture images of agricultural fields across multiple spectral bands (including visible, near-infrared, and thermal) as the drone autonomously flies over predefined waypoints using GPS guidance;

b) a processor operatively coupled to the multispectral cameras, the processor comprising a memory storing image analysis algorithms, the processor configured to:

i. receive and preprocess the multispectral images to correct for lighting, altitude, and motion artifacts;

ii. analyze the images using vegetation indices (such as NDVI and EVI) and machine learning algorithms to assess crop health, detect stress, disease, or nutrient deficiencies, and identify areas requiring intervention;

c) *a reporting module configured to generate actionable insights, including spatial maps and prioritized recommendations, and to communicate these insights wirelessly to farmers' mobile devices or farm management systems, enabling timely and targeted agricultural interventions.*

Stepwise analysis:

Step 1: The invention is a technical solution for automating the monitoring and assessment of crop health across large agricultural fields. It leverages drone-based multispectral imaging, advanced image processing, and real-time wireless reporting to provide farmers with actionable insights. This is not merely a computer program for data analysis or a generic reporting tool, but a technical process that integrates physical devices (drones, cameras), advanced algorithms, and real-world agricultural workflows to improve productivity and resource efficiency. Following are essential technical features (ETFs) of the claimed invention:

- **Drone with multispectral cameras:** Hardware for autonomous, high-resolution, multi-band imaging of crops, enabling detection of subtle physiological changes not visible to the naked eye.
- **Processor with image analysis algorithms:** Executes advanced algorithms (vegetation indices, machine learning models) to extract meaningful crop health information from raw multispectral data.
- **Automated reporting module:** Generates and transmits actionable maps and recommendations, integrating with farm management systems for real-time decision-making.

These features are indispensable for the system's operation and work together to deliver the claimed technical result.

Step 2: Technical Problem: Manual crop inspection is labor-intensive, slow, subjective, and often unable to detect early-stage stress or disease across large fields, leading to lower yields and inefficient resource use.

Technical Solution: The invention addresses this by providing a technical approach—autonomous drone-based multispectral imaging, advanced image analysis, and automated reporting—that enables rapid, objective, and comprehensive crop health assessment across large areas.

The technicality arises from the synergy of these ETFs, which together provide a technical solution (real-time, automated crop monitoring and analysis) to a technical

problem (inefficiency and inaccuracy of manual inspection). The method directly improves the functioning of agricultural monitoring systems and the decision-making process for farmers.

Step 3: The proposed solution (system) produces following technical effects:

- **Improved agricultural productivity:** Early detection of crop stress, disease, or nutrient deficiencies enables timely intervention, increasing yield and reducing losses.
- **Resource efficiency:** Targeted recommendations optimize the use of fertilizers, pesticides, and water, reducing waste and environmental impact.
- **Scalability and coverage:** The system can monitor vast fields quickly and objectively, far exceeding the capabilities of manual inspection.
- **Integration with digital agriculture:** Automated, wireless reporting enables seamless integration with farm management platforms, supporting precision agriculture practices.

These technical effects are concrete, measurable improvements to the functioning of agricultural monitoring and management systems, not merely incidental effects of using a computer.

Step 4: The invention does **not** fall under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It provides a technical solution to a technical problem (manual crop inspection inefficiency) through a novel integration of drone hardware, multispectral imaging, advanced algorithms, and automated reporting. The invention produces a technical effect—improved productivity, resource efficiency, and scalability—which goes beyond mere automation or data processing.

47. Example. System for Real-Time Fraud Detection in Financial Transactions

Claim:

A system for detecting fraud in financial transactions, comprising:

a) a transaction monitoring module configured to continuously capture and log transaction data in real time from multiple financial channels, including online banking, point-of-sale terminals, and mobile payment platforms, the module extracting transaction attributes such as amount, location, device ID, time, and account details;

b) a processor operatively coupled to the transaction monitoring module, the processor comprising a memory storing instructions and a machine learning model trained on trained on a labeled dataset of historical transaction data comprising examples of both legitimate and fraudulent transactions, wherein said training includes performing feature engineering on said historical data to derive a plurality of predictive features viz. aggregate transaction statistics, velocity metrics, behavioral deviations, or network relationship indicators, and learning the statistical correlations and patterns between these features and the occurrence of fraud for establishing learned profiles of legitimate and fraudulent behavior, the processor configured to:

i) pre-process the real-time transaction data by extracting and generating features relevant for fraud detection, consistent with features used during the model's training;

ii) receive real-time transaction data,

iii) analyze the pre-processed data using the machine learning model to detect anomalies or patterns indicative of fraudulent activity by comparing features of current transactions to learned profiles and patterns of legitimate and fraudulent behavior derived from the historical training data, and

iv) assign a fraud risk score to each transaction based on the model's output; wherein the fraud risk score represents a calibrated probability or an

anomaly likelihood of the transaction being fraudulent, reflecting the identified correlations;

c) *an alert module configured to automatically flag suspicious transactions in real time by generating alerts for transactions exceeding a predefined risk threshold, the alert module transmitting notifications to fraud analysts, account holders, or automated response systems for further investigation or immediate action (such as transaction blocking or step-up authentication).*

Stepwise analysis:

Step 1: The invention provides a technical solution for the real-time detection of fraudulent financial transactions. It integrates real-time data acquisition, advanced machine learning-based anomaly detection, and automated alerting to enable immediate response to suspicious activities. This is not merely a computer program for reporting or record-keeping, but a technical process that directly improves the security and operational efficiency of financial systems. Following are essential technical features (ETFs) of the claimed invention:

- **Transaction monitoring module:** Hardware/software for continuous, real-time collection and pre-processing of transaction data from diverse sources.
- **Processor with machine learning model:** Executes a trained model that analyzes transaction data for anomalies, leveraging pattern recognition and adaptive learning to detect new fraud tactics.
- **Real-time alert module:** Automatically flags and communicates suspicious transactions to relevant parties or systems, enabling immediate action.

