



An AI-Driven Adaptive User Experience Framework for Intelligent Meditation Information Systems Integrating Indian Knowledge Systems

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Abstract— Stress, anxiety and other threats to emotional well-being have become pressing global concerns, intensified by changing lifestyles, mounting work pressure and near-continuous digital engagement. Digital meditation applications are widely available, yet most deliver generic recommendations through static interfaces, personalize only superficially, and seldom bring together Artificial Intelligence (AI), Adaptive User Experience (Adaptive UX), Human–Computer Interaction (HCI) and Indian Knowledge Systems (IKS). This fragmentation weakens user engagement and limits the long-term adoption of digital wellness tools. This paper proposes a conceptual AI-driven Adaptive UX framework for intelligent meditation information systems that integrates IKS. The architecture is organized into four interconnected layers. A User Layer captures profile data and behavioural signals such as meditation history, login frequency, session duration, mood assessments, stress levels and stated preferences. An AI Business Logic Layer analyses these signals to anticipate wellness needs; within it, an Adaptive UX Engine reconfigures interface components and an IKS Repository supplies structured practices drawn from Yoga, Dhyana, Pranayama, the Bhagavad Gita, the Patanjali Yoga Sutras and Ayurveda. A Personalized Recommendation Layer turns these inputs into tailored meditation sessions, breathing exercises and screen layouts, and a Feedback & Continuous Learning Layer uses usage data and user ratings to refine later recommendations. In contrast to applications that serve identical static content to every user, the framework treats interaction design, continuous behavioural learning and cultural grounding as joint design goals, linking modern digital healthcare with traditional Indian wellness knowledge. Future work will implement the framework as an Android-based application and evaluate it in terms of usability, recommendation accuracy, user satisfaction and mental-wellness outcomes.

Keywords— Artificial Intelligence (AI); Adaptive User Experience (Adaptive UX); Human–Computer Interaction (HCI); Intelligent Information System; Meditation Information System; Indian Knowledge Systems (IKS); Behavioural Analytics; Personalized Recommendation; Digital Healthcare; Mental Well-being.

I. INTRODUCTION

Mental well-being has become a matter of global concern as levels of stress, anxiety and lifestyle-related disorders continue to rise. Rapid technological change, shifting work

environments, digital overload and declining social contact have each contributed to this trend, and mental disorders are reported to be among the leading causes of disability worldwide. Support that is accessible at scale is therefore needed, and technology-enabled interventions are an obvious candidate for providing it.

Meditation is one such intervention: it reduces stress and improves concentration and attentional focus [17]. Indian Knowledge Systems (IKS), which include Yoga, Ayurveda, the teachings of the Bhagavad Gita and a range of contemplative practices, offer a comprehensive account of well-being in which body, mind and consciousness are brought into balance through meditation, regulated breathing, self-awareness and disciplined living [13, 14]. Practices derived from these traditions have gained international recognition and are now incorporated into many digital wellness products.

AI, for its part, gives digital health tools the capacity to personalize. By modelling user behaviour, AI techniques can detect patterns relevant to well-being and propose routines suited to the individual [16, 18]. In a meditation setting this means selecting appropriate sessions, monitoring the user's focus and anticipating changes in stress, all of which can sustain engagement and make a wellness platform more effective.

Current meditation applications make little use of this potential. Most present the same static layout to every user regardless of age, stress level or background, and because their content does not adapt, users tend to lose interest quickly. Moreover, although practices such as yoga and breathing exercises are common in these products, few draw on IKS in an authentic and structured way, which limits both their cultural value and their overall impact.

A second limitation is the limited attention paid to Human–Computer Interaction (HCI) and User Experience (UX) design. The value of an intelligent system depends not only on the accuracy of its models but also on how easily people can use it. Static interfaces cannot accommodate differences in preference, digital literacy or momentary stress. Adaptive UX techniques, which reshape layouts and navigation in response to user behaviour, address this problem, but they have rarely been combined with AI-based meditation tools.



A third limitation concerns transparency. Most health applications issue recommendations without explaining them, which erodes user trust. Incorporating Explainable AI (XAI) into meditation systems can make recommendations more transparent, strengthen user confidence and support the formation of lasting habits [11, 12].

