# Yoga Pose Detection & Healthcare

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***Abstract*— Yoga pose detection and Healthcare delivers a personalized yoga experience through a system that combines pose detection with tailored healthcare. Users begin with a secure registration and OTP verification process, leading to a four-part interface: personal information, customized courses, a general exercise library, and a monthly progress report. The system's core strength lies in its ability to adapt to individual needs. By collecting data on weight, height, and specific pain points, the 'My Course' section generates exercise routines designed to address those unique concerns. When selecting a personalized exercise, users can choose between mobile or webcam input. Upon choosing the webcam option, a tutorial video guides the user through the pose, and real-time feedback alerts them to incorrect positions. A comprehensive monthly report then tracks their progress, providing a clear picture of their improvement. This integrated approach allows for a data-driven, user-centric yoga practice, promoting both physical and mental well-being.***

***Keywords*— Personalized Healthcare, Real Time Feedback, Therapeutic Exercise, Pain Management, OTP Verification.***

## I. Introduction

"Imagine a digital health platform designed to bring personalized yoga therapy directly into your home. This isn't just another generic fitness application; it's a comprehensive system that adapts to your individual physical needs and guides you through tailored exercise routines.

The user experience begins with a secure registration and login process. To safeguard personal data, we've implemented OTP (One-Time Password) verification, ensuring that only authorized individuals access their accounts. Upon successful login, users are prompted to provide essential personal information. This includes weight, height, and, crucially, specific areas of pain or discomfort. This data serves as the foundation for creating a truly personalized healthcare experience. The core functionality of the platform is centered around the 'My Course' section. Based on the user's reported pain points, the system intelligently curates a selection of yoga exercises designed to alleviate those specific issues. This personalized approach avoids the pitfalls of generic fitness routines, instead offering targeted therapeutic exercises that address individual needs. For instance, if a user indicates lower back pain, the system will recommend exercises known to strengthen and stretch that area.

Once a user selects their personalized course, they are provided with the option to utilize their device's camera, either mobile or webcam, to engage with the exercises. Before beginning any routine, a detailed tutorial video is presented, demonstrating the correct postures and movements. This visual guide ensures that users understand the exercises and can perform them safely.

During the exercise, the platform employs advanced pose detection technology. This technology monitors the user's movements in real-time, comparing them to the correct postures demonstrated in the tutorial. If the system detects a deviation from the proper form, it provides immediate feedback, alerting the user to adjust their position. This real-time correction is vital for preventing injuries and maximizing the therapeutic benefits of the exercises. It replicates the guidance of a professional yoga instructor, providing personalized feedback within the convenience of the home.To track progress and maintain motivation, the platform features a 'Report System.' This system compiles data on the user's performance over a monthly period, providing a comprehensive overview of their consistency and improvement. Users can view their progress, identify areas for improvement, and track the impact of their exercises on their overall well-being. This data- driven approach allows users to see tangible results and reinforces the benefits of consistent exercise. In essence, this project is a sophisticated integration of personalized healthcare and cutting-edge technology. It moves beyond the limitations of traditional fitness applications by offering tailored exercise routines, real-time feedback, and comprehensive progress tracking. This platform brings the expertise of a yoga instructor into the user's home, providing accessible, personalized, and effective exercise therapy."

## II. Literature Review

A. "When we look at the landscape of digital health and fitness apps today, we see a lot of general-purpose solutions. Many apps offer pre-made workout routines, but they often lack the crucial element of personalization. This is where your project really stands out. Existing literature and market analysis consistently point to a growing need for tailored wellness programs, especially in areas like therapeutic exercise and pain management.

B. Think about it: most fitness apps treat everyone the same, regardless of their individual health conditions. They might offer yoga routines, but they don't consider if someone has specific pain points or limitations. This is a significant gap. Research in fields like physiotherapy and sports medicine emphasizes the importance of personalized exercise programs for effective rehabilitation and injury prevention.

C. Your project addresses this directly by integrating a comprehensive user profiling system. By asking users about their weight, height, and, most importantly, their pain points, you're essentially building a digital patient history. This allows the system to tailor exercise recommendations, moving beyond generic fitness advice to provide targeted therapeutic interventions. This is consistent with the trend of 'precision medicine,' where treatments are tailored to individual patient characteristics.

D. Furthermore, the integration of pose detection technology aligns with the growing interest in AI- powered health monitoring. Studies have shown that real-time feedback during exercise can significantly improve adherence and effectiveness. Your project leverages this by providing immediate corrections, essentially mimicking the guidance of a human instructor. This is a significant improvement over traditional video-based exercise programs, which often lack interactive feedback.

E. The 'Report System' also contributes to the project's strength. Research in behavioral science highlights the importance of feedback and progress tracking for motivation and long-term adherence. By providing users with a monthly overview of their performance, you're empowering them to take control of their wellness journey. This data-driven approach aligns with the principles of self-monitoring and behavior change, which are essential for sustainable health outcomes.

F. The problem with many digital wellness solutions is their 'one-size-fits-all' approach. Your project directly tackles this by creating a system that understands and adapts to individual needs. By leveraging personalized data, AI- driven monitoring, and behavioral science principles, you've developed a platform that effectively delivers tailored yoga therapy. It's about moving away from passive video workouts to an interactive experience where users receive real-time feedback and track their progress, ultimately giving them a more effective and empowering path to better health.

