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RESEARCH PAPER

AI Assistants in the Workplace: Goal-Oriented Recommendations Using LLM

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Abstract
Self-quantifying technology enables users to evaluate their performance and define strategies for improvement. Workplace technology assists users in identifying activities and patterns that facilitate task completion. Software that measures workplace signals requires access to information from the user interface and peripherals. Current software solutions that track computer activity lack goal orientation and do not share raw data that could aid users and researchers in analyzing behavioral patterns at work. This paper presents Wellbot, an intelligent AI assistant capable of tracking workers' activities and providing personalized insights. The solution employs machine learning models to detect goal-oriented and recreational time. Based on users' goals and recent activities, Wellbot generates recommendations aided by Large Language Models. This work aims to enable tools that assist workers through an improved understanding of their context and goals.

Keywords:
LLM; Artificial Intelligence; Machine Learning; AI Assistant; Workplace; Recommendations

1 Introduction
AI assistants in the workplace are designed to support users in activities that optimize time management. In the contemporary professional landscape, a significant portion of the workforce relies on computers to perform their duties. Employees primarily engage in activities such as document creation, internet browsing, and navigation between various applications to accomplish their tasks. These activities are cognitively demanding, requiring high levels of focus, concentration, and memory. Given the demanding schedules that individuals across various disciplines face, there is an increasing need for assistance in managing workplace tasks.

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Recognizing the diversity of workplace contexts, our research defines "workplace" as any environment where computer-based tasks are performed to achieve professional goals. This project explores the design of an artificial intelligence (AI) assistant aimed at facilitating task completion and providing recommendations to workers. The objective is to develop an AI personal assistant capable of offering scheduling and recommendation services to enhance task management. To achieve this, we employ a Large Language Model (LLM), a text-based model known for its ability to understand and generate text, among other functionalities. LLMs have become increasingly valuable in contemporary settings, serving as the foundation for our assistant's capability to generate tailored recommendations and schedules for specific tasks.
This study represents a novel approach compared to existing research, focusing on the development of an AI assistant that can provide both scheduling and recommendations using a Large Language Model (LLM) [2, 3]. Our approach fills the gap in solutions, offering task recommendations specifically tailored for the workplace [4, 5]. The motivation behind this study is to introduce Wellbot, an AI-powered assistant designed to help users complete their tasks by offering personalized recommendations. In the subsequent sections, we will delve into how Wellbot can assist users in managing their workplace tasks.

2 Related Works
The general concept of AI assistants in the workplace has been explored from different angles. The 'Donna' project [2] aims to create an AI-based personal assistant that functions as a virtual secretary, helping individuals plan their schedules and meetings. It automatically forwards the user's meeting-related emails to itself, manages the coordination to schedule meetings at convenient times on the user's calendar, and integrates with Google Calendar to check availability. TaskTracer [3] is another software system designed to assist highly multitasking knowledge workers in quickly locating, discovering, and reusing past successful processes for task completion. It monitors users' computer interactions, collects detailed records of activities and resources accessed, and associates each event with a task. This enables users to access records of past activities and quickly restore task contexts, aiding in interruption recovery and knowledge reuse.
Another study on smart assistance [4] explores the use of intelligent agents in an office setting, employing a paraphrase-based approach to match agent capabilities with to-do items. It also investigates the use of personal tasks along with the types of assistance that can be provided to the user by elaborating them based on knowledge

extracted from the web. Additionally, it explores the coordination between different users via a to-do management application deployed on social networks. E-Mail Monitoring and Management with MS Social Bots [5] is another study utilizing social bots for personal communication, specifically in helping users answer emails automatically. This research employs the MS Bot Framework to develop a bot application that monitors incoming emails, identifying appointment requests by analyzing message content and matching it with user-specific preferences and settings using AI.

We compare Wellbot with other AI assistant systems discussed in this section, including Donna and TaskTracer, to evaluate the relative of each system. Table 1 presents a comparative analysis focusing on key features such as providing recommendations, scheduling capabilities and task management efficiency.

