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A Survey for Wellness Application that Implements Posture Detection using TensorFlow

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Abstract: ***With the rise of the digital world, the amount of time people spend sitting in-front of the computer screen has also increased greatly. This sedentary lifestyle is the cause of many health issues. These people who are coined as 'geeks' face health issues of all types be it mental or physical. Therefore the need to monitor screen-time, maintain correct posture, retain hydration and to avoid hearing loss due excessive use of headphones with high volumes and most importantly to look around and have a short break is very high. GeekFixx does just that. It is a wellness application (web-application) that takes care of you when you are busy working on the computer. It does this by correcting your posture using image recognition using tensorflow and historical data, it counts the amount of time you have been actively using the computer and asks you to take breaks, lower the brightness, to take off your earphones, remind you to look away and much more. Think of it as your personal wellness assistant.***
Keywords: Geeks, Wellness, Web-Application, Posture-Detection, Tensorflow, Wellness-Assistant.

I. INTRODUCTION

GeekFixx is a wellness application and a one-stop solution for the people working long hours in front of computer screens. Prolonged exposure to the screen invites all kinds of health risks like obesity, neck, and back pain, eye strain. The solutions we are working with are as follows:

1) Back Health
2) Eye Health
3) Ear Health
4) Stress Management
5) Device Health
6) Hydration Reminders

a) *Back Health:* Not sitting straight and slouching is the most common reason for back pain. Prolonged poor posture leads to lower back and spinal pain and rounded shoulders. The application comes with the feature of posture detection. It detects your posture at regular time intervals and reminds you to sit straight if you are not.
b) *Eye Health:* Many users suffer from eye strain due to continuous exposure to the computer screen. To relax your eyes we are going to ask the user to look away from the screen for a couple of minutes. This exercise relaxes our eyes and reduces eye strain. The application reminds you to follow this exercise at regular intervals.
c) *Ear Heath:* To take care of your ears only turn your device volume up to 60 percent and listen for no more than 60 minutes. The application checks if you are using earphones for longer than 60 minutes and reminds you to control your earphone usage if it is becoming unhealthy.
d) *Stress Management:* Due to long working hours many users find it difficult to manage stress. To help them, we are going to play some cute and funny videos for the users. This will distract them and help in handling stress.
e) *Device Heath:* For device health, we are going to remind the users to turn off the charger when the battery is charged up to 95 percent.

II. OBJECTIVES OF STUDY

1) To design and develop a wellness application that focuses on posture detection using TensorFlow. This involves creating a user-friendly interface and integrating the necessary components to detect and analyze the user's posture accurately.
2) To study available frameworks and tools for posture detection through image recognition.
3) To understand and evaluate different available methods for posture detection.
4) To optimize the posture detection algorithm to achieve high accuracy and real-time performance.

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5) To find out the existing methods implemented for seated posture recognition.
6) To compare the performance and effectiveness of the posture detection algorithm with existing methods or alternative machine learning approaches.

III. LITERATURE REVIEW

Concerned with the negative health impact, In the paper [1] authors Hediye Nupelda et al. have proposed a system in the year 2020 that incorporates hardware as well as software components. The system comprises wearable devices, this combination yields a higher accuracy using FCN and LSTM. Hence their proposed system overcomes the issue of accuracy with average accuracy 94.20\%.The wearable system is comfortably placed at the back and sends posture data to the computer to analyse and keep track of it. The data is collected very frequently, almost every instance and hence provides a good base for creating a time series analysis. Which the proposed system has talked about.

During the times of the pandemic when people had to work from home without proper equipment and resources. Thus these ad-hoc workstations are in most cases not very effective w.r.t posture. In addition, for the health personnel responsible for the prevention of occupational risks, there should be electronic devices that can detect the wrong behavior levels of the employees. To this end, in this paper [2], E Fuentes, S Moreno, A Navarro, create, use and test the visual operator based process; video is processed in real time by neural networks using special hardware. The system is able to analyze the body of the neck, shoulders and arms and advise employees to avoid health problems caused by poor posture.

The results of the process show that this video can be made using special equipment with low power consumption (less than 10 watts) in real time (up to 25 frames per second) and with an accuracy of more than 80% of the dots. of detected samples

In 2019 Shamsi Iqbal and Brian Bailey published a new alert management system in the paper [3] and also published the results of two studies that tested its effectiveness and efficacy. The system uses a statistical model to apply a breakpoint delay rule to manage notifications. The initial study tested the model's ability to detect three types of explosions in new sequential tasks. The results show that these models can describe the breakpoints well, but there are difficulties in distinguishing their types.

Their work also explored the impact of using report management on users and their activities. The results published in the paper showed that scheduling of notifications at breakpoints reduced stress and reaction time as compared to sending push notifications to the users. In 2020, Brian Bailey also discovered that the impact of the alert content determines the type of breakpoint it should send. The basic idea of scheduling notifications at breakpoints fits perfectly with the way users want to manage notifications. This indicates that users can receive administrative notifications.

