Stretch-a-little

Take a break from your computer

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ABSTRACT

In today's digital world everything is linked with computers and the dependency on computers is increasing every day. Most people spend a lot of time on computers for various purposes like work or education or even for relaxation. Long hours spent sitting at a desk, prevalent in today's information-based economy, have been linked to a variety of negative health outcomes like poor posture, increased risk of back pain, and decreased circulation. These in turn can increase the risk of conditions like deep vein thrombosis and other circulatory problems.

To help alleviate these health issues, the Stretch-a-little desktop application subtly prompts its users to stand up every so often. This application seeks to mitigate these negative impacts by encouraging users to incorporate regular standing breaks into their daily work routines. Integrating these brief rest periods naturally into the work has been shown to have positive effects on workers' health and productivity. The app's notification mechanism is subtle and allows users to choose their own intervals for reminding them to stand up and move about.

1 INTRODUCTION

Modern work and education environments encourage long periods of sitting have changed the nature of occupations from active to sedentary. The switch from paper-based to computer-based and paperless work is one of the reasons for this change. Office workers in multiple fields spend most of their day sitting down. The side effects of sitting down for prolonged periods of time are often underestimated and overlooked by people. Premature death is an effect of a sedentary lifestyle, along with a risk factor for cardio-metabolic disease, type 2 diabetes, obesity, coronary artery disease, musculoskeletal disorders, and some types of cancer. According to the World Health Organization (WHO, 2013), a sedentary lifestyle contributes to premature deaths of 3.2 million people worldwide each year.

Contrarily, leading an active lifestyle is important and enhances general health and lowers the risk of developing chronic conditions. Using stairs instead of elevators or escalators could help people get some exercise done during the day. Taking a quick break to enjoy a stroll outside can also help increase the productivity of people. Activity trackers encourage behavior-change strategies like goal-setting and self-monitoring, and their use has been linked to higher levels of physical activity. Many applications, smartwatches and smartphones are available in the market to provide timely alerts with the support of algorithms and advanced sensors. They motivate us to keep moving, establish fitness targets, and make better choices.

Stretch a Little desktop application helps address a few problems given by an inactive lifestyle of the modern office settings by encouraging users to take regular standing breaks throughout their workday. It is important to notify the users to take regular breaks based on their preferences to help promote a healthy lifestyle and improve their overall productivity and well-being. Our desktop application's target users are anyone with prolonged computer usage.

The end users are diverse and could include:
Office workers: Spend a significant time in the office working on computers.
Students: High school/college students involved in extensive computer-based education
Gamers: Who play video games for a prolonged time on computers

Remote workers/Freelancers: Who work from home and rely heavily on computers professionally.
People with sedentary lifestyles: Spend a lot of time on computers for personal and leisure activities.

When we researched the existing solutions, we noticed that they were usually a small part of the health trackers. Though stand-alone applications exist, they usually miss the customization and interactive interfaces, which most of the users mentioned in the survey. The existing applications want the users to cater to its needs rather than the application catering to the users' needs. It is important to include what the users want in the application to help them have a sense of control over the application which in turn will lead to more usability and improved well-being of the users. From our research and the user interviews, we plan on including the important features of the existing application along with what the users want.

The motivation for our design is mainly the user feedback. By using our application, the users can take small steps towards a healthier lifestyle and more active work life. Our interface is a desktop application run on computers whose primary feature is to subtly remind people to stand up periodically based on their own setting of working/studying hours. As the users spend most of the time on their computers/laptops, instead of using an additional device, our application will be running on them. This application allows users to customize their standing goals based on their requirements, as it was one of the main issues the users faced (based on the survey and interview results). It also provides a few basic stretches the uses can perform quickly and some articles related to the stretches. The application overall has a more interactive interface, features other than customization the users wanted. The combination of all these features is not being offered in the applications available today.

Another unique feature we have included in our interface is the "read" notification that tells the users to stand up based on the set goal. We decided to include this feature to help support the users with low vision or the users that are old adults and would like to listen to the notification asking them to stand rather than try to read the notifications. The application tries to empower people to achieve better work-life balance, increased energy and productivity. This application is a useful and efficient tool to improve the health and happiness of the modern workforce.

