Focusmate :AI-Powered Pomodoro Timer with Focus Tracking

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----------ABSTRACT----------

The rapid adoption of digital learning platforms has increased screen time among students, often leading to distraction, reduced attention span, and digital fatigue. Traditional productivity tools, such as Pomodoro timers, track time passively without evaluating actual user engagement, limiting their effectiveness. This paper presents an AI-Powered Pomodoro Timer with Focus Tracker, a novel system designed to enhance productivity while promoting digital wellbeing. The proposed approach integrates the Pomodoro technique with real-time AI-driven focus detection using computer vision technologies, including OpenCV and MediaPipe. By monitoring facial presence, eye gaze, and head orientation through a webcam, the system assesses users' focus levels during study sessions and provides instant feedback or notifications upon detecting distraction. All session data is securely stored and visualized, enabling personalized progress tracking and reflective analytics. Additionally, facial recognition-based login ensures individualized dashboards and secure data handling. Unlike conventional tools, this system combines structured time management, intelligent attention monitoring, and data-driven insights, empowering students to optimize their study sessions effectively. The proposed solution contributes to research on human-computer interaction and digital wellbeing by demonstrating a practical method to integrate AI-based focus tracking into productivity applications. It serves as both a smart productivity assistant and a digital wellbeing support system, facilitating sustained concentration and balanced technology use among learners.

Index Terms: Digital Wellbeing, Pomodoro Technique, Focus Detection, Computer Vision, MediaPipe, Productivity Monitoring

I. INTRODUCTION

With the increasing adoption of online education and digital tools, students spend extended hours in front of screens, which often results in reduced attention span, mental fatigue, and unhealthy digital habits. Although productivity applications such as timers and task trackers are widely used, they lack the ability to evaluate whether users are genuinely focused during work sessions.

The Pomodoro technique is a popular time-management strategy that divides work into focused intervals separated by short breaks. However, conventional Pomodoro applications assume that time spent equals productivity. To address this limitation, there is a need for an intelligent system that not only manages time but also monitors user attention. The proposed AI-Powered Pomodoro Timer integrates artificial intelligence with computer vision to actively assess focus levels, provide feedback, and encourage mindful technology use, thereby supporting digital wellbeing.

II. LITERATURE SURVEY

2.1 Related Work

Cirillo (2018) introduced the Pomodoro technique as an effective method to improve time management by breaking work into short, structured intervals. While effective, the technique relies on user discipline and lacks automation in focus evaluation.

Fogg et al. (2009) proposed behavior-based persuasive systems that encourage positive user habits through feedback and awareness. Their work highlighted the importance of real-time feedback in influencing user behavior.

Zhao et al. (2020) demonstrated that visual cues derived from facial landmarks and ocular movement analysis can be used to infer user attentiveness in real-time environments..

MediaPipe by Google provides lightweight, real-time face and eye landmark detection, enabling efficient attention analysis in real-time applications.

Despite these advancements, existing systems rarely combine time management, AI-based focus detection, and digital wellbeing principles into a unified solution. The proposed system bridges this gap.

III. EXISTING SYSTEM

Traditional productivity systems primarily rely on **time-based tracking mechanisms**. Applications such as standard Pomodoro timers only record session duration without assessing actual engagement. Users may appear productive according to the timer while being distracted by mobile phones or other activities.

Existing systems suffer from several limitations:

- No real-time focus or distraction detection
- Passive monitoring without user awareness
- Lack of behavioral analytics
- No personalization or secure user identification
- Minimal consideration of digital wellbeing

As a result, these systems fail to prevent digital fatigue, ineffective screen usage, and false productivity.

IV. PROPOSED SYSTEM

The proposed system introduces an AI-Powered Pomodoro Timer with Focus Tracking, which actively monitors user attention during study sessions. The Pomodoro timer and focus tracker start simultaneously, ensuring accurate productivity measurement.

The system uses OpenCV and MediaPipe to analyze facial presence, eye movement, and head orientation through a webcam. When distraction is detected, the user receives real-time alerts through the application interface and optional mobile notifications. All focus data is stored and visualized in a progress dashboard.

The system includes **facial recognition-based authentication**, enabling personalized dashboards and secure data storage. By combining AI awareness, structured study cycles, and reflective

analytics, the proposed system promotes productivity while ensuring digital wellbeing.