These features are indispensable for the system's operation and work together to deliver the claimed technical result.

Step 2: Technical Problem: Financial fraud is increasingly sophisticated and rapid, making manual or rule-based detection slow, inaccurate, and insufficient for real-time protection.

Technical Solution: The invention addresses this by providing a technical approach—real-time monitoring, AI-based anomaly detection, and automated alerting—that enables immediate identification and response to fraudulent transactions, even as fraud tactics evolve.

The technicality arises from the synergy of these ETFs, which together provide a technical solution (automated, real-time fraud detection and response) to a technical problem (fast, complex financial fraud). The method directly improves the functioning of financial transaction systems and their security infrastructure.

Step 3: The proposed solution (system) produces following technical effects:

- **Reduces financial losses:** Early detection and response prevent or mitigate the impact of fraudulent transactions.
- **Improves detection accuracy:** Machine learning adapts to new fraud patterns, outperforming static rule-based systems.
- **Enables real-time protection:** Immediate alerts allow for instant blocking or escalation, reducing the window of opportunity for fraudsters.
- **Enhances operational efficiency:** Automates the detection process, reducing manual workload and enabling financial institutions to handle more transactions securely.

These technical effects are concrete, measurable improvements to the functioning of financial security systems, not merely incidental effects of using a computer.

Step 4: The invention does **not** fall under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It provides a technical solution to a technical problem (real-time fraud detection in financial transactions) through a novel integration of real-time data capture, machine learning-based analysis, and automated alerting. The invention produces a technical effect—reducing financial losses, improving detection accuracy, and enabling real-time protection—which goes beyond mere automation or data processing.

48. Example. Method for efficient spectrum allocation in wireless networks

Claim:

A method for allocating spectrum in a wireless network, comprising:

a) *monitoring channel usage with spectrum sensors, wherein a network of distributed spectrum sensors continuously detects and measures real-time channel occupancy, signal strength, interference levels, and noise across multiple frequency bands within the wireless environment;*

b) *dynamically assigning frequencies to users based on real-time demand, wherein a central processor receives input from the spectrum sensors and, using a demand-aware allocation algorithm, dynamically allocates available frequency channels to wireless users or devices according to current network load, user priority, and application requirements, updating assignments as network conditions change;*

c) *minimizing interference using a conflict resolution algorithm, wherein the processor applies an interference management algorithm that detects potential channel conflicts or co-channel interference among users, and automatically reassigns frequencies or adjusts transmission parameters (such as power or bandwidth) to resolve conflicts and maintain optimal signal quality for all users.*

Stepwise analysis:

Step 1: The invention provides a technical solution for optimizing the use of wireless spectrum in a networked environment. It achieves this by integrating real-time environmental sensing, adaptive frequency allocation, and automated interference management—enabling the network to respond instantly and efficiently to changing usage patterns and interference conditions. This is not merely a computer program for scheduling users or logging data, but a technical process that directly improves the operation of wireless communication infrastructure. Following are essential technical features (ETFs) of the claimed invention:

- **Spectrum sensors:** Hardware for continuous, real-time monitoring of channel usage, interference, and noise across the network.

- **Dynamic allocation algorithm:** Software/hardware that assigns frequencies to users in real time based on live sensor data and demand, rather than static or manual assignment.
- **Conflict resolution/interference management algorithm:** Automated process for detecting and resolving channel conflicts, including real-time reassignment or adjustment of transmission parameters.

These features are indispensable for the method's operation and work together to deliver the claimed technical result.

Step 2: Technical Problem: Wireless spectrum congestion and interference due to static allocation, inefficient use, and lack of real-time adaptation, leading to poor network throughput and degraded communication quality.

Technical Solution: The invention addresses this by providing a technical approach—real-time monitoring, adaptive allocation, and automated interference management—that continuously optimizes spectrum use in response to actual network conditions.

The technicality arises from the synergy of these ETFs, which together provide a technical solution (adaptive, real-time spectrum management) to a technical problem (congestion and interference in wireless networks). The method directly impacts the functioning of the wireless communication system, improving efficiency, reliability, and throughput.

Step 3: The proposed solution (method) produces following technical effects:

- **Higher network throughput:** By dynamically allocating frequencies and minimizing interference, the method maximizes the effective use of available spectrum, increasing data rates and reducing dropped connections.
- **Reduced interference:** Automated conflict resolution ensures that users experience less cross-talk and signal degradation.

- **Improved quality of service:** The system adapts to changing demand and environmental conditions, ensuring consistent and reliable communication for all users.
- **Scalability and robustness:** The approach supports large, dynamic networks and can adapt to new devices or changing usage patterns without manual intervention.