Katia Bourahmoune and Toshiyuki Amagasa presented a smart chalk-talk chair app called LifeChair that combines the latest sensory perception technology, smartphone app interface and machine learning (ML) for real-time sitting and sitting guidance. Sitting and stretching posture data collection experiments were designed using posture training system

In paper [4] Toshiyuki Amagasa presents a fast and powerful supervised learning algorithm to detect more than 13 different sitting postures with 98.93% accuracy. It also demonstrates the importance of taking into account the differences between users' body sizes in physical therapy. In addition, its applications demonstrate the first ML-based system for continuous human posture recognition from high sensor data and demonstrate its performance in classification of six most commonly seen chair postures.

Recent research has shown that monitoring the behavior of animals is very important. , usually to identify health problems in animals. For many reasons, farmers are concerned about the health of live pigs, hoping to diagnose and treat them in a timely manner to control disease and increase production. Unlike existing methods, machine learning can detect without human intervention and with high accuracy. In an article published in 2019 [5], Saraswathi Sivamani et al. Focus on detecting pigs using YOLO darkflow based on machine learning.

The YOLO algorithm provides better real-time performance with fewer computational resources. The only apparent criticism would be that it needs a high quality video feed.

Software testing is almost as old as software engineering. However, research and general information on the subject had little impact on the concerned developers. This is a concern that determines that the main reason metrics are used is to improve software engineering decisions from management and perspective. While these indicators are considered successful due to their position, their limitations are well known and abuse still exists.

The main problem is to use these indicators alone. In their paper [6], Norman E. Fenton and colleagues argue that it is possible to provide effective management decision support based on this simple measure, but only with less isolation. In particular, he argues that it is important to clearly demonstrate (a) causation and (b) uncertainty and the composition of the evidence. This approach uses Bayesian belief networks, which are considered the best way to resolve decisions in uncertainty.

Most detection methods are not good at detecting accurately. So, in 2021 Sidrah Liaqat et al in their paper [7], Developed a classification based on machine learning (e.g. Support Vector Machine (SVM), Logistic Regression (KNN), Decision Making, Naive Bayes, Random Forest, Outlier Analysis and Quadratic Discrete Analysis) and deep learning (i.
For example, one-dimensional convolutional neural networks (1D CNN), two-dimensional convolutional neural networks (2D-CNN), LSTM and bidirectional LSTM are known for pose detection. The proposed combination uses predictions from machine learning (ML) and deep learning (DL) to improve the performance of ML and DL algorithms. Show test results in a wide range of test data and achieve greater than 98% accuracy
Human posture detection while sitting on a chair captures only the limited parameters of the human body, which are important for many applications such as life support, health, physical exercise and rehabilitation. This work could greatly benefit from recent advances in deep learning and computer vision. 2021, Audrius Kulikajevas and others. A new Deep Recurrent Hierarchical Network (DRHN) model based on MobileNetV2 aims to achieve greater flexibility by reducing or eliminating detection problems associated with the limited visibility of the human torso in the frame. The DRHN mesh accepts a series of RGB depth frames and creates a representation of the relevant content. Robertas Damaševičius achieved 91.47% accuracy for posture recognition while sitting in a chair at 10 fps video feed

IV. PROPOSED METHODOLOGY

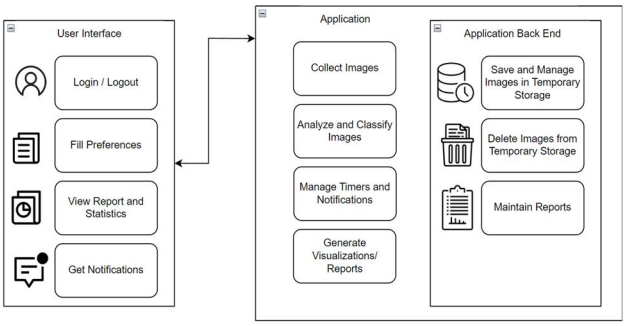


Fig: System Architecture

In this study, following steps were considered:

1) *Requirement Gathering and Analysis:* In this phase, the project team will gather and analyze the requirements for the GeekFixx application. This includes understanding the target audience, identifying the key features and functionalities, and defining the scope of the project.
2) *Design and Prototyping:* Based on the requirements, the team will proceed with the design phase. This involves creating wireframes, user interface (UI) designs, and interactive prototypes to visualize the application's layout and flow.
3) *Development:* The development phase focuses on the actual implementation of the GeekFixx application. The development team will follow the chosen technology stack and coding standards to build the application's front-end and back-end components.
4) *Testing and Quality Assurance:* Quality assurance plays a crucial role in ensuring the reliability and usability of the GeekFixx application. Testing activities will include unit testing, integration testing, system testing, and user acceptance testing. Test cases will be designed and executed to validate the functionality, performance, and security of the application.
5) *Deployment and Release:* Once the application has undergone thorough testing and meets the required quality standards, it will be deployed to a production environment. The deployment process will involve setting up servers, configuring the application, and conducting final checks to ensure a smooth release.

