ErgoPerfecto: Ergonomics App

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Abstract – **Wrong Ergonomics is a major problem that's bothering the IT industry. Workplace posture like sitting, hand position on keyboard, foot rest position etc, all determine the ergonomics of an employee. We are building an app, ErgoPerfecto which provides the employee with his/her own recommendations of ergonomic products, postures and exercises he/she must do to avoid inconveniences while working. ErgoPerfecto mainly takes the information about an employee's physical health and gives suggestions of exercises to the employee. A one place solution, where the employee can keep track of physiotherapy sessions he/she attended and can log exercises his/her therapist recommended. A google extension has also been built to let the app provide push notifications to the employee reminding him/her the proper postures and exercises he/she should do. The app also provides feedback from other employees who faced ergonomic issues and the exercises they used to overcome the pain. ErgoPerfecto also provides a chatbot to assist the user.**

Keywords -- Employee, Ergonomics, Google Chrome extension, Ergonomics suggestions, Chatbot, Exercises, Google authentication, Express, MongoDB, Node.js, Reactjs, MERN stack.

I. Introduction

It is important that an employee maintains his/her ergonomics posture at work. Wrong posture at workplace decreases the productivity of an employee and is a major reason of physical stress. Offices do have provisions for ergonomic evaluation and provide the necessary accessories to the employee[1]. But what about the exercises or physiotherapy sessions or peer-reviewed solutions for any physical pain? This paper proposes a solution which is focused on maintaining the ergonomics for the employee. ErgoPerfecto is a web app which an employee can use to track his/her ergonomics. This paper proposes a solution where an employee can maintain and gauge his/her ergonomics.

ErgoPerfecto provides the following solutions:

1. Personalized recommendations of products to use and exercises to follow based on the pain.
2. Peer Reviews of colleagues who recommended exercises and products which proved useful for removing their stress.
3. Interactive evaluation of stress based on location of the pain. Also, a user can maintain his/her relative evaluations.
4. Physiotherapy exercises that he/she can follow and upload his/her practiced exercises.
5. Physiotherapy schedules and appointments.
6. Chrome extension plugin which will send push notifications to remind the user about postures, exercises and physiotherapy sessions.
7. Chatbot for user assistance.

ErgoPerfecto aims at increasing the well-being of an employee so that physical stress does not hinder his or her productivity at work.

II. Architecture

This application is built using the *MERN* architecture (MongoDB, Express, Reactjs and Nodejs). The app also uses Kafka for communication between Mongo and Backend. In addition, Google based authentication has been used and Google Chrome extension was built for push notifications. The whole architecture was then deployed on AWS[2] to provide ErgoPerfecto as SAAS app.

As shown in the figure[1], the frontend app is deployed on a EC2 instance. Behind it is the backend deployed in 2 load balanced EC2 instances. The backend then communicates with the MongoDB cluster via Apache Kafka[3] behind the Apache Zookeeper. The Kafka topics created for the app are:

1. Login
2. Account
3. Evaluation
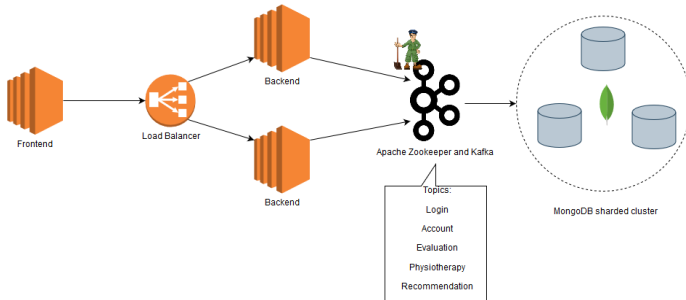4. Physiotherapy
5. Recommendation

Figure 2.1: Architecture on AWS. [2]

III. Process Flow

Any user can browse through the products and exercises on the dashboard. In addition, he/she can take the help of catbot for assistance. This flow has been shown in Fig. 3.1.
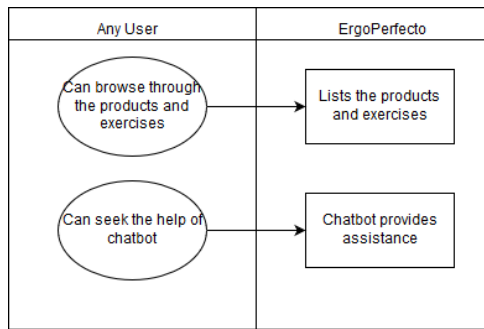