2 INITIAL DESIGN

Our initial design is a desktop application designed to encourage users to take regular breaks during their work. It sends users notifications to stand up, providing customizable options for more user-friendly and personalized experience. The user interviews and surveys, user-centered design principles and existing solutions combined with our research factored the initial and final design elements and features.

We have included two main features in our design: a more friendly interface with user personalization and quick basic stretches for the users to do. The main feature is to have more user-friendly interfaces that give users the control to receive the notifications based on their preferences and personalization rather than setting some fixed schedule. This helps encourage a better lifestyle by giving users a greater sense of control over the application and their work-life balance. For a more interactive and user-friendly approach, the users can easily edit their preferences and receive notifications as they like.

The second main feature we included is a few basic stretches the users can perform to help improve their active lifestyle. There are also instructions provided on how to perform these stretches along with few articles related to the stretches. The combination of these features is not being offered in the applications available today. Another unique feature we included in our initial interface is the "read" notification that tells the users to stand up based on the set goal.

After considering all the user interviews and survey, we designed our interface design to incorporate more customization. Taking this further, we created a high-fidelity prototype that accurately represents the final product and we have presented it to the class. While there were a few areas for improvement, overall, the feedback we received was positive. Most students appreciated our design, but some valuable suggestions were made. Reviewers noted that our design could benefit from more organization and hierarchy, suggesting that we should separate the notification type from the stretch and improve the interaction. Also, while editing the schedule, the reviewers noticed navigating to multiple screens was redundant as the purpose was same i.e., editing the preferences. Additionally, there were questions about how the articles connected to the stretches and whether they would be sent with every stretch notification. We decided to improve our design based on the feedback we have received.

We have finalized our design based on the feedback and made a few improvements to our design. In our finalized design, users have the flexibility to tailor their workdays to their schedules by specifying their start and end dates as well as their start and end times in the same screen, set the frequency of break notifications say for every 30 minutes. By default, users will receive regular notifications, but we've also incorporated an option for voice prompts to accommodate individuals with visual impairments. When voice prompts are enabled, users will receive both regular notifications and voice prompts for an inclusive user experience.

Articles related to stretches that was supposed to be displayed on home page is now moved to stretches screen, where the users can click on stretches to learn more about the stretch and can view instructions on how to perform the stretch. Our user interface is designed to be clean and user-friendly, with each component clearly laid out for easy accessibility and navigation.

3 SYSTEM

The desktop application prompts the users to take a break and stretch for a minute based on their preferences. Our final design implementation closely matches our high-fidelity prototype. Though the overall feedback we received was very positive, we decided to include the improvement points for a better design and user-experience.

All the screens are similar to the prototype with a few minor tweaks in some screens. The initial/home screen has two options for the users to choose from Signup (for first-time users) and Login (existing users) [Fig 1]. Upon clicking Signup, the users will be asked to fill in a registration form with their First Name, Last Name, Email address, Password and confirm Password (serve as their login credential and store customization preferences), Gender (options- Female, Male, Other). Two buttons – Back and Signup will let the users go to the previous screens and complete their registration respectively [Fig 2].

Figure 1 – Home screen with Signup and Login options

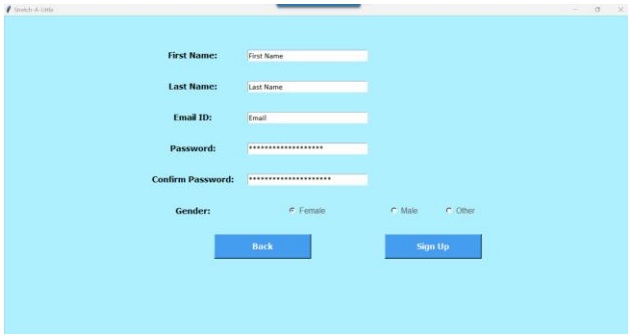

Figure 2 – Signup registration form with Back and Signup buttons

Upon signing up, the users will be able to see the Welcome screen where they will have two options – Set up Custom Settings or Set up Later. The Set up Custom Settings will allow the users to customize their preferences and the Set up Later will let them use the default settings of the application (discussed in the later part of the section). [Fig. 3].