To address these gaps, we propose an AI-driven Adaptive UX framework for intelligent meditation systems that combines AI, HCI principles and IKS to build individually tailored routines. The framework continuously monitors user actions, stress levels and practice history in order to recommend suitable practices and adapt the interface, while grounding its recommendations in traditional Indian practice. It is composed of interconnected modules for user profiling, AI analytics, interface adaptation, IKS knowledge and feedback. Our premise is that these modules are complementary: personalized content without an adaptive interface, or adaptation without explanation and cultural grounding, would each leave part of the engagement problem unsolved. Together they are intended to improve usability and engagement and to help users form durable mental-wellness habits.

The main contributions of this paper are as follows:

- 1) A novel AI-driven Adaptive UX framework for intelligent meditation systems.
- 2) The integration of IKS with modern AI as a basis for personalized recommendations.
- 3) An adaptive interface that responds to user behaviour and wellness needs.
- 4) An approach to enhancing user engagement through intelligent personalization and explainable AI (XAI).
- 5) A unified architecture that brings together AI, HCI, UX and IKS to inform the design of future digital health tools.

II. LITERATURE REVIEW

A. AI in Digital Mental Healthcare

Advances in AI have reshaped digital healthcare, making possible predictive analytics, intelligent decision support, continuous behavioural monitoring and recommendations tailored to the individual. Machine learning, deep learning and natural language processing are now widely used to support diagnosis, to plan individualized treatment and to monitor patients [16]. In mental healthcare, AI-based systems delivered through mobile applications, conversational agents and intelligent virtual assistants have shown considerable promise for widening access, enabling early intervention and personalizing wellness services [1, 2, 18]. Recent systematic reviews indicate that these applications help users manage stress, regulate emotions and access personalized wellness interventions, and that they lower the barriers to conventional care. Their large-scale adoption, however, remains constrained by unresolved concerns about transparency, explainability, privacy, ethical decision-making and user trust [1, 3].

B. Smartphone-Based Meditation Applications

Smartphone-based meditation applications have grown markedly in popularity over the past decade because they make mindfulness and stress-management support readily available. Applications such as Headspace, Calm, Balance, Insight Timer and Wysa provide guided meditation, breathing exercises, sleep support and emotional well-being programmes. In their scoping review of meditation applications, Muhiyaddin et al. [4] report that mindfulness meditation is the intervention these applications implement most often, and that reducing stress remains their principal aim. While these applications have widened access to meditation, they largely deliver standardized content through static interfaces. Personalization is limited, and contextual information, behavioural change and interaction patterns are seldom used to adapt recommendations over time [4, 5].

C. HCI, Human-Centred AI and Adaptive UX

HCI and UX quality have become decisive factors in the effectiveness of intelligent healthcare applications. The human-centred view of AI holds that an intelligent system should be judged by the experience it gives its users (its usability, accessibility, transparency and responsiveness to the individual) and not by algorithmic performance alone [6]. Adaptive UX puts this view into practice: the arrangement of screens, the structure of navigation, the way content is presented and the means of interaction all change in response to behaviour, preferences and context. Studies report that with adaptive interfaces users engage more, complete tasks more efficiently and are more satisfied [6, 7]. Design frameworks for intelligent support of digital well-being have also begun to emerge [19]. Much of the current research, however, concerns AI-assisted tools for designers [3] rather than adaptive interfaces deployed within AI-driven meditation information systems, and it is this opportunity that the present work takes up.

D. Indian Knowledge Systems and Digital Technology

IKS constitute one of the oldest holistic knowledge traditions in the world, encompassing Yoga, Dhyana (meditation), Pranayama, Ayurveda, Vedanta and the philosophical teachings of the Bhagavad Gita and the Patanjali Yoga Sutras [13–15]. These practices address physical, psychological, emotional and spiritual well-being through mind–body interventions that have gained scientific recognition. Efforts to digitize repositories of traditional knowledge and to use AI in disseminating Indian medical knowledge show a growing interest in connecting IKS with modern digital technology [8, 10]. Existing meditation applications, however, rarely encode IKS principles in structured form within recommendation engines, adaptive interfaces or personalized wellness strategies, which limits both their cultural relevance and their therapeutic effectiveness.