Figure 3.1: Recommendation Flow

After logging in, user can answer an evaluation for his/her ergonomics. The evaluation is based on a category of stress based on the body part. Then these evaluations are stored for future reference and also the system takes a note of the problems for recommending the relevant exercises and products. Fig 3.2 illustrates the evaluation flow.
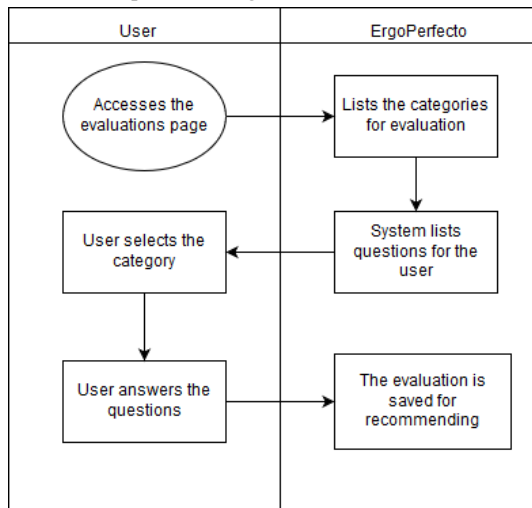
Fig 3.2: Evaluation Flow

After the evaluation, user can access the recommended exercises and products. To access the recommended exercises on the ErgoPerfecto dashboard, user can click on the tags for his/her problem. The system then lists the videos searched for. For this result, we are integrating the YouTube search API to return the relevant results. The flow has been charted in Fig 3.3.
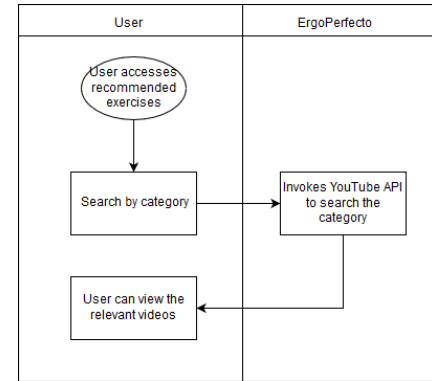

Figure 3.3 – Searching the recommended exercises

On the physiotherapy page, a user can schedule his/her appointments. Also, he/she can add the exercises to favorites. If an exercise is not listed, then he/she can add the exercise and also have an option to upload the video. This flow has been shown in Fig. 3.4.
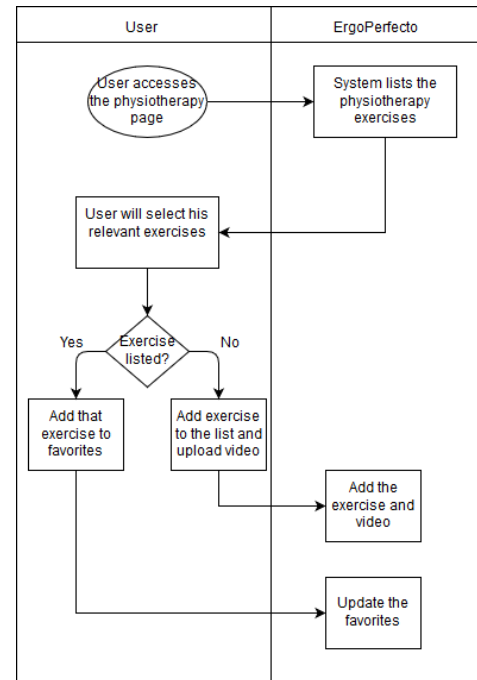

Figure 3.4: Physiotherapy exercise flow
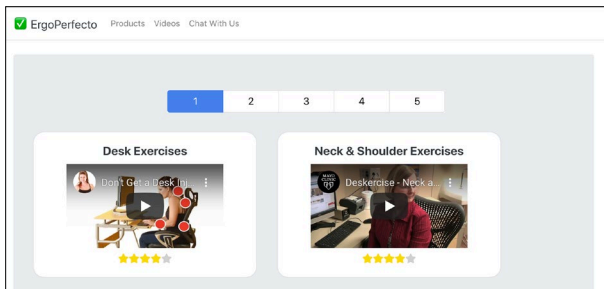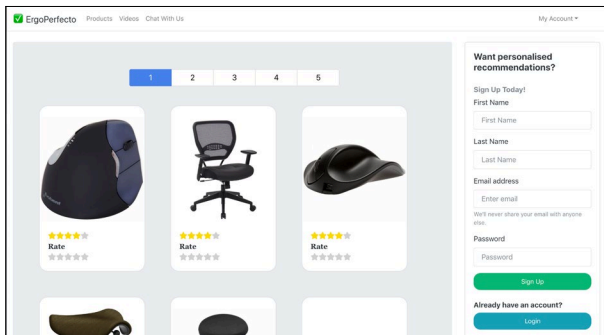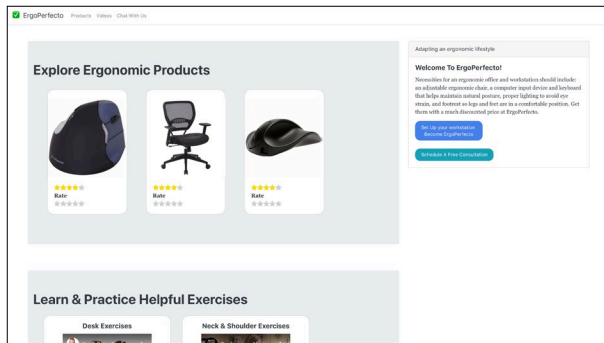
IV. Application User Interface

