

Gen-O-Clock: AI-Enhanced Employee Time Monitoring and Project Management System

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Abstract: *Gen-O-Clock is a smart mobile application designed to simplify employee time tracking for businesses. Traditionally, organizations relied on manual registers to record attendance and work hours, which were often prone to errors and tampering. These outdated methods could compromise accuracy and lead to mistrust within the workplace. To address these issues, Gen-O-Clock provides a secure, automated solution that monitors employee work activities and ensures data integrity. The app offers essential features like clock-in, clock-out, break tracking, and detailed reports on work durations. This eliminates the need for traditional attendance systems and reduces the risk of disputes between employees and managers. By streamlining time management, Gen-O-Clock creates a more transparent and efficient work environment. What sets the app apart is its integration of speech-to-text functionality and generative AI, allowing for hands-free task logging and intelligent suggestions. These features enhance user experience and support better decision-making by offering real-time insights into employee performance. Gen-O-Clock is more than just a time tracker—it's a tool for modern workforce optimization. By embracing AI-driven technology, organizations can automate routine processes, gain actionable insights, and foster a culture of accountability and growth. This research-backed application serves as a model for companies looking to leverage artificial intelligence in performance management and achieve long-term, sustainable success.*

Keywords: AI-Enhanced Employee Management, Task Management, Voice Recognition, Time Tracking, Speech-to-Text Conversion, Generative AI prompting, Performance Management, User Role Management, Mobile Application

I. INTRODUCTION

Gen-O-Clock is a modern application developed to transform how corporations monitor employee work hours. In today's dynamic business environment, tracking work time can be both challenging and resource-intensive. Gen-O-Clock addresses this by providing a comprehensive digital solution that enables both individuals and organizations to seamlessly record work hours and time spent on daily tasks. This intuitive platform helps companies maintain accurate attendance logs and ensures reliable data for payroll, invoicing, and compliance with labor regulations. With features such as real-time activity tracking, clock-in/clock-out functionality, leave management, and automated overtime calculations, Gen-O-Clock empowers managers to oversee workforce efficiency while reducing administrative overhead. The application also generates detailed reports, allowing leadership to identify trends, pinpoint inefficiencies, and make informed decisions related to staffing, scheduling, and project management. The user-friendly workflow begins when employees log in to access their personalized dashboard, where they can manage timesheets, monitor breaks, request time off, and track task-specific hours throughout the day. Managers benefit from access to real-time analytics on attendance, leave, and productivity metrics. Designed to serve a wide range of industries, including healthcare, manufacturing, retail and consulting, Gen-O-Clock supports both remote and on-site workforces. Its mobile compatibility ensures users can log their time effortlessly from any location. Beyond corporate use, the app is also ideal for freelancers, independent professionals, and project teams seeking to boost productivity and track billable hours.



efficiently. With its feature-rich design and user-centric approach, Gen-O-Clock is a powerful tool for any organization or individual aiming to enhance transparency, optimize time usage, and streamline workforce management.

Benefits of AI-Enhanced Management System:

- The application automates the task logging process through voice and text input, significantly enhancing the efficiency of recording completed tasks.
- By utilizing AI-driven language processing, Gen-O-Clock minimizes biases and errors in task entries, leading to more objective and accurate documentation.
- The app provides immediate prompts for users to confirm their entries, allowing for real-time feedback.

II. RELATED WORK

Employee time tracking applications have seen a surge in popularity among organizations in recent years, providing a streamlined way for employers to monitor their employees' work hours, attendance, and productivity. Numerous applications, such as Gen-O-Clock, Clockify, Toggl, and Harvest, serve as effective solutions for tracking time spent on various projects. These web-based tools allow employees to log their hours based on their schedules and track time dedicated to different tasks. Gen-O-Clock offers a comprehensive suite of features, including a speech-to-text module that enables users to log insights effortlessly by voice. The application supports both manual time entries and automated tracking, ensuring accuracy in capturing work hours. Its reporting functionality allows employers to generate detailed reports on time spent and earnings, viewable by individual employees or teams, and exportable to Excel or PDF for further analysis. Clockify and Toggl are also popular options that allow employees to track their time spent on specific projects and tasks. Both applications provide reporting features that help employers monitor productivity levels. Toggl emphasizes productivity tracking rather than just billable hours, analyzing computer usage to offer insights into time management and efficiency. Similarly, Harvest allows employees to log their hours and provides reporting tools for project budgeting and team management. With paid plans that include additional features like project templates and invoicing, these applications cater to a wide range of business needs. Collectively, these time tracking solutions empower businesses to effectively manage employee time and enhance overall productivity while ensuring compliance and data accuracy in time reporting. Artificial Intelligence (AI) plays a significant role in Human Resources (HR) by automating and enhancing various HR functions. HR streamlines processes, enhances decision-making, and contributes to a more efficient and data-driven approach to human resource management. Data-driven insights are revolutionizing performance management as a result of AI.