V. SYSTEM ARCHITECTURE

The architecture of the AI-Powered Pomodoro Timer follows a modular, layered design to ensure scalability and efficiency.

1) Presentation Layer (Frontend – Streamlit App)

This layer provides the user interface for:

- Starting and stopping Pomodoro sessions
- Displaying real-time focus status
- Viewing progress and analytics The frontend is developed using **Streamlit** for interactive visualization.

2) Application Layer (Business Logic Layer)

This layer manages:

- Pomodoro timer synchronization
- AI-based focus detection
- Distraction alert generation
- Session data processing
- Facial recognition authentication

3) Data Layer (Backend + Storage)

This layer stores:

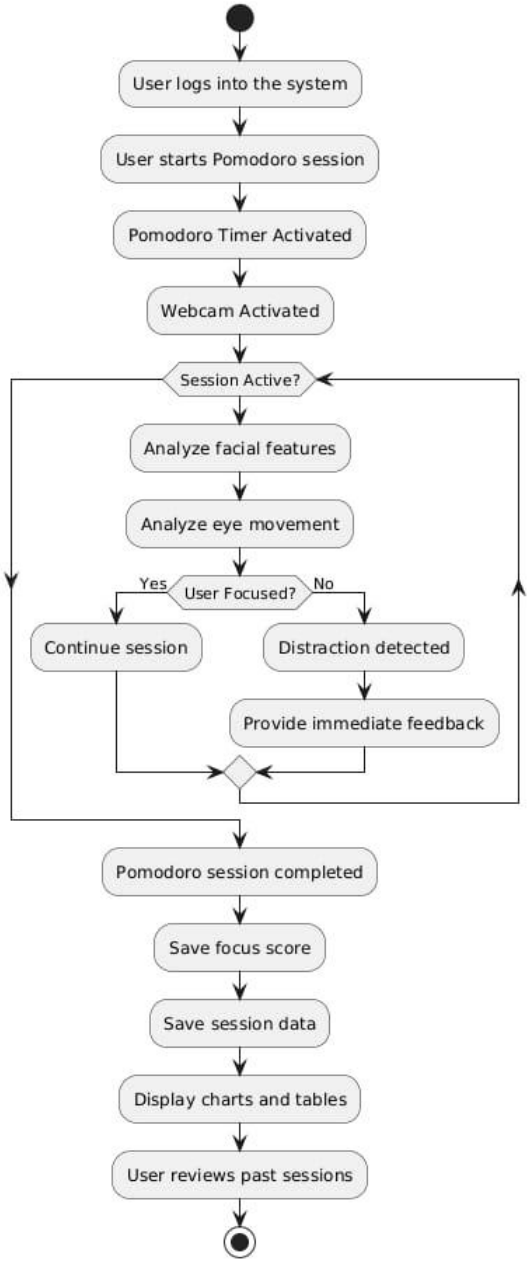
- User profiles
- Focus scores
- Session history
- Authentication data

B. Data Flow Overview

1. User logs in using facial recognition
2. Pomodoro session starts → webcam activates
3. Focus data processed in real time
4. Alerts generated if distraction occurs
5. Session data stored and visualized

VI. WORKING SCENARIO

The user logs into the system and starts a Pomodoro study session. The timer and webcam-based focus tracker activate simultaneously. During the session, the system continuously analyzes facial and eye features to determine focus levels. If distraction is detected, the user receives immediate feedback. Upon completion of the session, focus scores and session data are saved. Users can review past sessions through visual charts and tables, enabling reflection and improvement. This workflow ensures productive and healthy digital study behavior. And also we have used digital wellbeing notifications of only open sources apps using android device bridge and small app for notification triger