V. CONCLUSION

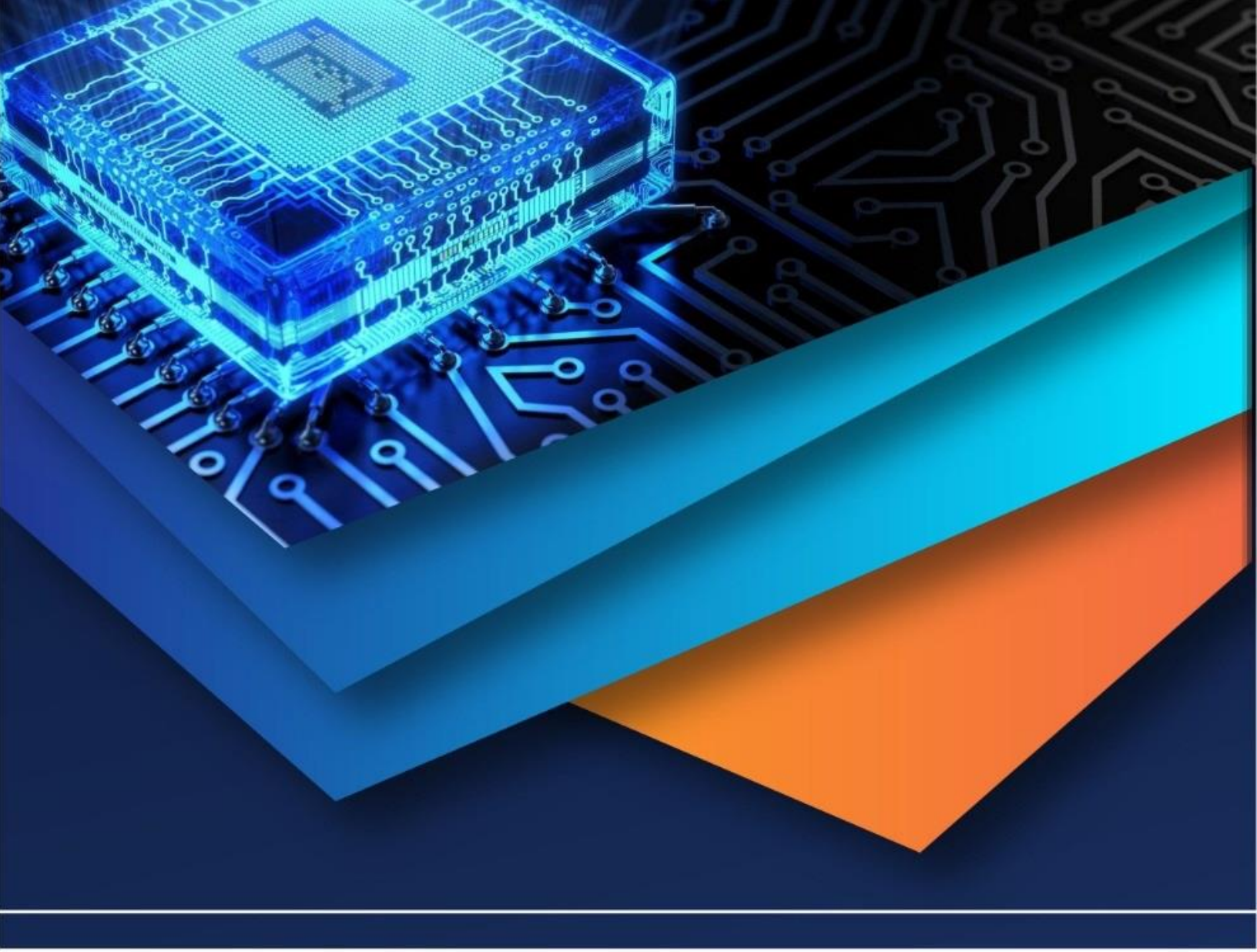
GeekFixx web-application is a comprehensive wellness application designed to promote healthy habits and provide reminders for various aspects of personal well-being. The application offers modules for back care, eye care, ear care, device health, stress management, and water reminders. Throughout the development process, various tools and technologies were utilized to create a user-friendly and efficient application. The posture detection feature alerts users about their posture using mobilenet technology. The application thus provides the user a smooth experience

In summary, the GeekFixx application offers a holistic approach to wellness by addressing various aspects of personal health. Through its modules and user-friendly interface, it aims to promote healthy habits and enhance the overall well-being of its users.

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