Table 1. Comparative analysis of key features in systems

Features	Wellbot	Donna	TaskTracer
Recommendations	Yes	No	No
Scheduling	Yes	Yes	No
Task Management	Medium	Low	Low

3 System Overview & Implementation

Wellbot is a software solution designed for installation on operating systems, capable of executing a series of interconnected steps to assist users in their tasks. The system begins by receiving a task from the user and then proceeds to monitor user activities in real time. Subsequently, it transmits both the task and the recorded user activities to a Large Language Model (LLM). Finally, Wellbot retrieves recommendations generated by the LLM and displays them through its user interface.

We have implemented Wellbot for Windows and macOS operating systems due to their widespread use. This section describes how users assign tasks to achieve their objectives. In the experimental version, we have provided a predetermined task for users, which is already integrated into the Wellbot script. Future iterations may include an input bar for users to enter their own tasks.

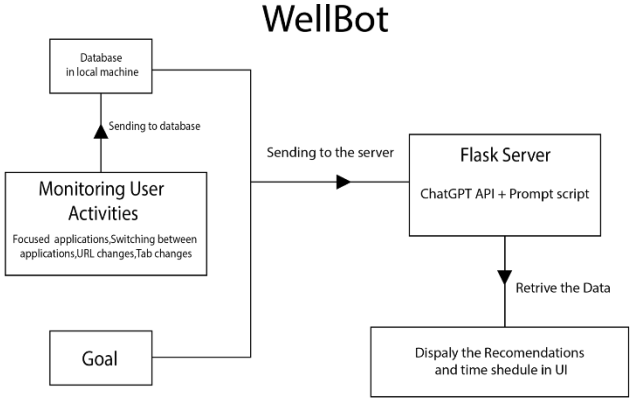

Figure 1. Wellbot architecture

Monitoring the User Activities:

Wellbot is capable of monitoring user activities in real-time on each operating system, including application switching, application opening, and recording timestamps. At this stage, Wellbot does not employ AI for activity monitoring but utilizes a standard algorithm for detection. To capture real-time browser activities such as URL changes and tab switches, we integrated an extension with Wellbot. This extension, developed using JavaScript, is currently compatible only with the Chrome web browser. By leveraging these applications and extensions, we aimed to create a comprehensive user activity monitoring system for both macOS and Windows environments. These monitored user activities are recorded in a database for further analysis.

Transmitting Task and User Activity Data to the LLM:

Wellbot utilizes the ChatGPT 3.5 API, which is deployed on a server using the Flask web framework. ChatGPT generates recommendations based on user-monitored data sent to the server in chronological order. Prior to transmission to ChatGPT, Wellbot stores monitored user activities in an SQLite database, including timestamps, tab names, URLs, and focused application names with which the user interacted during the goal-oriented period. Figure 2 illustrates the real-time activity monitoring process, where Wellbot records the user's interactions with various applications. The recorded data in Figure 2 is sent to ChatGPT according to an assigned time frame, which, in this experiment, is set to 3 minutes. The server-side implementation employs the ChatGPT 3.5 API within the Flask framework, utilizing specific prompts in the server script to generate recommendations

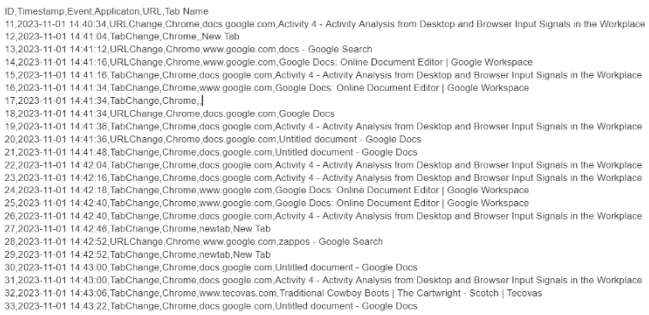

Figure 2. Recorded data during the task period

Retrieving and Displaying LLM Recommendations:

Figure 3 shows the corresponding recommendations generated by the LLM based on the recorded data in Figure 2. These recommendations are presented in a readable and comprehensible format for the user.