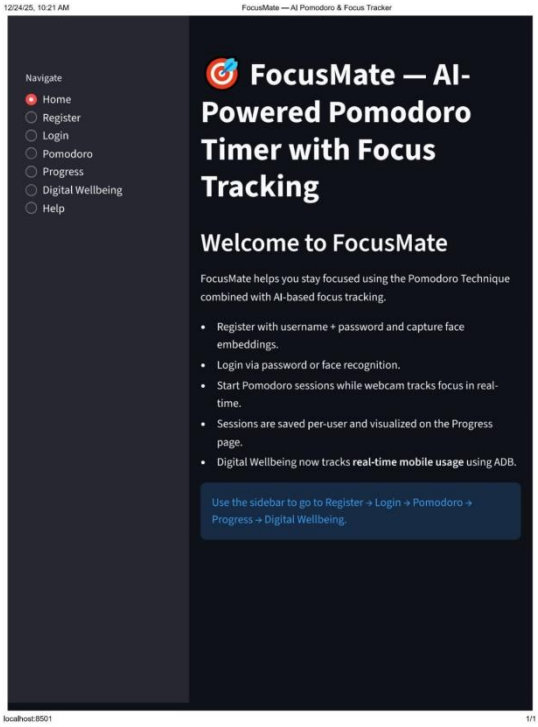


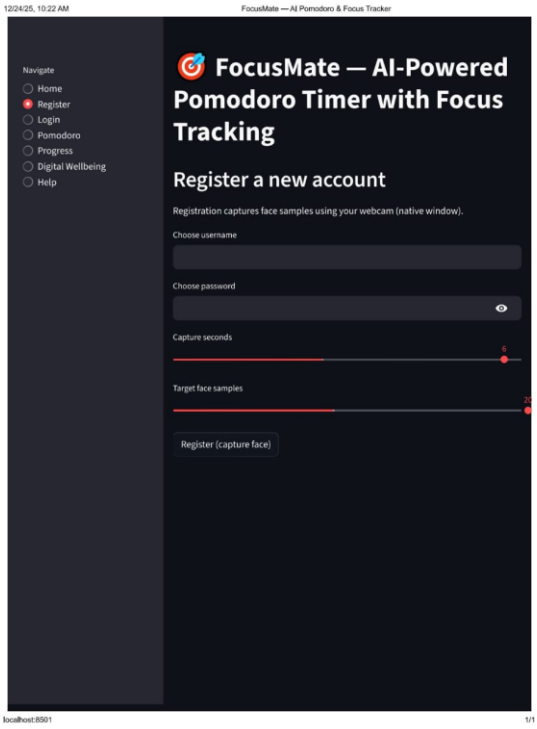
VII. TECHNICAL PART

The system is developed using Python with Streamlit as the frontend framework. OpenCV and MediaPipe are used for real-time face and eye tracking. Facial recognition enables secure login and personalized dashboards. Data storage and analytics are managed using structured files or databases. The system follows a layered architecture to ensure modularity, performance, and scalability.

VIII. CONCLUSION

The AI-Powered Pomodoro Timer with Focus Tracker provides an intelligent solution for improving student productivity while promoting digital wellbeing. By integrating AI-based focus detection with structured time management, the system transforms passive productivity tools into active, awareness-driven systems. The proposed approach reduces distraction, enhances self-discipline, and encourages balanced technology use. This work demonstrates how artificial intelligence can be effectively applied to support healthier digital learning environments.