Figure 5.1: Homepage, Product Display, Video Display, Chatbot (order top to bottom)

Figure 5.1 shows the view of the unauthenticated functionality. Application homepage, Product Display, and Video Display are available for any user. To access these pages, login is not required. The user can browse through the products and exercise videos. Additionally, he/she can interact with the chatbot for assistance.
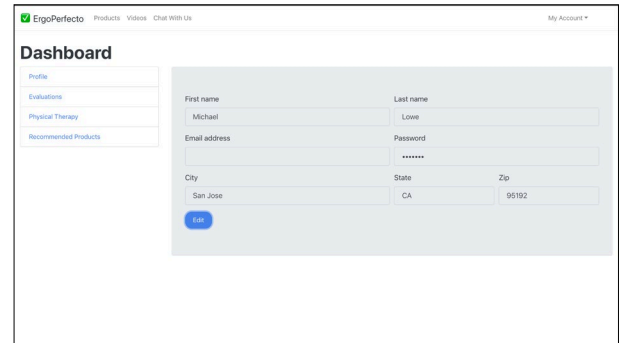

Figure 5.2: User Dashboard

Figure 5.2 shows the dashboard after a user logs in. The user can see the Profile, Evaluations, Physiotherapies, Recommended Products on the left Pane.
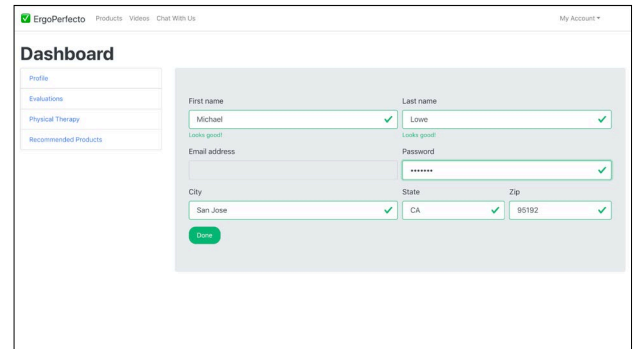

Figure 5.3: User Profile Editing

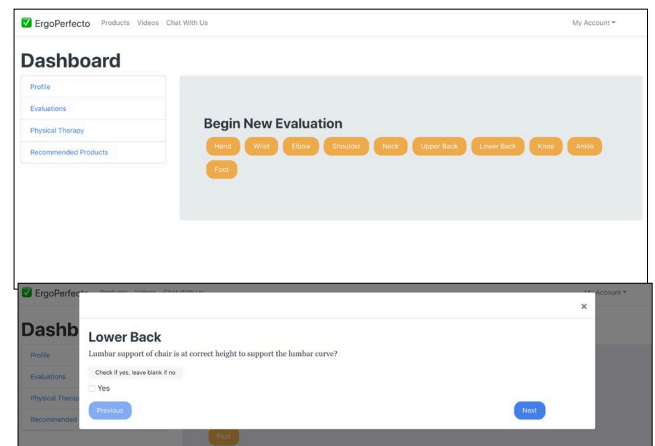Figure 5.3 shows the editing functionality on the user profile.

Figure 5.4: Evaluations (top), Evaluations Form (bottom)

Figure 5.4 shows the evaluations page. In this page, a user can select an evaluation category and complete the associated survey.