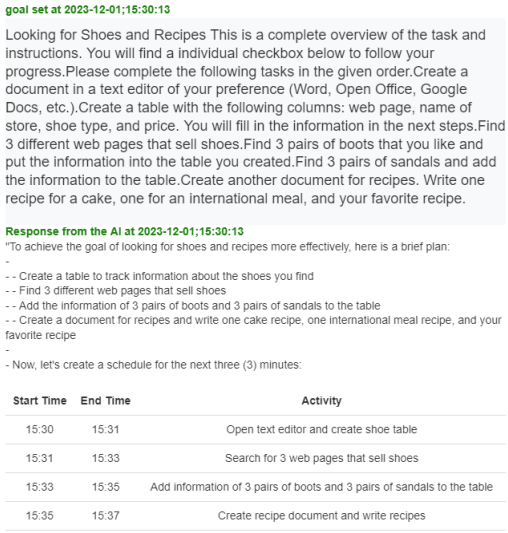

Figure 3. Recommendations

4 Methodology

Research design: The primary objective of this study was to evaluate the effectiveness and user experience of Wellbot, an AI assistant designed to aid in task management and provide goal-oriented recommendations. To achieve this, we employed a mixed-method approach, combining quantitative data from surveys with qualitative insights from interviews. The study consisted of three main phases: a pre-survey, task execution using Wellbot, and a post-survey followed by interviews. The entire study duration was approximately 45 minutes per participant.

Pre-Survey: The pre-survey aimed to gather baseline data on participants' online habits, the types of applications they frequently use, and their general approach to productivity. This information was crucial in tailoring the tasks to be representative of typical workplace activities and ensuring that the evaluation was relevant to the participants' daily routines. Sample questions from the pre-survey are shown in Figure 4.

Task-Execution: Participants were asked to complete one of two activities designed to simulate common workplace tasks, such as data gathering and information organization, using Wellbot. The first task involved creating a table with information about the CEOs, CTOs, and regular employees from three major tech companies, while the second task required finding different types of shoes from various stores and organizing this information into a Word document. These tasks were selected based on the insights gathered from the pre-survey and were designed to assess Wellbot's ability to assist in task management across different contexts.

Post-Survey & Interviews: Following the task execution, participants completed a post-survey, which focused on their experience using Wellbot, including its usability, effectiveness, and any privacy concerns. The post-survey contained both multiple-choice and open-ended questions, with sample questions presented in Figure 5. To complement the survey data, semi-structured interviews were conducted to gather in-depth feedback on the overall user experience with Wellbot, including likes, dislikes, and suggestions for improvement.

Participants: The study targeted English-proficient students from Clemson University. Six participants were recruited for this preliminary evaluation. While this small sample size provides initial insights, future studies will involve a larger participant pool to enhance the robustness of the findings.

5 Results

In the pre-survey questionnaire, we focused on online habits and some questions regarding productivity. In the future, we plan to improve the productivity of users. Figure 4 shows what type of questions were asked in the pre-survey.

Which operating system do you regularly use?
How many hours do you use the computer per day?
What kind of activity do you do on your computer?
How much time in each activity do you spend on your computer?
Productivity apps that you use?
How many web pages do you use today?
What do you do to be more productive at work?

Figure 4. Pre-Survey sample questions

Most of the questions are designed for future work of this study. Here are some analyses of the pre-survey. Figure 6 a) bar chart depicting the distribution of daily computer usage among six respondents. Half of the respondents use the computer for more than 8 hours a day, indicating a significant portion of their day is spent on computer-related activities. The remaining half of the respondents are evenly split between 3 hours, 6 hours, and 7 hours per day, showing a lesser dependency on or need for computer usage.