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FocusMate — AI Pomodoro & Focus Tracker
Navigate
Home
Register
Login
Pomodoro
Progress
Digital Wellbeing
Help
🎯 FocusMate — AI-Powered Pomodoro Timer with Focus Tracking
Register a new account
Registration captures face samples using your webcam (native window).
Choose username
Choose password
Capture seconds
Target face samples
Register (capture face)
localhost:8501
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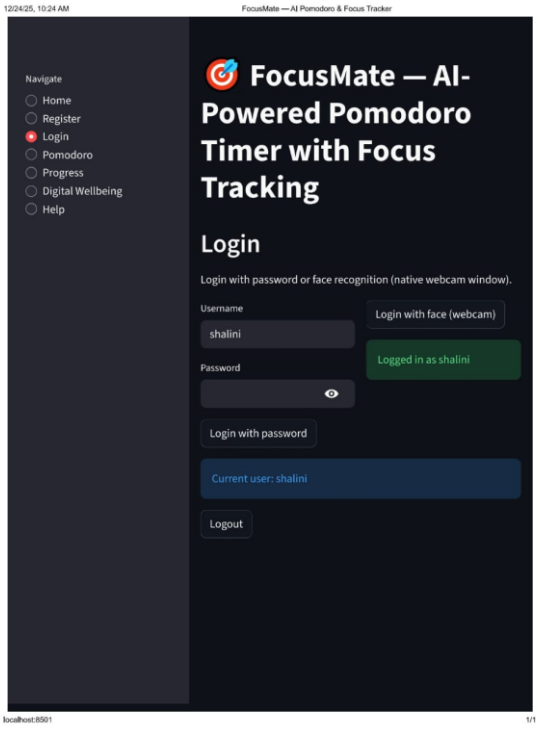
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FocusMate — AI Pomodoro & Focus Tracker
Navigate
Home
Register
Login
Pomodoro
Progress
Digital Wellbeing
Help
🎯 FocusMate — AI-Powered Pomodoro Timer with Focus Tracking
Login
Login with password or face recognition (native webcam window).
Username
shalini
Password
Login with face (webcam)
Logged in as shalini
Login with password
Current user: shalini
Logout
localhost:8501
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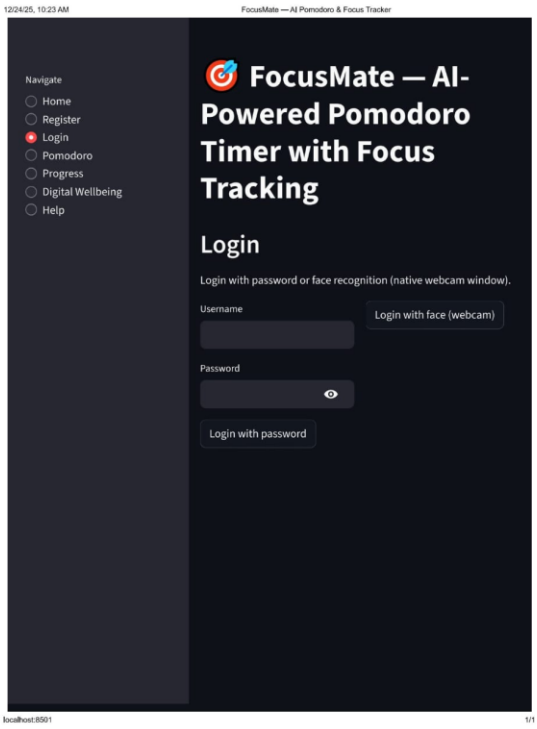
