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iOS Application for Goal Adherence and Habit Formation

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Abstract
Habit-tracking apps fail because users can self-report completion without actually doing anything. This work aims at building an iOS app that verifies goal completion in real time using a vision-language model (VLM), requires a financial pledge to charity in case of failure, and automatically blocks distracting apps during a focus session via the Screen Time API. The result is a fully functional iOS application in which cheating is technologically prevented and psychological accountability is enforced by a real financial stake. The combination of objective AI verification and financial commitment addresses the self-reporting problem that no existing solution on the market solves completely.

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1. Introduction

Research shows that most people who install a habit-tracking app stop using it quickly — a 2024 scoping review of 18 studies found that 70% of users had abandoned their app within the first 100 days of downloading it. [1] The root cause is that every major existing app relies on the user's own honesty: you tap a button to say you did the thing. That works well when motivation is high, but at the exact moment when motivation falls short — the moment the app is supposed to help — the user simply taps the button without doing anything.

A robust habit-tracking system needs three properties that are currently not found together:

- **Objective verification** — the system must confirm goal completion without trusting the user's word.
- **Meaningful consequence** — while breaking a streak hurts, true accountability requires a real, tangible cost.
- **Protected focus time** — distracting apps must be unavailable while the task completion session is in progress.

Existing solutions generally fail to combine objective verification with meaningful consequences. For instance, *Pursoo* [2] asks users to photograph themselves before and after an activity; however, a human moderator reviews the pair manually, which introduces latency and lacks financial stakes beyond an internal credit system. *Atoms* [3] (the official Atomic Habits companion) has no objective verification whatsoever — completion is merely a long-press. *One Thing* [4] comes closest, verifying photos with AI and blocking apps, but it involves no financial commitment. Ultimately, none of these alternatives provide all three properties simultaneously.

Our solution is a native iOS application that introduces a "bound motivation" mechanism. Before starting a goal, the user must commit to a specific financial amount. To successfully finish the session and save their money, the user must submit photographic proof, evaluated by VLM, that they have started goal completion. If they fail, the pledged amount is automatically charged to their saved credit card and donated to a charity. Otherwise, the timer starts the focus session, while distracting apps are locked on the OS level.

Contributions: We successfully engineered an application that integrates three previously isolated mechanics into a seamless user experience: hardware-level app blocking, VLM-based visual verification, and automated off-session financial penalties via a custom backend.

2. Core Concept

The user journey starts with goal creation, where the user defines the activity, duration, and the verification method (either Photo or Geofencing). The user is also supposed to select a charity of choice and pledge a penalty amount (e.g., $1 to Save The Children).

Once the verification of starting a goal is complete, "Focus Mode" is initiated, and the application uses Apple's

Screen Time API to enable the app blocker to shield the user from distractions. The selected social media or entertainment apps are entirely blocked at the operating system level until the timer reaches zero and the verification process is completed.

3. Objective AI Verification

Traditional trackers use simple toggles for confirming completion. Our approach, detailed in Section 4 of the poster, uses VLM from *Mistral AI*, specifically *Mistral Large 3* via its API for objective image analysis, due to the company's French origin in compliance with strict European privacy laws, while rivaling models like ChatGPT (GPT-5/GPT-4o) in performance[5]. Furthermore Mistral AI Studio offers sandbox, which was essential for development. In the future thorough analysis will be carried out to determine the most suitable model (see 6). When the user starts a goal, they are prompted to take a photo to confirm they have started working on the goal (e.g., gym equipment). Running local classification models using CoreML proved to be too unusable due to the lack of contextual understanding required for diverse user goals. Therefore, the image is sent to the Mistral API along with an optimized prompt.

The VLM reply returns a structured JSON object containing a `score` and `reasoning`. If the score exceeds the threshold determined from experiments across a variety of tested goals (0.5), the goal is marked as successful. If the evaluation detects an irrelevant image or an attempt to cheat, verification fails, triggering the penalty mechanism.

4. Automated Donation Processing

The most technically critical part of ensuring "True Accountability" is the automated penalty execution, shown in the Sequence Diagram in Section 3. The `Stripe API` was chosen over alternatives such as Square or GoPay for the following reasons. Square's payment services are geographically limited and currently unsupported in the Czech Republic. GoPay was unsuitable, as it disrupts the user experience by relying on browser-based payment gateways. To communicate with the `Stripe API`, a custom `FastAPI` backend in Python was implemented. The process has two phases:

1. **Setup:** Using `PaymentSheet`, a `SetupIntent` is created, allowing the user to securely save their credit card details without being charged yet. The card data never touches our backend; it is tokenized directly by Stripe.
2. **Execution (Off-Session):** If the user fails to complete the goal, the iOS app sends a request to the `/charge-penalty` endpoint. The backend creates a `PaymentIntent` with the `off_session=True` parameter. This allows the system to automatically deduct the pledged amount and route it to the chosen charity.

5. Technology Used

The system relies on a modern, distributed technology stack to ensure seamless user experience, security, and scalability:

- **Swift & SwiftUI:** The native iOS application is built entirely in Swift utilizing SwiftUI for a responsive user interface. Furthermore, native Apple frameworks such as `SwiftData`, `AVFoundation`, and `FamilyControls` are utilized for local data persistence, camera hardware access, and OS-level app blocking, respectively.
- **Mistral AI:** The "brain" behind the objective verification. It utilizes the *Mistral Large 3* multimodal API. This allows for highly flexible, context-aware evaluation of the photographic proof in real-time.
- **FastAPI:** The server-side component is a lightweight, asynchronous Python backend built with FastAPI. It acts as a secure intermediary, keeping sensitive environment variables (API keys) safe and exposing REST endpoints (`/payment-sheet` and `/charge-penalty`) for the iOS client.
- **Stripe Payments:** The financial infrastructure powering the accountability mechanism. Stripe handles PCI-compliant card tokenization through its mobile SDK and executes the automated, off-session charity donations via its robust API when a user fails to meet their commitment.

6. Conclusions

The developed application proves that habit tracking on mobile devices can move beyond the easily manipulated habit tracking applications. By combining Swift's modern frameworks with VLM and backend payment processing, we created a tool that enforces true accountability. While the current implementation relies on cloud-based Mistral AI for visual verification, in the future our work could explore on-device VLM, such as Gemma 4 or Qwen3.5, to perform the validation locally, thus enhance user privacy, eliminate online dependency and also become more cost effective.

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References

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