Figure 6 b) is a bar graph representing the types of activities these respondents engage in on their computers. Education is an ordinary activity, with all six respondents 100% using their computers. Lifestyle activities are closely followed, with 4 out of 6 respondents, 66.7%, engaging in them. Art and Design, Productivity, Social, and Gaming each have an equal share, with two respondents, 50%, using their computers for these activities. This distribution suggests that while the computer is used for a variety of activities, educational activities are the primary driver for its usage in this group.

Regarding the pre-survey analysis, we determined the amount of time each user spent on their computer daily, the types of activities they engaged in frequently using their computer, and the methods they currently use to be productive at work. This provided insights into their computer usage habits and needs. The results showed that users spend considerable time of their day on their computers, using them primarily for educational activities. Most employ schedule planning, developing routines, and taking breaks to be productive. This suggests that users are looking for an AI assistant that can help optimize their time on the computer by assisting with academic and educational tasks. By understanding their computer activities, we gained a picture of what type of activities users like to archive using AI assistant. The pre-survey analysis established a foundation for developing an AI assistant prototype to match their needs and the type of activities they are doing daily.

In the post-survey questionnaire, we focused on how users experienced after using the Wellbot. Figure 5 shows what type of questions we asked in the post-survey. For the post-survey, some respondents agree that the Wellbot helps them complete their activities. And other respondents remained neutral, indicating neither agreement nor disagreement. Also, few responses indicated any level of disagreement.

The recommendations of the Wellbot help me to complete the activities?
The recommendations of the Wellbot me to avoid distractions?
The results of the Wellbot help me to plan the activity easily?
The results of the Wellbot help me have better work management during the activity?
Recommendations from Wellbot are easy to read?
The duration of the activity and the time spent viewing recommendations from the UI of the Wellbot sufficient?
The recommended time schedule from Wellbot easy to understand?
The recommended schedule from the Wellbot helps manage your task?
Would you like to use this app regularly?

Figure 5. Post-Survey Sample questions

For planning the activities, 3 out of 6 respondents feel that the Wellbot assists in planning activities, suggesting a level of satisfaction with this feature. However, there's a notable divide as one respondent disagrees, indicating that the Wellbot may not be as helpful for some users regarding planning. Also, participants agree that the Wellbot aids 66.7% in better work management during the activity. However, two respondents disagree. The absence of neutral or strongly disagreeing responses could imply that the users have a clear stance on the Wellbot's effectiveness in this area.

Overall, the post-survey indicates that respondents find the Wellbot helpful for completing and managing work during activities, with a particular endorsement for planning activities. However, the participants' responses suggested that there might be areas for improvement in the AI assistant features or user experience.

The feedback on the Wellbot experience Figure 6 d) is mixed among the six responses provided. The first user feels that the Wellbot could have significantly improved in time management but acknowledges some useful recommendations. The second user experienced initial frustration but believed that the Wellbot could become more user-friendly with more work and familiarization. The third user reports that the Wellbot was efficient in task completion, with AI suggestions being notably beneficial. Overall, while the Wellbot aspects are appreciated, users suggest improvements in its design and presentation of information for a more streamlined user experience.

During the interviews, we asked participants if they liked using this type of tool, to which they agreed. When asked about their preferred activities, they mentioned academic writing as their primary focus.

In the interview process structured around the use of an AI assistant, six participants (P1, P2, P3, P4, P5, P6) provided insightful feedback on the tool's impact and potential enhancements. The general consensus was that the tool facilitated their activities. P3 expressed appreciation for the tool's suggestions on effective task management: "So I think it would help. Um, it definitely helped. Like, give suggestions on what to do next and how to do it more effectively."

The participants also shared the types of activities they would like the tool to assist with. Academic writing and coding tasks were commonly mentioned, with a desire for the tool to provide specific URLs based on Google ratings. P1 found it particularly useful for writing papers: "Um, so, like, in writing papers, I think that'd be really helpful, especially, like research papers. It was telling me, like, how to navigate between tabs better. Um, so I think that would be really helpful. Like writing papers for school or for research studies or anything." P2 mentioned this sentiment, highlighting the tool's potential assistance in coding.