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FocusMate — AI Pomodoro & Focus Tracker
Navigate
Home
Register
Login
Pomodoro
Progress
Digital Wellbeing
Help
🎯 FocusMate — AI-Powered Pomodoro Timer with Focus Tracking
Login
Login with password or face recognition (native webcam window).
Username
Login with face (webcam)
Password
Login with password
localhost:8501
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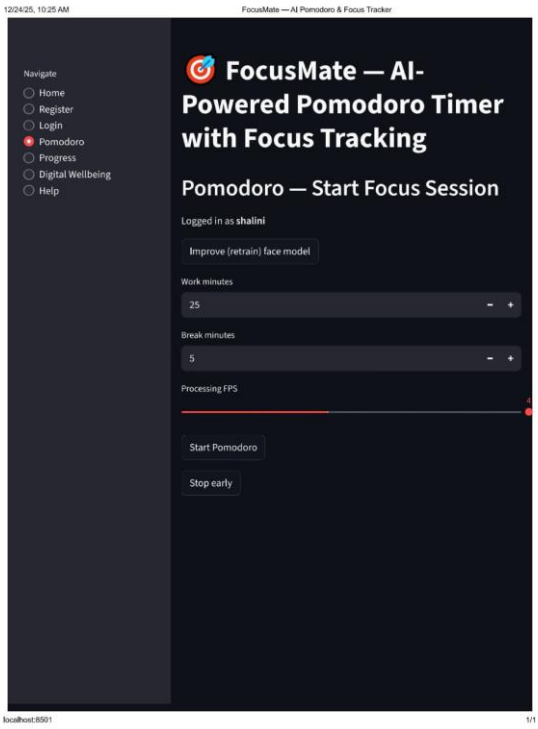
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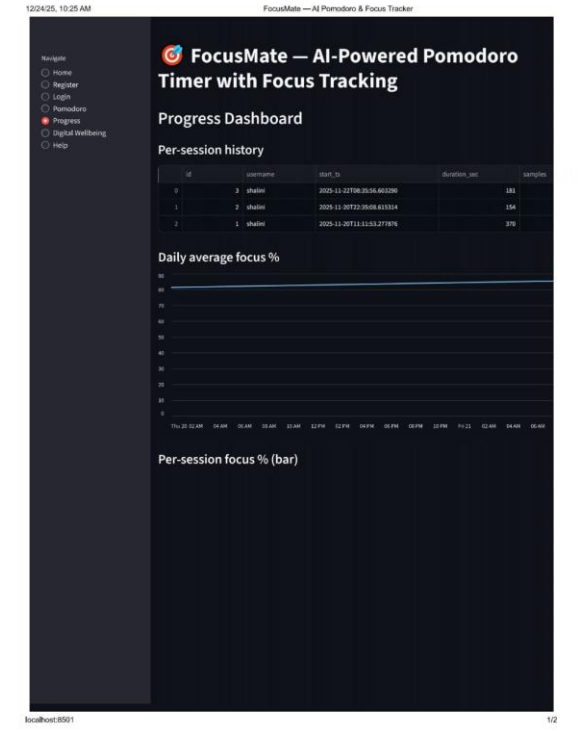
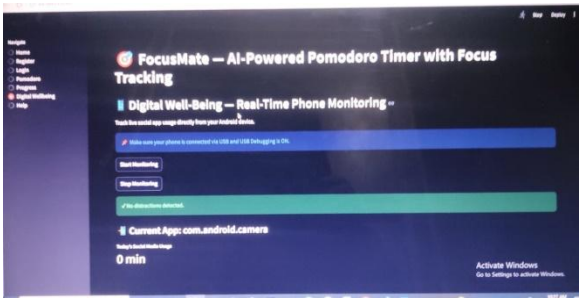
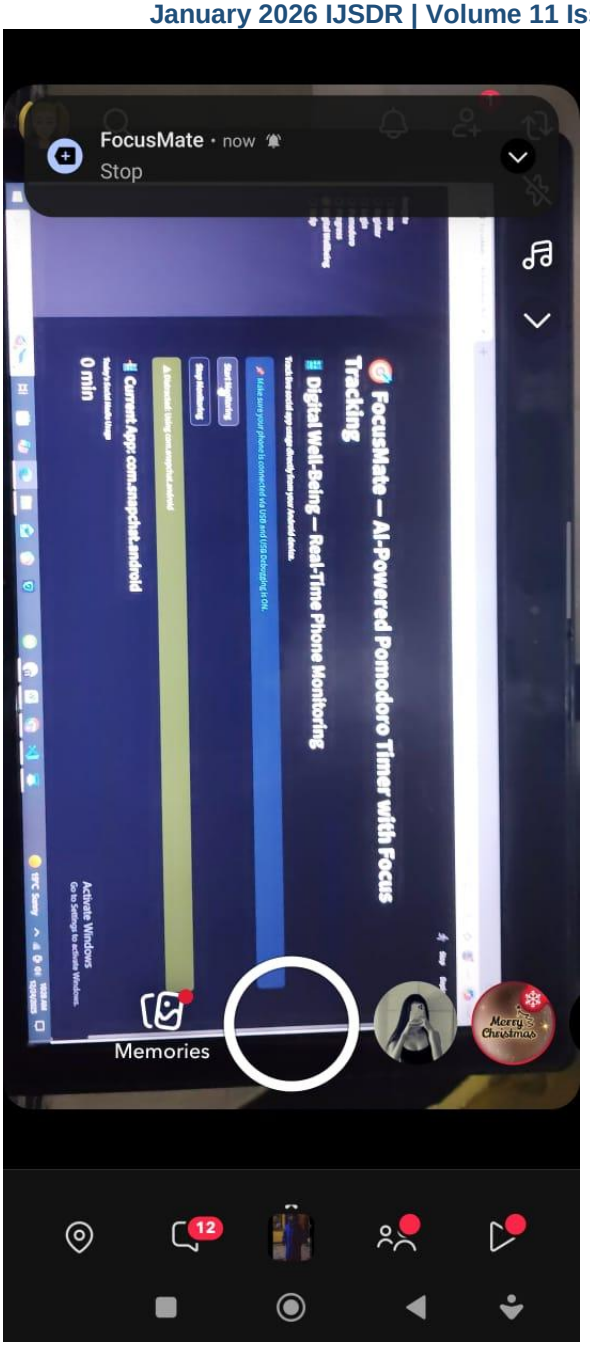
FocusMate — AI Pomodoro & Focus Tracker
Navigate
Home
Register
Login
Pomodoro
Progress
Digital Wellbeing
Help
🎯 FocusMate — AI-Powered Pomodoro Timer with Focus Tracking
Pomodoro — Start Focus Session
Logged in as shalini
Improve (retrain) face model
Work minutes
25
Break minutes
5
Processing FPS
Start Pomodoro
Stop early
localhost:8501
1/1







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