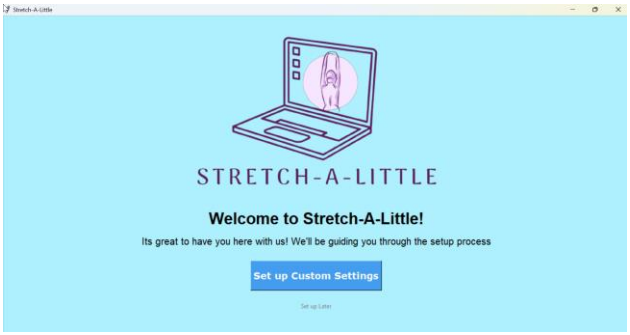

Figure 3 – Welcome page with Custom and default settings buttons

Upon clicking the Set up Custom Settings button, the users will have to enter their custom preferences – their work schedule period, using the calendar by clicking on the drop-down [Fig. 4].

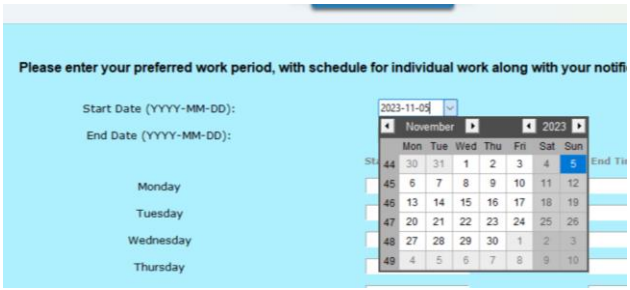

Figure 4 – Work schedule period using calendar.

Then, their individual workday start and end time needs to be entered to receive the notifications. This needs to be entered in HH:MM format (24-hour format). Then, the users have an option to choose their notification frequency/interval from the drop-down. The frequencies have been set to 15, 30, 45, and 60 minutes [Fig. 5].

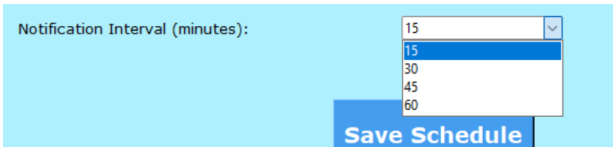

Figure 5 – Notification interval dropdown options

The users can then opt-in for voice prompts by checking the check-box. Upon clicking the Save Schedule button [Fig. 6], the users schedule will be saved in the database.

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Figure 6 – Setup Custom Settings screen with Save button

After saving their schedule, the user will receive feedback from the system stating their schedule has been save successfully [Fig. 7] and will be led to the Main screen. On the same screen, the users also have a Log out button on the top right which lets them log out of the application and be routed to the Home page [Fig. 1] where they can Login again by clicking the Login button.

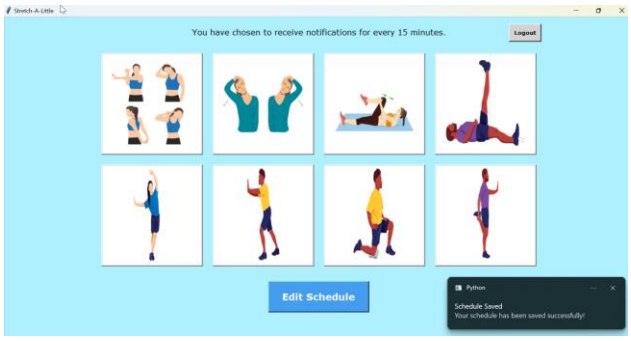

Figure 7 – Main screen with system feedback on saving the schedule

Upon clicking the login button, they will have to enter their credentials [Fig. 8], which upon verification user will be led to the Main screen with their set preferences [Fig. 9].