Interestingly, P4 preferred receiving periodic reports on productivity rather than immediate recommendations: "Maybe if I could get, like, a monthly report of where I could improve my performance, optimize it and stuff like that, it would be you."

However, not all feedback was entirely positive. Two participants noted that the tool could be distracting during tasks. P4 shared, "Kind of because I was trying to concentrate on what I was doing. So it was being popped up continuously. So it was a bit distracting."

Despite some concerns, the overall sentiments were optimistic, with all participants acknowledging the tool's potential to enhance productivity and balance in their day-to-day lives. P5 and P3 noted its capability to provide accurate work estimates and improve productivity.

I think it will because it can give me the proper estimates, like how I'm working "P5. Also, P3 mentioned that

"In essence, it will increase productivity because if we meet my expectations, then I think it's good. " P2 added a note of realism, recognizing the tool's potential but also its need for further development: "I think there's a potential. It needs some work, obviously."

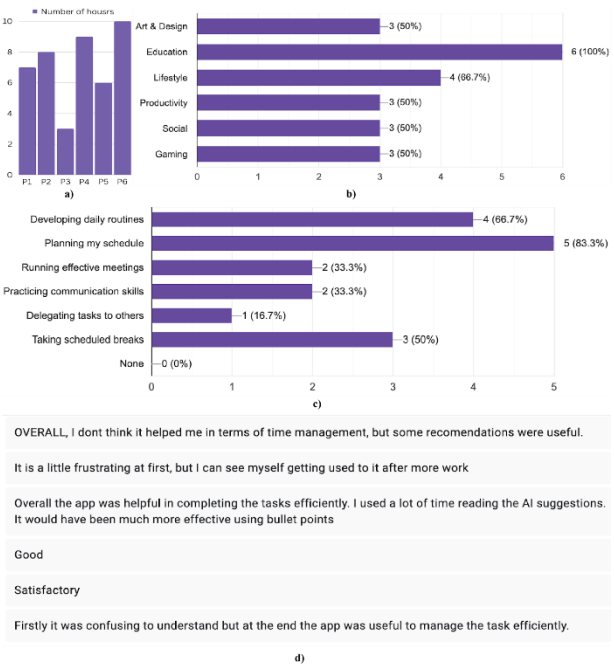

Figure 6. Results a) Number of hours users spend on the computer. b) Daily Engaging activities. c) Feedback.

6 Discussion & Conclusion

This study investigates the potential of AI assistants, specifically through the development and initial testing of a system called "Wellbot," designed to enhance productivity in the workplace. Wellbot monitors computer activities to discern between work-related and recreational tasks, subsequently offering personalized recommendations and scheduling assistance without compromising user privacy. A pilot study with six participants revealed generally positive feedback, with users acknowledging Wellbot's helpfulness in task completion and workflow management. Despite this, some participants did not find the tool particularly beneficial, highlighting the need for improvements in its user interface and recommendation delivery. In the future, we plan to increase the number of participants, which could lead to a more positive change in these results. These insights underscore the necessity for AI assistants to integrate seamlessly into existing workflows and present clear, actionable suggestions. As AI and natural language processing technologies advance, workplace assistants like Wellbot could become more intuitive and responsive to individual work styles. The study emphasizes the importance of designing AI tools that prioritize user privacy and align with ethical guidelines, thereby fostering trust and broader acceptance. While the findings indicate promising potential for AI in augmenting workplace productivity, they also call for ongoing refinement and more extensive research to address user needs effectively. Overall, the study provides foundational insights into human-AI collaboration, suggesting that thoughtfully designed AI assistants could significantly transform work experiences and enhance efficiency, provided they are deployed with a focus on ethical considerations and user-centric design.

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