Once a category is selected, a modal view is presented with relevant questions to that category.
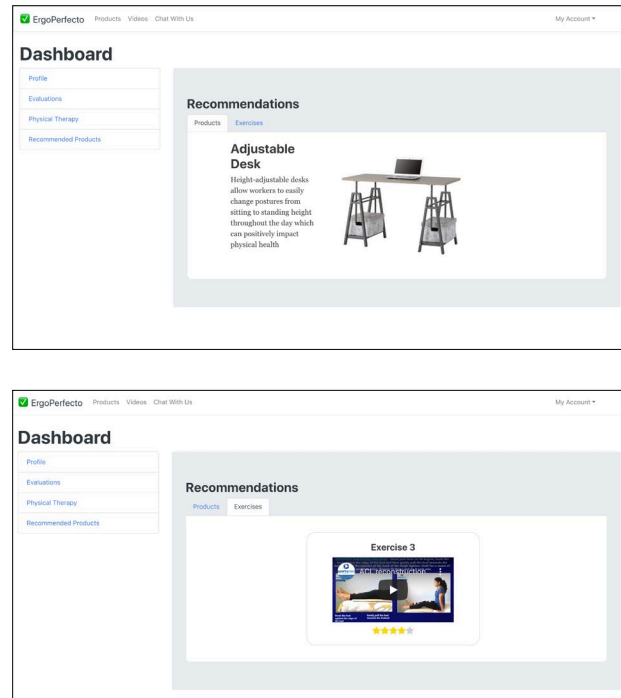

Figure 5.5: Recommended Products (top), Recommended Exercises (bottom)

Figure 5.5 Shows the layout for the user's product and exercise recommendations. Recommendations are shown in scrolling carousel view[4].
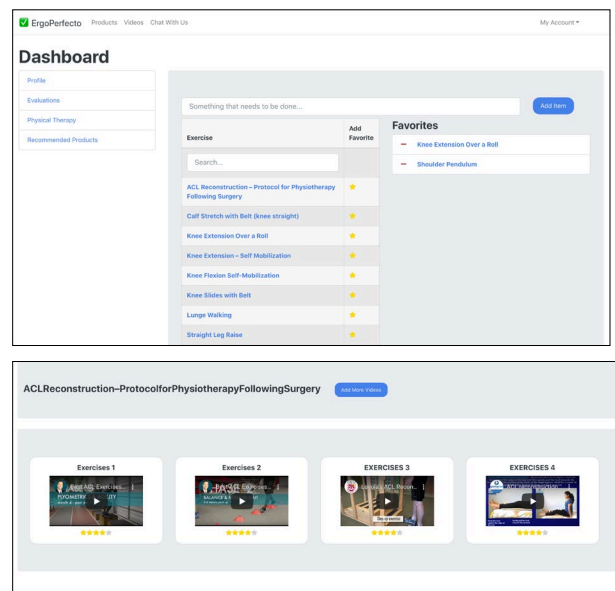

Figure 5.6: Dashboard PhysioTherapy (top), Single Exercise View (bottom)

Figure 5.6 The PhysioTherapy view in the dashboard allows a registered user to search and favorite relevant exercises. When the user favorites an exercise, they can click on the link to open a single exercise page with the related videos.

V. Future Enhancement

Recommending exercises is now interacting with YouTube developer API to get the related videos. As a future enhancement, we can use Machine Learning algorithms to search even more relevant exercise videos and products.

Right now, we have Google Authentication for logging in. For integration of the product with the organization's SSO, we must do LDAP integration. Also, the posture of the employee at the workplace can be observed via video sensors and this data can be analyzed by the app to provide the relevant feedback for ergonomics.

VI. Conclusion

The web application developed provides a single platform for the employees to keep track of their ergonomics. Not only the physiotherapy sessions, but also an employee can get peer reviewed exercises that his/her colleague followed to get rid of the stress. In addition, an employee can also search for products he/she needs and keep a track of his/her ergonomic assessment. The Google Chrome extension reminds the employee by sending push notifications. The chatbot developed also provides a guide for the employee to help him/her with the app. With the help of this app, an organization will benefit its employees as the ergonomic problems of an employee are dealt with easily and the overall productivity is increased.

VII. Acknowledgements

Thanks to Professor Ranjan for providing us the opportunity to explore our idea of helping employees with Ergonomics. This project will surely help organizations to maintain the well-being of their employees.

VIII.   Project Repository
Git Repository URL:

https://github.com/SJSU272Spring2019/Project-Group-9

IX.   References

[1] https://ieeexplore.ieee.org/document/7294958
[2] https://aws.amazon.com/elasticloadbalancing/
[3] https://kafka.apache.org/
[4]https://getbootstrap.com/docs/4.0/components/carousel/