E. Quality and Trustworthiness of Mental Health Apps

A further concern is whether digital mental-health applications can be relied upon: their quality, reliability and trustworthiness vary widely. In a systematic search and review of smartphone mental-health applications available to Indian users, Mehrotra et al. [9] found that, although many offered attractive interfaces and useful features, only a limited number were backed by strong scientific evidence, involved qualified healthcare professionals or dealt adequately with privacy and security. These findings point to the need for meditation information systems that are intelligent, evidence-based, culturally relevant and user-centred, and that combine modern AI techniques with established wellness practice.

III. RESEARCH GAP

The literature reviewed above shows rapid progress on several fronts: AI is increasingly used in digital mental healthcare to improve accessibility, emotional well-being and personalized wellness services, and meditation applications deliver guided meditation, breathing exercises, stress management and mindfulness practice through mobile platforms [1, 2, 4, 5, 8]. Read together, however, these studies also reveal six gaps that motivate the present work.

First, AI-enabled meditation applications concentrate on content recommendation and guided sessions rather than on adapting the user experience. Algorithms may select sessions on the basis of preferences and past activity, but the interface typically remains static and identical for all users; layout, navigation, interaction method and content presentation are seldom adjusted to behaviour, experience level, emotional state or context. This weakens both personalization and long-term engagement [3, 5, 6].

Second, although AI-based recommendation has made meditation content more personal, behavioural adaptation remains shallow. Most applications rely on basic preferences and historical usage data but do not keep learning from how a user's practice habits, emotional responses, stress levels and broader behaviour change over time. Personalization therefore stays largely static instead of following the user's changing wellness needs [2, 4, 8]. Moreover, AI-based personalization is generally confined to the recommendation engine, without explainable decision-making, behavioural analytics or dynamic interface adaptation.

Third, HCI principles have not been fully carried into meditation information systems. Research has concentrated on recommendation accuracy and meditation content, and comparatively few studies examine adaptive interaction design, intelligent navigation, usability, accessibility or personalized interface behaviour. Human-centred AI research advocates adaptive, user-centric interface design, but this guidance has seldom been applied to intelligent meditation systems [3, 6].

Fourth, IKS are only weakly integrated into intelligent meditation applications. Existing platforms mostly offer generalized mindfulness and meditation content; authentic Indian wellness knowledge, including Yoga, Dhyana,

Pranayama, the Patanjali Yoga Sutras, the Bhagavad Gita and Ayurveda, is rarely built into recommendation mechanisms or adaptive interfaces. As a result, culturally relevant knowledge that could support holistic mental well-being goes unused [1, 7].

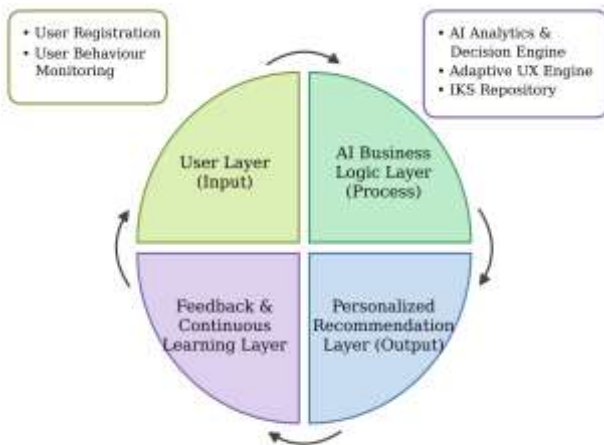
Fifth, meditation applications face problems of scientific validation, trustworthiness and evidence-based recommendation. Many commercial products have appealing interfaces and useful content, but few rest on rigorous scientific evidence, involve healthcare professionals or have been assessed against standardized evaluation frameworks. This undermines user confidence and limits the uptake of intelligent meditation systems in clinical and educational settings [4, 8].

Finally, AI, HCI, Adaptive UX, intelligent information systems and IKS have each been investigated, but almost always independently. Existing research addresses AI, meditation applications, HCI or IKS separately; very few studies combine intelligent recommendation, adaptive interfaces, behavioural analytics and traditional Indian wellness knowledge within a single intelligent meditation information system [1–8].