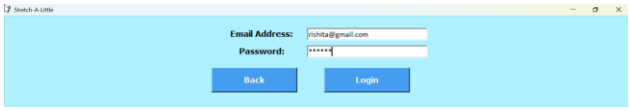

Figure 8 – Login screen to enter credentials

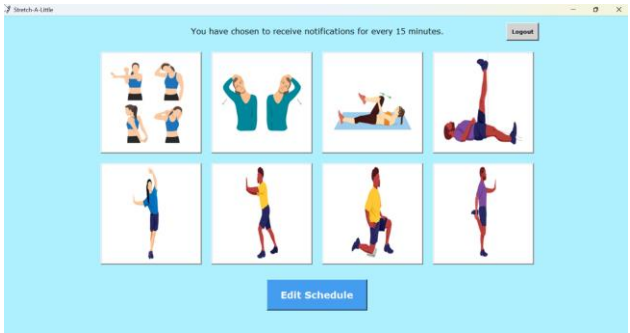

Figure 9 – Main screen after Logging in with the credentials

On the top of the Main screen, the users will be able to view what their notification interval preferences are. They are also able to view 8 different basic/easy stretches to perform at home or in the office setting [Fig. 9]. Upon clicking on the stretches, a new window pops up with some instructions or steps to do the stretch along with an article to read more about the stretch if interested [Fig. 10] [Fig. 11].

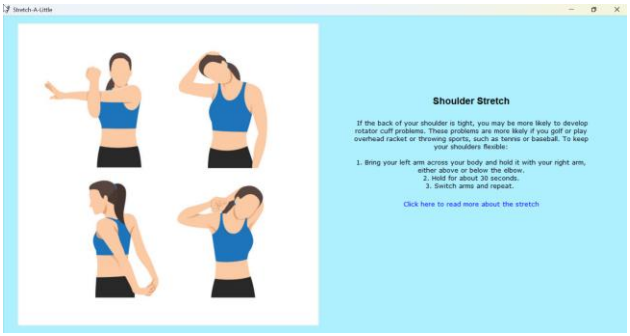

Figure 10 – Steps to be followed to perform the stretch

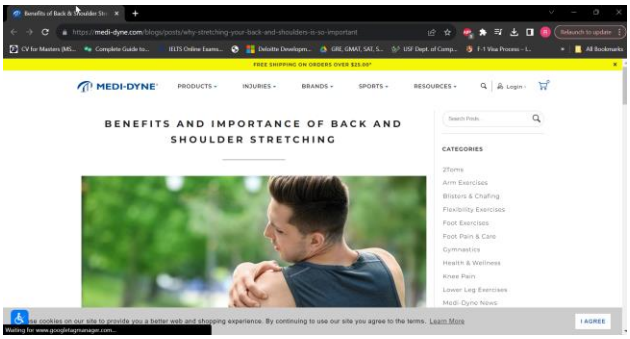

Figure 11 – Upon clicking the link, stretch related article opens in browser

When the user selected interval is up, the user receives a notification (voice prompt too if selected) to stretch for a minute [Fig. 12]

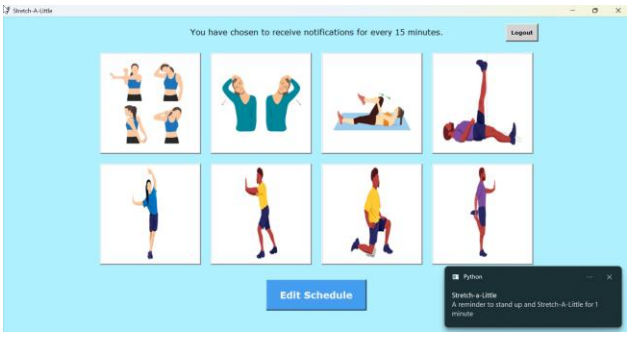

Figure 12 – Desktop notification prompting the user to stretch for a minute

On the same screen, the users also have a button to Edit Schedule, which lets the users to edit their preferences and work schedule [Fig. 13]. Upon clicking the Save Schedule button, the user will be

directed to the Main page with their new preference being displayed [Fig. 14].

Figure 13 – Edit Preferences screen

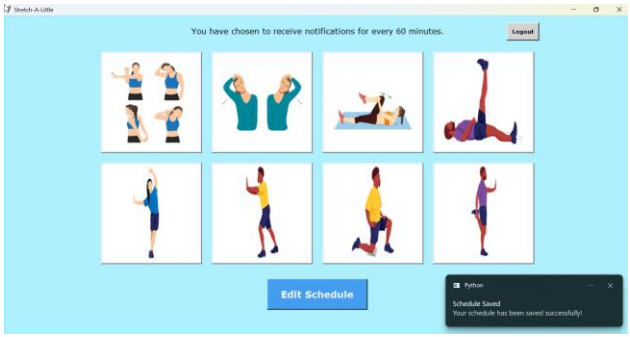

Figure 14 – Edited preference reflecting on the Main screen (15 minutes to 60 minutes)

