PROVISIONAL PATENT APPLICATION

Title: AI-Driven Longitudinal Behavioral Coaching System for Health and Wellness

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1. BACKGROUND OF THE INVENTION

The increasing reliance on artificial intelligence (AI) in health and wellness applications has led to the development of static AI-driven meal planning and fitness recommendation tools. However, these systems typically function as point-in-time solutions, failing to account for the **longitudinal behavioral changes** required for **sustained health and wellness outcomes**.

This invention introduces an **AI-powered behavioral coaching system** that evolves with users over time. The system utilizes a **large language model (LLM) to generate "Day in the Life" behavior-based coaching scenarios**, integrating **evidence-based behavioral therapy principles, NASM science-based methodologies, and user trust-building mechanisms**. The **trust-based AI adoption framework** mirrors behavioral changes in health and wellness, reinforcing user engagement over time.

Additionally, the system is uniquely implemented using a **locally running LLM on commodity hardware**, allowing for **scalable, low-latency AI-driven coaching with minimal client-side requirements**. Users can engage with the system through **low-bandwidth interfaces such as text messaging and mobile devices**, ensuring accessibility for real-time motivation and support throughout the day, even in regions where high-end hardware is not prevalent.

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2. SUMMARY OF THE INVENTION

The proposed AI system employs a **progressive learning model** that dynamically **adjusts to a user's habits, preferences, and progress**, reinforcing **behavioral modification strategies** through **adaptive coaching sessions**. Unlike traditional AI meal planners, this system is designed to:

1. **Provide Longitudinal Behavioral Coaching** – Using AI to analyze user input and real-world behaviors over time, rather than providing static recommendations.

2. **Generate Personalized "Day in the Life" Scenarios** – AI-driven coaching narratives simulate real-world decision-making, encouraging sustained lifestyle change.
3. **Incorporate Behavioral Therapy and Wellness Science** – NASM-certified principles and behavioral reinforcement mechanisms guide users toward sustainable health improvements.
4. **Enhance AI Trustworthiness for User Adoption** – The system incorporates **quantifiable trust** research to enhance user engagement, ensuring AI-generated recommendations align with **perceived credibility and reliability**.
5. **Enable Accessibility and Scalability** – The AI system operates on **commodity hardware**, with a lightweight interface allowing **interaction via text messaging, mobile devices, or other low-bandwidth communication methods**.

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3. DETAILED DESCRIPTION

The system consists of the following key components:

(a) AI-Powered Longitudinal Learning Engine

- Uses **machine learning algorithms** to track and adapt to user health data over time.
- Adjusts recommendations based on **habit formation**, **progress metrics**, and **historical interactions**.
- Integrates **contextual learning** to evolve alongside user behavior.

(b) Large Language Model (LLM) for Behavioral Coaching

- Generates **personalized, adaptive coaching scenarios** simulating real-world decision-making.
- Incorporates **motivational interviewing techniques** and **cognitive behavioral therapy (CBT)-based prompts**.
- Adjusts dialogue and recommendations based on **user engagement patterns**.

(c) NASM-Backed Health and Wellness Integration

- Implements evidence-based **fitness and nutrition coaching**.
- Uses AI-driven assessments to recommend **corrective exercise techniques**.

- Adjusts coaching responses based on **biomechanics, recovery patterns, and metabolic adaptation**.

(d) Trust-Driven AI Adoption Framework

- Embeds **quantifiable trust research** into AI decision-making.
- Provides **explainable AI (XAI) insights** to justify recommendations.
- Uses **confidence scoring and feedback loops** to build user trust in AI-generated responses.

(e) Locally Deployed AI with Minimal Client-Side Requirements

- Runs on **commodity hardware**, reducing infrastructure costs while maintaining real-time AI capabilities.
- Allows **users to interact via text message, mobile devices, or other low-bandwidth methods**, ensuring accessibility for on-the-go coaching and motivation.
- Provides a **scalable, self-contained AI coaching system** without reliance on cloud processing.

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4. CLAIMS

1. **A method for AI-driven longitudinal behavioral coaching**, comprising:
    - Collecting and analyzing **real-time and historical user health data**.
    - Generating **personalized behavior-based coaching scenarios** via an **LLM-driven AI system**.
    - Adjusting AI recommendations based on **long-term engagement, trust metrics, and behavior patterns**.
    - Integrating **behavioral therapy and NASM-certified coaching strategies** into adaptive coaching.
    - Utilizing a **trust-scoring model** to enhance AI recommendation credibility.
    - Implementing **a locally deployed AI system with minimal client-side requirements** to ensure accessibility.
2. **A system for AI-powered health coaching**, comprising:
    - A **longitudinal learning engine** tracking user progress over time.

- An **AI-driven scenario generator** producing day-in-the-life coaching simulations.
- A **behavioral science-based adaptation model** for real-time coaching adjustments.
- A **trust reinforcement mechanism** ensuring AI-generated insights align with user expectations.
- A **self-contained AI system operable on commodity hardware**, allowing interaction via **low-bandwidth communication methods, including mobile devices**.

3. **A non-transitory computer-readable medium storing instructions for AI-based behavioral coaching**, the instructions comprising:
   - Training an LLM to simulate real-world **habit formation scenarios**.
   - Analyzing **engagement data** to refine AI-generated recommendations.
   - Implementing **confidence-calibrated AI suggestions** to build trust in health interventions.
   - Running an AI coaching system on **commodity hardware** for scalable, low-cost deployment.

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5. POTENTIAL APPLICATIONS

- **AI-driven personal health coaching platforms**
- **Corporate wellness and preventive healthcare programs**
- **Clinical behavioral therapy augmentation tools**
- **Customizable AI coaching frameworks for fitness professionals**
- **Adaptive AI-based lifestyle change interventions**
- **Low-bandwidth health coaching solutions via text messaging or offline methods**
- **Mobile-based coaching solutions designed for users in regions with lower-cost hardware**

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6. CONCLUSION

This invention introduces a **longitudinally adaptive AI coaching system**, integrating **trust-building mechanisms, behavioral therapy, and NASM-backed fitness coaching** into a **holistic health and wellness coaching solution**. By leveraging **AI-driven "Day in the Life" scenarios**, the system facilitates **sustained behavior change**, enhancing **both AI adoption and long-term health outcomes**. The use of **commodity hardware, mobile accessibility, and low-bandwidth interfaces** ensures scalable, real-time coaching for a diverse user base.

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