Literature Review:

AI systems empower organizations with predictive analytics that enhance strategic decision-making. By forecasting employee performance, companies can optimize team composition, improve project outcomes, and create a more conducive work environment.

In the interdisciplinary field of computational linguistics, speech recognition technology facilitates the conversion of speech to text. A multilingual speech-to-text conversion system has been developed using the Mel-Frequency Cepstral Coefficient (MFCC) feature extraction, combined with Minimum Distance Classifier and Support Vector Machine (SVM) methods. In a notable implementation, an open-source framework, Sphinx, was employed to convert Bengali speech into text [1].

Collaborative time tracking systems (CTTS) are integral to project management, enabling organizations to align with business objectives by monitoring employee activities across multiple projects. These systems capture task-specific start and end times, generate time sheets, track project status, and facilitate managerial oversight [2].

Mobile applications, like Clock Track, streamline employee work-hour tracking using React Native technology, preventing unauthorized data alterations and enhancing user experience for both employees and managers [3].



Employee tracking systems using Android operating systems and SQLite databases allow real-time personnel monitoring and task management via mobile devices. These systems support scheduling and time-off requests while offering analytical tools to assist managerial decision-making [4].

III. PROPOSED METHODOLOGY

In this paper, our proposed system has been developed based on the Software Development Life Cycle (SDLC) which is the one of the popular software development method. Below is a suggested framework that you can adapt based on your specific research objectives, resources, and constraints:

Software Development Life Cycle (SDLC):

The SDLC is a structured approach to creating high-quality software that fulfils customer requirements while staying within budget and timeline constraints. The development of the proposed time-attendance management system follows a process broken down into seven primary phases: planning, requirements analysis, system design, development, testing, deployment, and maintenance.

Planning Phase:

This phase focuses on understanding the core functionalities of the system, including speech-to-text conversion, and collaborative time tracking systems. Requirements are gathered to ensure the system aligns with company objectives, such as employee tracking, project monitoring, time-sheet generation, and report management. Integration with HR and payroll systems, and compatibility with existing software, are also analysed.

Functional Requirements:

The system provides an interface for employees to log their working hours, including start and end times, breaks, and total hours. It will facilitate real time tracking with log breaks and the system calculates total hours worked.

The application will allow users to input task descriptions and updates through voice commands. The system will convert spoken language into text accurately and provide editing options for users to review and correct the text.

The application will generate real time reports and analytics, providing insights into employee performance, project status, and time logged. Managers are able to visualize this data through dashboards for decision making.

The system supports multiple user roles, such as Admin, Manager, and Employee, each with defined permissions for accessing and modifying data within the system.

The system uses AI to enhance text inputs for professionalism, offering suggestions and improvements for task descriptions and management based on the historical data.

Analysis Phase: At this phase, the core functionalities of the Gen-O-Clock system are defined. Key features include user registration, secure login authentication, real-time attendance tracking, and management of company and employee profiles, task assignment, and monitoring. The system also supports automatic calculation of leave, late arrivals, and overtime by recording employee check-ins and check-outs. Additionally, reports are generated to provide insights into employee performance and project progress.

A detailed use case diagram offers a high-level view of how the system's main components interact with users, including the managers, employees, and administrators. The use case diagram in Fig. 1. illustrates the interaction between users and key system functions for efficient project management.

Manager: Managers have an intermediate level of access, managing both their own time and that of their team members. They review and approve employee attendance logs, leave requests, and timesheets, ensuring compliance with company policies. Managers also have access to team performance reports, allowing them to monitor productivity levels, identify trends, and provide feedback to their team



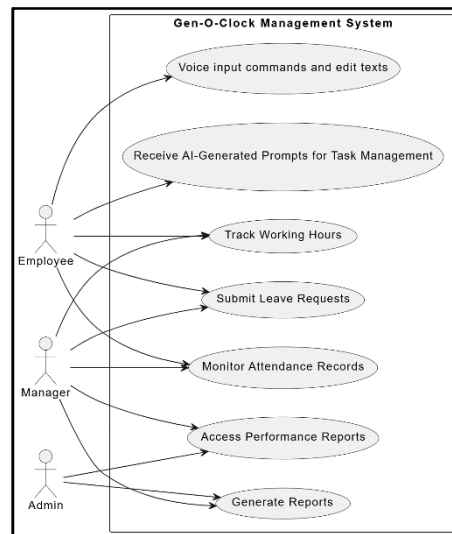


Fig. 1. Use case diagram of the proposed system

Employee: Employees have limited access to the system, focusing on their own time and attendance management. They use the system to clock in and out, track their working hours, and view their schedules or shifts. Employees may also submit leave requests and check the status of their applications.