These technical effects are concrete, measurable improvements to the functioning of wireless communication systems, not merely incidental effects of using a computer.

Step 4: The invention does **not** fall under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It provides a technical solution to a technical problem (spectrum congestion and interference) through a novel integration of spectrum sensing, dynamic allocation, and interference management. The invention produces a technical effect—higher throughput, reduced interference, and improved quality of service—which goes beyond mere automation or data processing.

49. Example. System for Real-Time Network Intrusion Detection

Claim:

A system for detecting network intrusions in real time, comprising:

a) a packet inspection module configured to continuously monitor and capture network traffic data at various points within an enterprise or cloud network, the module extracting packet-level features such as source/destination IP, port, protocol, payload characteristics, and timing information;

b) a processor operatively coupled to the packet inspection module, the processor comprising a memory storing a deep learning model trained on large datasets of normal and malicious network traffic, the processor configured to:

i) receive and preprocess the captured network traffic data,

ii) *analyze the data using the deep learning model to identify patterns, anomalies, or signatures indicative of known or unknown cyberattacks (such as DDoS, malware, or unauthorized access attempts) in real time;*

c) *an alert module configured to automatically generate and transmit notifications to network administrators or security operations centers upon detection of suspicious or malicious activity, the module providing actionable information such as the nature of the threat, affected assets, and recommended response actions.*

Stepwise analysis:

Step 1: The invention provides a technical solution for securing computer networks against cyber attacks by integrating real-time network traffic monitoring, advanced deep learning-based anomaly detection, and automated alerting. This is not merely a computer program for logging or reporting data, but a technical process that directly improves the security and operational resilience of network infrastructure. Following are essential technical features (ETFs) of the claimed invention:

- **Packet inspection module:** Hardware/software for continuous, real-time analysis of network packets, enabling granular visibility into network activity.
- **Processor with deep learning model:** Executes a trained neural network capable of detecting both known and novel intrusion patterns, leveraging complex feature extraction and adaptive learning.
- **Real-time alert module:** Automatically notifies administrators, enabling immediate response to threats and reducing the window for successful attacks.

These features are indispensable for the system's operation and work together to deliver the claimed technical result.

Step 2: Technical Problem: Network breaches and cyberattacks are increasingly sophisticated and fast-moving, making manual or rule-based detection methods inadequate for real-time protection.

Technical Solution: The invention addresses this by providing a technical approach—real-time packet inspection, deep learning-based anomaly detection, and automated alerting—that enables immediate identification and response to a wide range of cyber threats, including zero-day attacks.

The technicality arises from the synergy of these ETFs, which together provide a technical solution (automated, real-time intrusion detection and response) to a technical problem (network security breaches). The method directly improves the functioning of network security infrastructure, not just automating a manual process.

Step 3: The proposed solution (system) produces following technical effects:

- **Prevents cyberattacks:** Early detection and response block or mitigate attacks before they cause significant harm.
- **Improves detection accuracy:** Deep learning adapts to evolving attack patterns, outperforming static signature-based systems.
- **Enables real-time protection:** Immediate alerts allow for rapid containment, reducing the risk of data loss or service disruption.
- **Enhances operational efficiency:** Automates the detection and initial response process, reducing manual workload for security teams.

These technical effects are concrete, measurable improvements to the functioning of network security systems, not merely incidental effects of using a computer.

Step 4: The invention does **not** fall under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It provides a technical solution to a technical problem (real-time network intrusion detection) through a novel integration of real-time packet inspection, deep learning-based analysis, and automated alerting. The invention produces a technical effect—prevention of cyberattacks, improved detection accuracy, and real-time protection—which goes beyond mere automation or data processing.

50. Example: A Method for Hierarchical Token-Based Secure Access for Industrial Automation

Claim:

A method of managing secure access to an industrial automation system comprising a plurality of physically distributed sensor arrays and actuators, for a user operating a remote control terminal, the method comprising:

a) *establishing a secure communication channel between the remote control terminal and a central control server;*
b) *providing a zone access token to the remote control terminal via the secure communication channel, wherein the zone access token authenticates the user's general access to a designated operational zone comprising a plurality of sensor arrays and actuators, but does not grant direct control over individual actuators or specific data streams from individual sensor arrays;*
c) *responsive to the remote control terminal transmitting a command request for a specific actuator within the designated operational zone for a first time, performing a server-side validation of the received zone access token, and upon successful validation of the zone access token, cryptographically generating and providing a time-limited device command token to the remote control terminal via the secure communication channel, wherein the device command token is configured to authorize a single command operation for said specific actuator; and*
d) *when the remote control terminal transmits a subsequent command request for said specific actuator within the valid lifespan of the device command token, then receiving and validating the device command token from the remote control terminal to authenticate the user's authorization for said subsequent command operation, thereby enabling the central control server to transmit the command to said specific actuator."*

Stepwise analysis:

Step 1: The claim describes a method of managing secure access to an industrial automation system, which includes physically distributed sensor arrays and actuators,

accessed remotely by a user via a control terminal. Following are essential technical features (ETFs) of the claimed invention:

- **Establishing a Secure Communication Channel**: A secure link is created between the remote control terminal and a central control server to protect all data exchanges.