These gaps are interdependent. An adaptive interface needs a continuously updated user model to adapt to; a user model is of limited value if the recommendations it drives cannot be explained; and practices drawn from IKS must first be organized as structured knowledge before they can be personalized at all. Addressing any one gap in isolation is therefore unlikely to be sufficient. This is the rationale for an integrated design: the AI-Driven Adaptive User Experience Framework for Intelligent Meditation Information Systems Integrating Indian Knowledge Systems, which combines AI, Adaptive UX, HCI principles, behavioural analytics and IKS in one intelligent information system intended to deliver personalized, explainable, culturally relevant and user-centric meditation experiences, and thereby to improve usability, engagement and overall mental well-being.

IV. PROPOSED FRAMEWORK

The proposed framework is designed to produce meditation recommendations that are personalized, adaptive and culturally relevant by combining AI, Adaptive UX and IKS within a single intelligent information system. As Fig. 1 shows, it is organized as a cycle of four layers: a User Layer (input), an AI Business Logic Layer (processing), a Personalized Recommendation Layer (output) and a Feedback & Continuous Learning Layer. Working together, the layers model user behaviour, produce personalized recommendations, reshape the interface and use feedback to raise the quality of later recommendations.



Four-layer architecture of the proposed AI-driven Adaptive UX framework.

A. User Layer (Input)

The User Layer is the entry point of the framework and gathers the data required for personalization through two components: User Registration and User Behaviour Monitoring. At registration, users supply basic details, namely age, occupation, preferred language, previous meditation experience, wellness and meditation goals, and experience level. These details form a baseline profile that guides early recommendations before any behavioural data are available. The User Behaviour Monitoring component then observes, unobtrusively and continuously, how the user interacts with the system, recording login frequency, meditation duration, mood selections, stress levels, sleep quality and favoured content categories. Unlike a fixed profile, this behavioural record evolves over time and so reflects the user's actual progress. All collected information is transmitted securely to the AI Business Logic Layer for analysis and decision-making.

B. AI Business Logic Layer (Processing)

The AI Business Logic Layer is the analytical core of the framework. It examines user habits, predicts wellness needs, personalizes interaction with the application and draws on IKS to construct meaningful recommendations. It comprises three linked modules.

1) AI Analytics & Decision Engine

This engine is the data-processing core. It draws on the user's background profile together with mood changes, stress indicators, earlier sessions and habitual behaviour to infer what the user prefers, and machine-learning models applied to this history estimate the user's current state of mind. The engine is designed to use XAI so that its decisions are transparent and can be justified to the user rather than appearing arbitrary [11, 12]. Its outputs are shared with the other modules to update layouts and customize content.

2) Adaptive UX Engine

Using the outputs of the decision engine, the Adaptive UX Engine tailors the interface to each user's characteristics and

current mood, dynamically adjusting elements such as the dashboard layout, menus, font sizes, colour themes and notification behaviour. A beginner, for example, might be shown a simplified screen with clear step-by-step guidance, whereas an experienced practitioner would be given access to more advanced tools and customizable meditation plans. By allowing the interface to evolve with the user, the engine aims to improve usability and sustain engagement.

3) Indian Knowledge Systems Repository

The IKS Repository is a structured knowledge base of authentic wellness practices. It holds structured content from Yoga, Dhyana, Pranayama, the Bhagavad Gita, the Patanjali Yoga Sutras [15] and Ayurveda, and catalogues each practice by goal, difficulty, duration and health benefit. This cataloguing is what makes traditional knowledge usable by the AI components: it allows practices to be matched to user states, so that recommendations are at once culturally grounded and suited to the individual.

C. Personalized Recommendation Layer (Output)

This layer is where analysis becomes action. Taking the behavioural insights produced by the AI Business Logic Layer, it pairs them with practices retrieved from the IKS Repository to produce concrete recommendations aimed at the user's mental well-being. Depending on the user's current stress, mood and previous experience, it suggests customized meditation sessions, yoga postures, breathing exercises (Pranayama) and relevant verses from the Bhagavad Gita. Alongside these suggestions it adjusts the interface layout, issues timely reminders and provides motivational content. Whereas basic wellness applications look the same to every user, the output of this layer changes continuously in step with the user's behaviour and wellness progress.