Design Phase: The design phase includes the system specific designs and workflows based on our application to meet the intended user requirements. The features of the proposed system are described in the system architecture. The user interface should make the user interaction simple and effective.

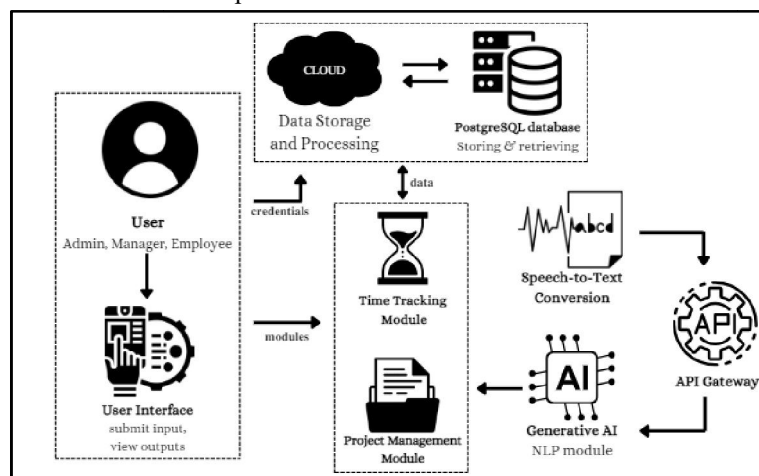


Fig. 2. Overview of the proposed architecture

The architecture diagram in Fig. 2. presents the key components of the Gen-O-Clock system, highlighting its integration of time tracking, project management, speech-to-text conversion, and generative AI functionalities.

At the centre is the User Interface, where employees, managers, and admins interact with the system to submit inputs like time logs, speech data, and project updates. They also view outputs such as attendance records, reports, and AI-generated prompts. The Time Tracking Module handles employee attendance, while the Project Management Module manages tasks and generates reports. Both modules rely on user credentials and leverage Cloud Storage and Processing, with the PostgreSQL database storing time logs, attendance, and project data securely.

The Speech-to-Text Conversion Module converts multilingual speech inputs into text. This integrates with the Generative AI Module, which provides task prompts and summaries, enhancing task management. The API Gateway ensures smooth, secure communication between all system components and external services.



Development Phase: The Development Phase of the Gen-O-Clock system involves translating the designed architecture into a working application by implementing its core components, integrating databases, AI functionalities, and speech-to-text features. For simple implementation and maintenance, we use Model-View-Control (MVC) framework and PostgreSQL database system allowing efficient code reuse and parallel.

TABLE I: Technology Stack Description

Technology	Description
Visual Studio Code	It is a versatile code editor to develop code
React Native	It is a framework for building mobile apps using JavaScript
Node.js	It is a runtime for executing JavaScript on the server side
PostgreSQL	It is a powerful open-source relational database
GPT-4 (OpenAI)	It is a generative AI language model
Microsoft Azure	It is a cloud platform providing cloud services like storage, etc.
Github	It is a repository hosting service for version control
JIRA	It is a tool for project management and issue tracking

Testing Phase: The Testing Phase for the Gen-O-Clock system is a critical stage where all components and functionalities of the system are thoroughly evaluated to ensure accuracy, reliability, and user satisfaction. This phase involves several types of testing to validate the system's performance under different conditions.