- **Providing a Zone Access Token**: This token is sent to the remote terminal via the secure channel. It authenticates the user's general access to a specific operational zone (a group of sensors and actuators) but does not allow direct control over individual devices or data streams.

- **Generating a Time-Limited Device Command Token**: When the user first requests a command for a specific actuator, the server validates the zone access token. If valid, it cryptographically generates a time-limited device command token, which authorizes a single command for that actuator.

- **Validating the Device Command Token for Subsequent Commands**: For additional commands to the same actuator within the token's lifespan, the server validates the device command token to authorize those operations, enabling the command to be sent to the actuator.

These steps (ETFs) while working in coherence technically form a **hierarchical authorization mechanism** the zone access token provides broad access to an area, while the device command token grants specific, temporary control over individual actuators.

Step 2: Core Problem: The invention tackles the challenge of **securely managing remote access to an industrial automation system**. Industrial systems with distributed sensors and actuators are vulnerable to unauthorized or malicious commands, especially when controlled remotely. This is a technical problem involving data security, authentication, and physical device control.

Proposed Solution: The method introduces a layered security approach:

- A **secure communication channel** ensures data integrity and confidentiality.

- A **zone access token** authenticates general access to an operational zone without exposing individual devices.

- A **time-limited device command token** is generated for specific actuator control, restricting its use to a single command and a limited time frame.

- **Server-side validation** ensures that only authorized commands are executed, even for subsequent operations.

This solution uses cryptographic tokens and validation processes to create a controlled, secure access system.

Step 3: The method produces clear **technical effect(s)** that go beyond mere software execution:

- **Enhanced Security**: The use of time-limited, single-use device command tokens reduces the risk of unauthorized or malicious commands. Even if a user has zone access, they cannot control specific actuators without a validated, temporary token.

- **Controlled Access**: The hierarchical structure limits the scope of access—broad zone access does not translate to unrestricted device control, preventing exploitation of general permissions.

- **Real-Time Authorization**: Continuous validation of tokens for each command ensures ongoing security, critical in dynamic industrial environments.

Step 4: The invention does **not** fall under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It provides a technical solution to a technical problem. The **hierarchical authorization mechanism**combining a secure channel, zone access token, and time-limited device command token ,demonstrates a **synergy** of

components that work together to achieve a **technical effect**. This coherence elevates the invention beyond a mere computer program.

51. Example. Method for Scheduling Employee Shifts

Claim:

A method for scheduling employee shifts, comprising:

a) *receiving employee availability through a user interface or data import, wherein employees submit their preferred working hours, days off, and any scheduling constraints;*

b) *generating shift schedules using predefined rules, wherein a scheduling module applies business logic or organizational policies (such as maximum hours, required skills, or labor laws) to automatically assign employees to available shifts, optimizing for coverage and fairness;*

c) *notifying employees of their shifts, wherein the system communicates the finalized schedule to each employee via email, SMS, or an internal portal.*

Stepwise analysis:

Step 1: The invention is, at its core, a digital tool designed to automate the process of employee shift scheduling. It takes manual, administrative tasks—collecting availabilities, applying rules, and communicating schedules—and executes them through standard computer-based automation. The underlying objective is organizational efficiency and convenience, not a technical improvement in computing or scheduling technology itself. Following are essential technical features (ETFs) of the claimed invention:

- **User interface/data import:** For collecting employee availability.
- **Scheduling module:** Applies rule-based logic to generate shift assignments.
- **Notification module:** Sends out schedule information to employees.
- **Processor and memory:** Standard computing hardware running the above modules.

All features are standard software components operating on generic computer hardware. The scheduling is performed using predefined business rules (if-then logic, constraints), and notifications use standard communication channels. There is no novel interaction with hardware, nor any technical innovation in the way scheduling or notification is performed.

Step 2: Problem: Manual shift scheduling is time-consuming, error-prone, and inefficient for managers and employees.

Solution: The system digitizes and automates this process using standard rule-based scheduling and notification modules. The solution is non-technical; it simply automates an existing manual task using generic computer functionality.

Technicality: There is no technical contribution beyond the automation of a routine administrative process. The system does not improve the underlying operation of the computer, database, or communication network. It does not provide a technical solution to a technical problem, nor does it interact with hardware in a novel or inventive manner.

Step 3: The only effect is increased efficiency in performing a business/administrative task. This is an incidental benefit of using a computer and does not constitute a technical effect. There is no improvement in system efficiency, resource utilization, or user interaction at a technical level—only the inherent speed and convenience of computer automation.

Step 4: The invention **does fall** under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It does **not** provide a technical solution to a technical problem, nor does it produce a technical effect beyond automation of a routine business process.

52. Example. System for Generating Business Reports

Claim:

A system for generating business reports, comprising:

a) *a module for collecting sales data, wherein the module receives, stores, and organizes sales transaction records from various input sources (such as databases, spreadsheets, or manual entry);*

b) *a module for formatting and displaying reports, wherein the module processes the collected data to generate summary tables, charts, or textual reports, and presents them to the user via a graphical user interface;*

c) *a module for exporting reports to PDF, wherein the module converts the formatted reports into a PDF file format and enables the user to save, print, or share the reports electronically.*

Stepwise analysis:

Step 1: The invention is essentially a digital tool that automates the process of business report generation. Its core purpose is to collect, organize, format, and present sales data in a user-friendly manner, and to automate the export of these reports for sharing or archiving. The underlying objective is to improve convenience and efficiency in business administration, not to provide a technical improvement to computer systems or data processing technology itself. Following are essential technical features (ETFs) of the claimed invention:

- **Data collection module:** Software for aggregating sales data from various sources.
- **Formatting and display module:** Software for processing and presenting data in tables, charts, or text.
- **PDF export module:** Software for converting and exporting reports to a standard file format.