D. Feedback & Continuous Learning Layer

This layer closes the loop. Once a session ends it asks the user for explicit feedback, including satisfaction ratings and reported changes in stress and mood, together with implicit data such as session length and application usage patterns. From these it evaluates progress in terms of meditation consistency, wellness improvement, engagement level and behavioural change over time. The results are fed back to the AI Analytics & Decision Engine, where the machine-learning models revise user profiles, sharpen their predictions and improve subsequent recommendations, so that personalization deepens as interactions accumulate. This loop is what distinguishes the framework from preference-based personalization: the user model is revised according to observed responses, not only according to stated preferences.

E. Operational Workflow

In operation, the framework follows a closed loop. (i) A new user registers and creates a basic profile, after which the application records daily interactions. (ii) These data are passed to the AI Business Logic Layer, where machine-learning components analyse behavioural habits, predict wellness needs



and adjust the layout. (iii) In parallel, the IKS Repository supplies relevant practices from Yoga, Pranayama, the Bhagavad Gita and Ayurveda. (iv) The Personalized Recommendation Layer combines these inputs into customized meditation sessions, breathing exercises and screen configurations. (v) After each practice, the Feedback & Continuous Learning Layer evaluates the user's response and updates the core AI models. Repeated over time, this cycle is intended to make recommendations progressively more accurate, adaptive and user-centric.

V. EXPECTED OUTCOMES

Because the framework is conceptual, its benefits are presented here as expected outcomes to be tested in future work rather than as demonstrated results. By combining continuous feedback and AI-driven analytics with demographic and behavioural data, and by integrating AI, Adaptive UX, HCI and IKS in a unified framework, it is expected to make digital meditation applications more effective and to offer each user practice that is personal, responsive and rooted in a familiar cultural tradition. Table I summarizes the anticipated outcome for each component. Each outcome is stated in terms that the evaluation planned in Section VI, covering usability, recommendation accuracy, user satisfaction and mental-wellness outcomes, can test directly.

EXPECTED OUTCOMES OF THE PROPOSED FRAMEWORK

Component	Expected Outcome
Artificial Intelligence	Intelligent analysis of user behaviour and personalized recommendations
Adaptive UX	Dynamic user interface based on user preferences, behaviour, and experience level
User Behaviour Monitoring	Better understanding of user interaction and meditation habits
Indian Knowledge Systems	Integration of Yoga, Pranayama, Meditation, Bhagavad Gita, and Ayurveda into digital wellness
Personalized Recommendation Engine	Customized meditation sessions, breathing exercises, and wellness routines
Feedback & Continuous Learning	Continuous improvement of recommendations through user feedback and progress tracking
User Engagement	Increased motivation, application usage, and meditation adherence
Mental Well-being	Improved stress management, emotional regulation, focus, and overall wellness
Overall System Performance	Enhanced usability, recommendation accuracy, user satisfaction, and adaptive interaction

VI. CONCLUSION AND FUTURE WORK

This paper has presented an AI-driven Adaptive UX framework for intelligent meditation information systems that integrates IKS, with the aim of overcoming the static design of existing digital meditation applications. The framework unites AI, HCI principles, behavioural monitoring and IKS. Where conventional applications offer every user the same interface, the proposed system adapts dynamically to each user's observed habits, and by drawing on traditional practices such

as Yoga, Dhyana and Ayurveda it produces wellness recommendations that are both personalized and culturally grounded. The central argument of the paper is that personalized recommendation, interface adaptation, continuous learning and cultural grounding should be designed together rather than added piecemeal. Although the framework is conceptual, it provides a foundation for the design of next-generation meditation systems intended to improve user engagement, usability and mental well-being.

Future work will implement the framework as an Android-based intelligent meditation application that brings together the AI recommendation components, behavioural monitoring, adaptive layouts and the IKS Repository. The application will be evaluated for usability, user satisfaction, recommendation and tracking accuracy, and its effect on mental-health outcomes. Later research could connect the application with wearable devices, fitness sensors, emotion-recognition tools and voice interaction, and extend its use of XAI, to make the system more personal, transparent and trustworthy.

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