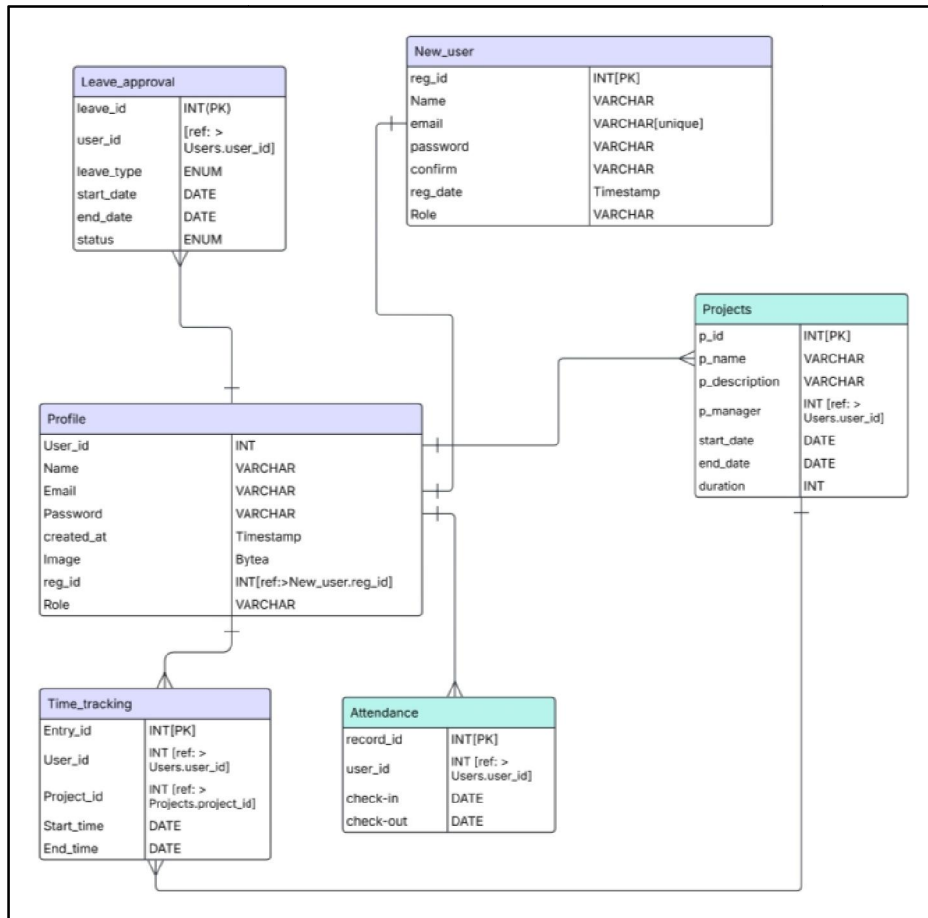


Fig. 3. Database diagram of the proposed system



Fig. 3 shows the database schema representing the system with six interconnected tables. The New_user table stores registration details like reg_id, name, email, password, and role, while the Profile table extends it by linking user_id to reg_id and adding attributes like image and created_at. The Leave_approval table manages employee leave requests, tracking and status. The Projects table stores project-related information, including p_id, p_name, p_manager, start_date, end_date, and duration. The Time_tracking table monitors work hours by associating user_id and project_id with start_time and end_time. Lastly, the Attendance table logs check-in and check-out times for employees. These relationships ensure seamless tracking of employee activities, projects, attendance, and leaves, optimizing overall workforce management

Mathematical Model:

The mathematical model describes the different modules and their interaction with other modules to form the required system for the expected architecture.

$$UI = f(U)$$

The User Interface (UI) is a function of user interaction (U). Users interact with the UI to perform actions.

$$PM = g(UI)$$

The UI facilitates Project Management (PM) functions (task assignment, progress tracking, leave approvals).

$$TT = h(UI)$$

The UI also manages Time Tracking (TT) (logging hours, tracking work duration).

$$API = j(PM, TT)$$

The API Gateway integrates both PM and TT functionalities, serving as a communication bridge.

$$P = k1.PM + k2.TT + k3.API + k4.GA + k5.STT$$

where k_i are constants representing the weight of each module's contribution to performance.

GA be the Generative AI module for prompting

STT be the Speech-To-Text module for user input

IV. RESULTS AND DISCUSSIONS

The development of the Gen-O-Clock application demonstrates a transformative approach to task management and employee engagement in corporate settings. By integrating cutting-edge technologies like multilingual speech recognition, Generative AI prompting and advanced analytics, the platform addresses key inefficiencies in traditional task tracking systems. This section delves into the anticipated outcomes and their strategic implications for organizations.

The Gen-O-Clock application is built using modernized android technologies, with React Native powering the front-end, NodeJs managing the back-end, and PostgreSQL serving as the database. This combination of technologies ensures that the application is fast, scalable, and secure. Gen-O-Clock is accessible from any device, providing a flexible and convenient time tracking remedy for organizations of varied sizes. Here is a breakdown of how the application functions:

- Employees log into using their unique credentials.
- They can track hours either manually or through automated tracking features.
- All the data is stored in a centralized PostgreSQL database, which employers can fetch to analyze detailed reports and invoices.
- Employers can also monitor employee activities, such as time spent on specific tasks or projects.
- Managers or HR allocate the tasks and roles to every employee as per the hierarchy of the project teams.
- Employees can receive alert for the tasks having deadline nearer to the latest date.