Now, if the user, upon signing up, chooses Set up Later, the default settings will be applied [Fig. 15]. The default settings are:

Start date – today's date (2023-11-15 for instance)

End Date – 2200-12-31

Monday – Friday – 09:00 – 18:00

Notification Interval – 60 minutes

Voice Prompts – Uncheck (doesn't receive them)

The Main screen remains the same for the default setting, with the basic 8 stretches, edit preferences button and the Log out button. The user can edit their preferences using this button in the process similar as outlined above and the users will be receiving the notifications or prompts with the default setting unless modified.

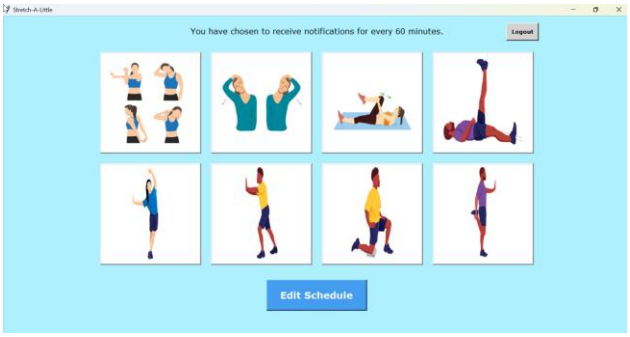

Figure 15 – Main screen with default setting

3.1 Front-end:

The front-end interface is built using Python Tkinter library for a more consistent design with a robust and user-friendly graphical user interface. Different components like frames, labels, entries, buttons, grids, pop-up windows along with custom formatting features like width, height, color, font, font size, font weights are used to build. Grid is especially used to enforce a structured format for the signup and login forms.

These components allowed a more structured and appealing interface for the application and maintain consistent color coding and format across the interfaces. Few libraries have also been used for some front-end components. For example, tkcalendar was installed to support the display of calendar when the user is inputting their schedule. More details on the libraries used is in the later part of the section.

3.2 Back-end:

SQLite database is used as the backend to store and update the data related to the users and their preferences. Python is used to implement the backend logic. The SQLite3 module in python is used to connect to the SQLite database and handle the database operations. The operations like Create, Update and Retrieve as performed on the different tables in the database. Three tables – users, user_schedule and day_schedule are the three tables being created and utilized to store and retrieve the user details and preferences. To check and validate the database, its tables, their schema and records, the DB Browser for SQLite was installed and used. This is to help identify if the tables are being populated as expected.

3.3 Database schema:

Three tables have been implemented in the database schema to store the user details and their preferences.

Users: This table stores the user details like the first name, last name, email address, password and gender. This enables the

application to differentiate the users and store and retrieve their preferences from the other 2 tables.

User_schedule: This table stores a part of the user preferences – Start date, end date, notification interval and voice prompt options. This table also has a field, user_id, from the Users table to map the user and their preferences.

Day_schedule: This table stores the individual workday schedule with the start time and end time. This table also has columns for the user_id and schedule_id to store and map the individual workday preferences for the users in the user and user_schedule tables.

Below is the illustration of the table schemas

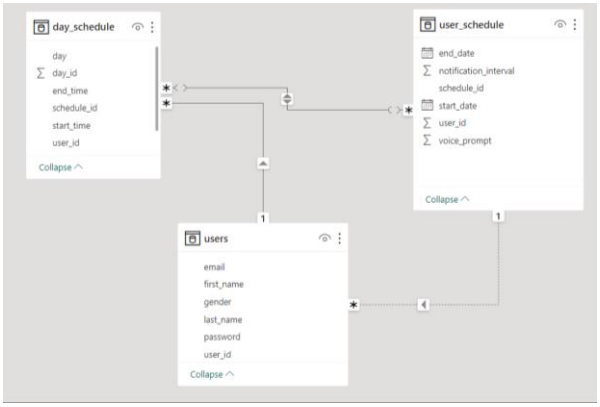

Figure 16 – Database schemas

3.4 Tools and libraries for the project extension and replication:

Python: For both front-end and back-end implementations

Tkinter: For the creation of Graphical User Interface of the desktop application and to use different the front-end components like label, entry, etc.