- **Processor and memory:** Standard computing hardware for running the above modules.

All these features are standard software components operating on generic computer hardware. The modules use conventional data processing and formatting techniques, and there is no novel interaction with hardware or any technical innovation in data processing, storage, or display.

Step 2: Problem: Manual report generation is time-consuming, error-prone, and inefficient for business users.

Solution: The system digitizes and automates this process using standard data collection, formatting, and export modules. The solution is non-technical; it simply automates an existing manual administrative task using generic computer functionality.

There is no technical contribution beyond the automation of a routine information management process. The system does not improve the underlying operation of the computer, database, or user interface in any technical way. It does not provide a technical solution to a technical problem, nor does it interact with hardware in a novel or inventive manner.

Step 3: The only effect is increased efficiency in performing a business/administrative task. This is an incidental benefit of using a computer and does not constitute a technical effect. There is no improvement in system efficiency, resource utilization, or user interaction at a technical level—only the inherent speed and convenience of computer automation.

Step 4: The invention **does fall** under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It does **not** provide a technical solution to a technical problem, nor does it produce a technical effect beyond automation of a routine business process.

53. Example. Method for Creating Digital Art

Claim:

A method for generating digital art, comprising:

a) *selecting a color palette, wherein a user or the system chooses a set of colors from which the artwork will be generated;*

b) *applying randomization to generate patterns, wherein a software module uses random or pseudo-random algorithms to create visual patterns, shapes, or textures based on the selected color palette;*

c) *displaying the resulting image, wherein the generated digital artwork is rendered and presented to the user on a display screen or saved as a digital file.*

Stepwise analysis:

Step 1: The invention is, at its core, a digital tool for creating visual art. It automates the process of artistic creation by generating patterns and images using randomization techniques and color selection. The underlying objective is to facilitate or automate creative, aesthetic output, not to provide a technical improvement to computing, image processing, or display technology itself. Following are essential technical features (ETFs) of the claimed invention:

- **Color palette selection module:** Allows the user or system to choose colors.
- **Randomization/pattern generation module:** Software that applies random or pseudo-random logic to create visual elements.
- **Display/output module:** Renders and presents the generated image.
- **Processor and memory:** Standard computing hardware for running the above modules.

All these features are standard software components operating on generic computer hardware. There is no novel interaction with hardware, nor any technical innovation in the way the software generates, processes, or presents the digital art.

Step 2: Problem: Artistic creation—how to generate new, visually appealing images or patterns, often for aesthetic or entertainment purposes.

Solution: The system digitizes and automates this process using randomization and color selection algorithms. The solution is non-technical; it simply automates or assists a creative process using generic computer functionality.

There is no technical contribution beyond the automation of an artistic or creative process. The system does not improve the underlying operation of the computer, display, or graphics subsystem in any technical way. It does not provide a technical solution to a technical problem, nor does it interact with hardware in a novel or inventive manner. As per your attached file, this falls squarely under "Claims primarily concerned with aesthetics or artistic creation (protected by copyright)" and is explicitly cited as an exclusion.

Step 3: The only effect is the creation of an aesthetic image or pattern. This is an incidental benefit of using a computer and does not constitute a technical effect. There is no improvement in system efficiency, graphics processing, or user interaction at a technical level—only the inherent speed and convenience of computer automation for artistic tasks.

Step 4: The invention **does fall** under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It does **not** provide a technical solution to a technical problem, nor does it produce a technical effect beyond automation of an artistic or creative process.

54. Example. System for Managing Personal Finances

Claim:

A system for managing personal finances, comprising:

a) *a module for recording expenses, wherein the module enables users to input, categorize, and store records of financial transactions and expenditures;*

b) *a module for generating budgets, wherein the module allows users to set budgetary limits for various categories and automatically calculates remaining allowances based on recorded expenses;*

c) *a module for displaying charts of spending, wherein the module processes the stored data to generate visual representations (such as pie charts or bar graphs) of spending patterns, and displays these charts to the user via a graphical user interface.*

Stepwise analysis:

Step 1: The invention is fundamentally a digital tool for organizing, tracking, and visualizing personal financial information. Its core purpose is to automate manual financial record-keeping, budgeting, and basic data visualization for user convenience. It is an information management and presentation system for personal or household use, not a technical improvement to computer systems or data processing technology itself. Following are essential technical features (ETFs) of the claimed invention:

- **Expense recording module:** Software for data entry and storage of financial transactions.
- **Budget generation module:** Software for basic arithmetic calculations and storage of budget limits.
- **Chart display module:** Software for generating standard visual representations of data.
- **Processor and memory:** Standard computing hardware for running these modules.

All these features are standard software components operating on generic computer hardware. There is no novel hardware or technical innovation in the way the software manages, processes, or presents the data.

Step 2: Problem: Disorganized personal finances, difficulty in budgeting, and lack of visual insight into spending—these are non-technical, organizational, or convenience problems.