One of the standout features of the Gen-O-Clock application is its advanced speech-to-text module, which significantly enhances user convenience and productivity. Instead of manually typing out their work insights or updates, users can simply speak into the application, and their voice will be automatically converted into text. This feature is especially useful for users who need to log their tasks or provide detailed reports on the go, as it saves time and reduces the effort involved in typing. Another innovative feature of Gen-O-Clock is its integration of Generative AI prompts, powered by the OpenAI model, to assist employees in providing comprehensive and detailed work updates. As employees log their tasks or projects, the AI generates context-specific prompts to ensure that all critical information is included. For instance, the AI might prompt the user with suggestions such as, "Please include the duration of the R&D you performed," or "Please list the technology stack you used for the project," and "Please mention the team members you collaborated with on the R&D". These intelligent prompts not only guide users in capturing essential details but also help standardize reporting across the organization.

Timer Page: Fig. 4 shows the timer page of our mobile-based application provides the main features to start timer, get suggestions on user input, and add people, projects and tasks.

Attendance Page: Fig. 5 is the page that allows all users to view the attendance records. It displays the daily entry and exit times of employees, tracking their work hours. Users can select a specific month from the drop-down menu to view attendance details for that period.

Fig. 6 shows an Employee Dashboard that provides a visual representation of various key performance indicators (KPIs) related to an employee's work and productivity. The Task Completion line chart tracks tasks completed over time, while the Pending vs. Completed Tasks bar chart compares assigned and completed work. The Deadline Adherence Rate bar chart visualizes on-time task completion, and the Employee Engagement Level donut chart shows participation distribution among employees.

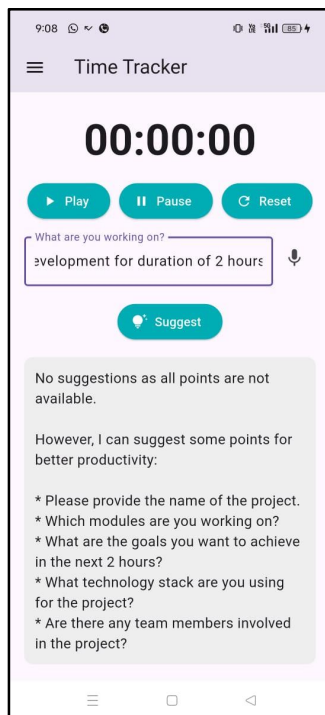


Fig. 4. Timer Page

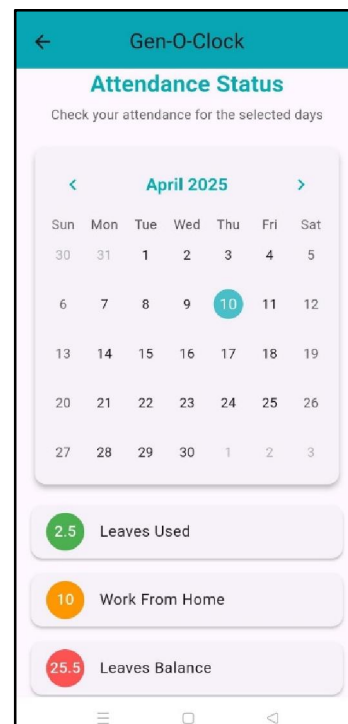


Fig. 5. Attendance Page





Fig. 6. Dashboard of the proposed system

V. CONCLUSION AND FUTURE DIRECTIONS

The Gen-O-Clock system presents a transformative solution for enhancing employee performance and driving organizational growth through AI-powered performance management and real-time time tracking. By leveraging advanced technologies, the platform enables accurate monitoring of employee hours, improving accountability, preventing payroll abuse, and fostering higher productivity. The integration of continuous feedback mechanisms supports employees' ongoing development, aligning individual progress with organizational objectives. In doing so, Gen-O-Clock not only streamlines managerial oversight but also promotes better employee engagement, morale, and overall operational efficiency, making it an essential tool for modern workforce management.

To further enhance Gen-O-Clock, future improvements could include predictive analytics for forecasting attendance and optimizing scheduling.

Automatic scheduling using machine learning would reduce errors and increase productivity. A platform integrating company news, benefits, and recognition programs would boost employee engagement.

Uploading and verifying legal documents by the employees to the application as a part of the work. Integrating latest technologies like PowerBI to simplify the dashboard mechanism at the managerial and HR role for organizational handling.

Seamless integration with HR systems, such as performance management, talent development, and payroll, would help managers track and reward contributions.

Additionally, features ensuring compliance with labor laws, personal notifications for key updates, and stronger data security measures like multi-factor encryption would safeguard employee information as well as streamline operations.

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