PIL/Pillow: The PIL (Python Imaging Library) is installed to use the images (logo and stretches)

Tkcalendar: Installed this library to use the calendar in the Start Date and End Date while entering the schedule

Notification from *Plyer:* Installed this library to send desktop notifications

Pyttsx3: Installed this library to send voice prompts. This library is for text-to-voice conversion

Webbrowser: To open the stretch related articles in web to let the users learn more information about them

SQLite3: Used this in python for seamless integration with the SQLite database

VSCode (Visual Studio Code): IDE used to code

DB Browser for SQLite: The application to check and interact with the database, its tables and records

All the above-mentioned libraries and modules are to be installed to be able to implement and replicate the project.

4 IMPLEMENTATION STATUS

Our interface has been successfully implemented. The overall background and theme of our final interface design align perfectly with our high-fidelity prototype. Database connectivity has been successfully implemented. Successful implementation of database connectivity is highly important for ensuring the structured and efficient way to store, manage, and retrieve data. Furthermore, the backend has been implemented successfully.

4.1 Successfully Implemented Features

While designing the interface we tried to follow the 8 golden rules of design. All of the core features in our proposed system have been effectively implemented. Features like customizable workdays, flexible notification frequency, dual notification options, basic stretches and articles related to stretches were implemented with minor tweaks based on the class feedback and for a better user experience.

1. *Sign up or login:* The user is provided an option to sign up or login. The user must register if it's their first time using the application. If their account already exists, they can log in using their credentials created when signing up.
2. *Personalize work schedule, individual workday and notification frequency:* Personalization options are provided to the users to enter their work period and schedule. For the users to be in control of the notification frequency, they can choose among the different available options – 15, 30, 45, 60 minutes along with an option to opt-in for voice prompts.
3. *Stretches and articles:* Upon saving the schedule, the users will be able to see the main screen with 8 different basic stretches. These are clickable buttons and upon clicking, then a new pop-up window opens with instructions to perform the stretches and a link to an article about the stretch.
4. *Easy editing of preferences:* The users are given option to easily edit their preferences using the Edit Schedule button and all of their preferences can be edited form this one page.

All of the above core features have been successfully implemented in our desktop application. Additionally, we have also added a few minor features like a prompt (feedback from the system) when the

user’s schedule is saved so the users are informed that their updates have been saved.

Each element of our user interface is thoughtfully arranged for simple accessibility and navigation, making it both visually appealing and simple to use. It is an easy-to-use solution meant to encourage more healthful work habits.

4.2 Incomplete Features

In our implementation, all of our proposed core features have been successfully implemented. Our application successfully notifies the users based on the frequency they have set, the schedule inputted by them, the type of notifications opted in by them along with the basic stretches to be performed by the user.

Not every application is perfect in one go and needs modifications especially when the user feedback is received. Hence, though all of the core features were implemented, a few features have been modified when compared to the initial design but have been implemented fully.

Below are the features that are modified but implemented fully:

1. *Modified the edit preferences features:*
   Based on the initial design the users were provided a personalize individual workday timings button, with options to specify their start end date and timings. This was reconfigured in the final design to include all the customizations, including start and end dates, individual workday timings, notification frequency, and the ability to enable voice prompts in a single, user-friendly page. By allowing users to enter all information on one page and eliminate the need to traverse between pages, this adjustment was made to improve the user experience.
2. *Related articles preferences:*
   Initially, we included the articles on the main screen. This was not included in the final design on the main screen due to class feedback, as they were not able to relate how the stretches and articles relate to each other. Rather, a link to articles was integrated into the description of each stretch in the final design. When viewing particular stretches, this approach gives users easy access to related content.
3. *Hierarchy/Organization of the Main page:*
   The main page was changed to improve clarity and structure in response to feedback that suggested the need for better organization and hierarchy on the main page. In the final design, the notification type was separated from stretches. The "*Edit Schedule*" button allows users to view and modify their preferences, giving the main page a more organized and structured appearance while highlighting the elements that are important i.e., stretches.

Based on the feedback we have received during the presentation all these features were revised. The project's aims and objectives have been met with the successful implementation of all planned additions and adjustments. Our project is finished 100% to the best of our knowledge and ability.