Solution: The system digitizes and automates these tasks using standard data entry, calculation, and visualization modules. The solution is non-technical; it simply automates an existing manual process using generic computer functionality.

There is no technical contribution beyond the automation of a routine information management process. The system does not improve the underlying operation of the computer, database, or user interface in any technical way. It does not provide a technical solution to a technical problem, nor does it interact with hardware in a novel or inventive manner.

Step 3: The only effect is increased efficiency in performing a business/administrative task. This is an incidental benefit of using a computer and does not constitute a technical effect. There is no improvement in system efficiency, resource utilization, or user interaction at a technical level—only the inherent speed and convenience of computer automation.

Step 4: The invention **does fall** under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It does **not** provide a technical solution to a technical problem, nor does it produce a technical effect beyond automation of a routine business or administrative process.

55. Example. Method for Generating Playlists Based on User Preferences

Claim:

A method for generating music playlists, comprising:

a) *receiving user genre preferences, wherein a user interface or input module collects information about the user's preferred music genres, artists, or moods;*

b) *selecting songs from a music database, wherein a software module queries a stored database of songs, matching entries to the user's preferences using standard filtering or lookup techniques;*

c) *creating a playlist for playback, wherein the selected songs are compiled into a playlist structure, which is then presented to the user for playback or export to a music player.*

Stepwise analysis:

Step 1: The invention is essentially a digital tool for automating the creation of music playlists based on user preferences. Its core purpose is to make the task of playlist creation more convenient and personalized for users, automating what would otherwise be a manual selection and arrangement process. The invention is fundamentally about information retrieval and presentation for entertainment or convenience, not about providing a technical improvement in computing, audio processing, or user interface technology. Following are essential technical features (ETFs) of the claimed invention:

- **User preference input module:** Software for collecting and storing user genre or artist preferences.
- **Song selection module:** Software for querying a database and filtering songs based on preferences.
- **Playlist creation module:** Software for compiling selected songs into a playlist structure.
- **Processor and memory:** Standard computing hardware for running the above modules.

All these features are standard software components operating on generic computer hardware. There is no novel interaction with hardware, nor any technical innovation in the way the software manages, processes, or presents the playlists.

Step 2: Problem: Manual playlist creation is time-consuming and may not align with user preferences. This is a non-technical, convenience or entertainment problem.

Solution: The system digitizes and automates this process using standard database lookups and filtering techniques. The solution is non-technical; it simply automates or assists a personal or entertainment task using generic computer functionality.

There is no technical contribution beyond the automation of a routine information retrieval and organization process. The system does not improve the underlying operation of the computer, database, or user interface in any technical way. It does not provide a technical solution to a technical problem, nor does it interact with hardware in a novel or inventive manner. As per your attached file, this falls squarely under "Customized playlist generation based solely on user preferences or listening history (lacks technical effect on the system)".

Step 3: The only effect is increased convenience in creating music playlists. This is an incidental benefit of using a computer and does not constitute a technical effect. There is no improvement in system efficiency, resource utilization, or user interaction at a technical level—only the inherent speed and convenience of computer automation for playlist creation.

Step 4: The invention **does fall** under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It does **not** provide a technical solution to a technical problem, nor does it produce a technical effect beyond automation of a routine entertainment or information retrieval process.

56. Example. System for Generating Invoices

Claim:

A system for generating invoices, comprising:

a) *a module for entering customer and product data, wherein users input details such as customer name, address, product descriptions, quantities, and prices, and the system stores this information in a database;*

b) a module for calculating totals, wherein the system automatically computes line item totals, applies taxes or discounts as per predefined rules, and generates the final invoice amount;

c) a module for exporting invoices to PDF, wherein the formatted invoice is converted into a PDF file for digital storage, printing, or electronic distribution.

Stepwise analysis:

Step 1: The invention is fundamentally a digital tool for automating the process of invoice creation. Its core purpose is to replace manual data entry, arithmetic, and document formatting with computer-based automation for business convenience and efficiency. The invention is about business process automation and data presentation, not about providing a technical improvement in data processing, calculation, or file export technology. Following are essential technical features (ETFs) of the claimed invention:

- **Data entry module:** Software for collecting and storing customer and product information.
- **Calculation module:** Software for computing totals, taxes, and discounts.
- **PDF export module:** Software for formatting and exporting invoices as PDF files.
- **Processor and memory:** Standard computing hardware for running these modules.

All these features are standard software components operating on generic computer hardware. There is no novel interaction with hardware, nor any technical innovation in the way the software manages, processes, or presents the invoice data.

Step 2: Problem: Manual invoice creation is time-consuming, error-prone, and inefficient for businesses.

Solution: The system digitizes and automates this process using standard data entry, calculation, and export modules. The solution is non-technical; it simply automates or assists a business administrative task using generic computer functionality.

There is no technical contribution beyond the automation of a routine business process. The system does not improve the underlying operation of the computer, database, or user interface in any technical way. It does not provide a technical solution to a technical problem, nor does it interact with hardware in a novel or inventive manner. As per your attached file, this falls squarely under "simple conversion of manual tasks (like record keeping, accounting, business documentation) to computer execution without additional technical gain beyond inherent computer speed/efficiency" (see Section 4.5.4.1, Non-Exhaustive List, i.a).

Step 3: The only effect is increased efficiency in performing a business administrative task. This is an incidental benefit of using a computer and does not constitute a technical effect. There is no improvement in system efficiency, resource utilization, or user interaction at a technical level—only the inherent speed and convenience of computer automation for invoice creation.

Step 4: The invention **does fall** under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It does **not** provide a technical solution to a technical problem, nor does it produce a technical effect beyond automation of a routine business or administrative process.

57. Example. Method for Scheduling Social Media Posts

Claim:

A method for scheduling social media posts, comprising:

a) *receiving post content and desired time, wherein a user interface or API receives the content to be posted (text, image, video, etc.) along with the user's specified date and time for posting;*

b) storing the post in a queue, wherein the system saves the post content and associated scheduling metadata in a queue or database, ordered by scheduled posting time;

c) automatically posting at the scheduled time, wherein a software module monitors the queue and, at the appropriate time, retrieves the post and transmits it to the selected social media platform using standard APIs.

Stepwise analysis:

Step 1: This invention is fundamentally a digital tool for automating the process of scheduling and publishing social media posts. Its core purpose is to replace manual posting with computer-based automation for convenience, consistency, and time management. The invention is about business process automation and scheduling, not about providing a technical improvement in data processing, queue management, or network communication. Following are essential technical features (ETFs) of the claimed invention:

- **Content and time input module:** Software for collecting post content and desired posting time.
- **Queue management module:** Software for storing and ordering posts by scheduled time.
- **Automated posting module:** Software for monitoring the queue and posting to social media via standard APIs.
- **Processor and memory:** Standard computing hardware for running these modules.

All these features are standard software components operating on generic computer hardware. There is no novel interaction with hardware, nor any technical innovation in the way the software manages, processes, or posts the content.

Step 2: Problem: Manual social media posting is time-consuming and may lead to inconsistent posting schedules. This is a non-technical, organizational, or convenience problem.

Solution: The system digitizes and automates this process using standard queue management and scheduling modules. The solution is non-technical; it simply automates or assists a business or personal process using generic computer functionality.

There is no technical contribution beyond the automation of a routine scheduling and posting process. The system does not improve the underlying operation of the computer, database, or network in any technical way. It does not provide a technical solution to a technical problem, nor does it interact with hardware in a novel or inventive manner. As per your attached file, this falls squarely under "simple conversion of manual tasks (like record keeping, scheduling) to computer execution without additional technical gain beyond inherent computer speed/efficiency".

Step 3: The only effect is increased efficiency and convenience in scheduling and posting social media content. This is an incidental benefit of using a computer and does not constitute a technical effect. There is no improvement in system efficiency, resource utilization, or user interaction at a technical level—only the inherent speed and convenience of computer automation for scheduling.

Step 4: The invention **does fall** under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It does **not** provide a technical solution to a technical problem, nor does it produce a technical effect beyond automation of a routine scheduling and posting process.

58. Example. Method for Generating Sudoku Puzzles

Claim:

A method for generating Sudoku puzzles, comprising:

a) *selecting numbers based on predefined rules, wherein a software module applies the standard rules of Sudoku (such as ensuring each number 1–9 appears only once per row, column, and 3x3 subgrid) to select and position numbers;*

b) *arranging numbers in a grid, wherein the selected numbers are algorithmically placed into a 9x9 grid structure, resulting in a valid Sudoku puzzle with a unique solution;*

c) *displaying the puzzle to a user, wherein the generated grid is rendered and presented via a user interface for interactive play or printing.*

Stepwise analysis:

Step 1: The invention is fundamentally a digital tool for automating the creation of Sudoku puzzles. Its core purpose is to replicate or streamline the manual process of constructing puzzles by applying the game's rules algorithmically and presenting the result for entertainment or educational use. The invention is about automating a mental exercise or game creation process, not about providing a technical improvement in data processing, algorithmic innovation, or user interface technology. Following are essential technical features (ETFs) of the claimed invention:

- **Number selection module:** Software for choosing numbers according to Sudoku rules.
- **Grid arrangement module:** Software for placing numbers in a 9x9 grid structure.
- **Display module:** Software for rendering the puzzle for user interaction or output.
- **Processor and memory:** Standard computing hardware for running these modules.

All these features are standard software components operating on generic computer hardware. There is no novel interaction with hardware, nor any technical innovation in the way the software generates, processes, or presents the Sudoku puzzle.

Step 2: Problem: Manual Sudoku puzzle creation is time-consuming and requires careful adherence to the game's logic. This is a non-technical, creative, or mental exercise problem.

Solution: The system digitizes and automates this process using standard algorithms for number selection and grid arrangement. The solution is non-technical; it simply automates or assists a mental exercise or entertainment task using generic computer functionality.

There is no technical contribution beyond the automation of a creative or mental process. The system does not improve the underlying operation of the computer, database, or user interface in any technical way. It does not provide a technical solution to a technical problem, nor does it interact with hardware in a novel or inventive manner. As per your attached file, this falls squarely under "Claims embodying rules for games or processes for mental exercises," which are explicitly cited as exclusions.

Step 3: The only effect is the creation of Sudoku puzzles for entertainment or mental challenge. This is an incidental benefit of using a computer and does not constitute a technical effect. There is no improvement in system efficiency, resource utilization, or user interaction at a technical level—only the inherent speed and convenience of computer automation for puzzle generation.

Step 4: The invention **does fall** under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It does **not** provide a technical solution to a technical problem, nor does it produce a technical effect beyond automation of a creative, mental, or game-related process.

59. Example. System for Managing Customer Loyalty Points

Claim:

A system for managing loyalty points, comprising:

a) *a module for recording purchases, wherein transaction data such as customer identity, purchase amount, and date are input via a user interface or automatically captured at the point of sale, and stored in a database;*

b) *a module for calculating points, wherein the system applies predefined rules (e.g., points per currency spent, promotional multipliers) to compute loyalty points earned for each recorded purchase and updates the customer's loyalty account accordingly;*

c) *a module for redeeming points, wherein the system enables customers to use accumulated points for discounts, rewards, or other benefits, deducts redeemed points from the account, and updates transaction records.*

Stepwise analysis:

Step 1: The invention is fundamentally a digital tool for automating the management of customer loyalty programs. Its core purpose is to replace manual tracking, calculation, and redemption of loyalty points with computer-based automation to increase efficiency and accuracy for businesses and customers. The invention is about business process automation and customer relationship management, not about providing a technical improvement in data processing, transaction security, or user interface technology. Following are essential technical features (ETFs) of the claimed invention:

- **Purchase recording module:** Software for collecting and storing purchase transaction data.
- **Point calculation module:** Software for applying business rules to compute and update loyalty points.
- **Point redemption module:** Software for processing redemption requests and updating account balances.
- **Processor and memory:** Standard computing hardware for running these modules.

All these features are standard software components operating on generic computer hardware. There is no novel interaction with hardware, nor any technical innovation in the way the software manages, processes, or presents loyalty point data.

Step 2: Problem: Manual management of loyalty points is time-consuming, error-prone, and inefficient for businesses and customers. This is a non-technical, administrative, or business process problem.

Solution: The system digitizes and automates this process using standard data entry, rule-based calculation, and redemption modules. The solution is non-technical; it simply automates or assists a business administrative task using generic computer functionality.

There is no technical contribution beyond the automation of a routine business process. The system does not improve the underlying operation of the computer, database, or user interface in any technical way. It does not provide a technical solution to a technical problem, nor does it interact with hardware in a novel or inventive manner. As per your attached file, this falls squarely under "business methods and administrative automation" .

Step 3: The only effect is increased efficiency in performing a business administrative task. This is an incidental benefit of using a computer and does not constitute a technical effect. There is no improvement in system efficiency, resource utilization, or user interaction at a technical level—only the inherent speed and convenience of computer automation for loyalty point management.

Step 4: The invention **does fall** under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It does **not** provide a technical solution to a technical problem, nor does it produce a technical effect beyond automation of a routine business or administrative process.

60. Example. Method for Generating Email Templates

Claim:

A method for generating email templates, comprising:

a) selecting a template, wherein a user interface or system module allows users to choose from a set of predefined email templates (such as business, personal, or marketing emails) stored in a database;

b) *entering recipient information, wherein the system collects and inserts recipient-specific data (such as name, email address, and personalized content) into the selected template, customizing the message for each recipient;*

c) *sending the email, wherein the system formats the completed email and transmits it to the intended recipient(s) using standard email protocols (such as SMTP).*

Stepwise analysis:

Step 1: The invention is fundamentally a digital tool for automating the process of creating and sending emails using templates. Its core purpose is to replace manual email drafting, personalization, and distribution with computer-based automation for efficiency and consistency. The invention is about process automation and information presentation for communication, not about providing a technical improvement in data processing, email protocols, or user interface technology. Following are essential technical features (ETFs) of the claimed invention:

- **Template selection module:** Software for retrieving and displaying email templates.
- **Personalization module:** Software for inserting recipient details into the chosen template.
- **Email sending module:** Software for formatting and transmitting emails via standard protocols.
- **Processor and memory:** Standard computing hardware for running these modules.

All these features are standard software components operating on generic computer hardware. There is no novel interaction with hardware, nor any technical innovation in the way the software manages, processes, or sends emails.

Step 2: Problem: Manual email creation is time-consuming, prone to inconsistency, and inefficient for repetitive or bulk communications. This is a non-technical, administrative, or communication problem.

Solution: The system digitizes and automates this process using standard template selection, data insertion, and email sending modules. The solution is non-technical; it simply automates or assists a communication or business process using generic computer functionality.

There is no technical contribution beyond the automation of a routine communication process. The system does not improve the underlying operation of the computer, database, or email system in any technical way. It does not provide a technical solution to a technical problem, nor does it interact with hardware in a novel or inventive manner. As per your attached file, this falls squarely under "simple conversion of manual tasks (like record keeping, scheduling, communication) to computer execution without additional technical gain beyond inherent computer speed/efficiency".

Step 3: The only effect is increased efficiency and convenience in creating and sending emails. This is an incidental benefit of using a computer and does not constitute a technical effect. There is no improvement in system efficiency, resource utilization, or user interaction at a technical level—only the inherent speed and convenience of computer automation for email creation.

Step 4: The invention **does fall** under the exclusion of "computer programme per se" under Section 3(k) of The Patents Act. It does **not** provide a technical solution to a technical problem, nor does it produce a technical effect beyond automation of a routine communication or template management process.

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