## III. Proposed System

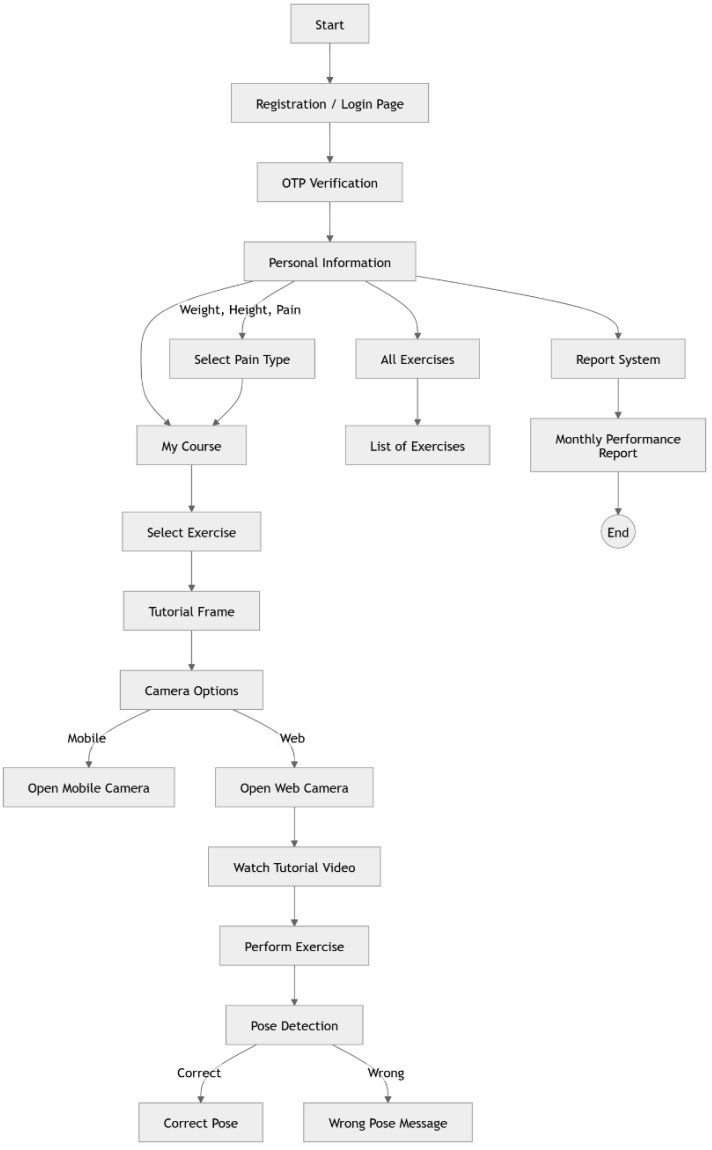


FIG.1.0. YOGA POSE DETECTION & HEALTHCARE

The Fig.1.0 illustrates a **Yoga Pose Detection and Healthcare System** follows a well-defined process that ensures users can practice yoga correctly while tracking their health and fitness progress. The system consists of multiple stages, each playing a critical role in guiding users through authentication, exercise selection, real-time pose detection, and performance evaluation. Below is a detailed breakdown of each process.

1. User Authentication Process

The system starts with user authentication to ensure secure access. When users open the application, they are directed to the Registration/Login Page, where they can either create a new account or log in with their existing credentials. After entering their details, they must complete an OTP Verification step, where a one-time password is sent to their registered mobile number or email. This ensures that only authorized users can access the system and proceed to the next step. Successful authentication grants users access to the main dashboard, where they can manage their exercises and track their progress.

2. Personal Information Collection Process

Once logged in, users are prompted to enter their personal information, which includes their weight, height, and any pain areas they experience. This data is essential for tailoring exercise recommendations. Weight and height are used to calculate BMI and help the system determine suitable yoga poses based on body composition. The pain information allows the system to identify problem areas and recommend exercises specifically designed to alleviate discomfort. This step personalizes the experience by ensuring that users receive workouts that suit their physical condition.

3. Exercise Selection Process

After submitting personal information, users proceed to exercise selection, which can be done in two ways. If a user has reported pain, they can select the pain type (such as back pain or knee pain) and access a personalized course under the "My Course" section. This ensures that users perform exercises that help relieve their specific pain points. Alternatively, users can browse the "All Exercises" section, which provides a list of exercises to choose from based on their preference rather than pain-related recommendations. This flexibility allows users to either follow a guided plan or explore general yoga poses.

4. Tutorial and Camera Setup Process

Before beginning an exercise, users are introduced to the tutorial frame, which provides instructions on how to correctly perform the selected yoga pose. This tutorial helps users understand the correct body alignment and movements. Once they are familiar with the pose, they must choose a camera option for real-time pose detection. They can either use a mobile camera, which enables them to track their posture using a smartphone, or a web camera, which is ideal for those practicing yoga on a desktop or laptop. Web camera users also have access to a tutorial video, which visually demonstrates the correct execution of the pose before they proceed to perform it.

5. Pose Detection and Feedback Process

After setting up the camera, users begin the pose performance stage, where the system starts tracking their movements. The pose detection module analyzes their body alignment in real-time. If the system detects that the user is maintaining the correct posture, a "Correct Pose" confirmation is displayed, indicating that the exercise is being performed properly. However, if the system identifies any misalignment, it generates a "Wrong Pose Message", alerting the user to make the necessary adjustments. This feature ensures that users maintain the right posture, preventing injuries and maximizing the effectiveness of their yoga practice.

6. Performance Tracking and Report Generation Process

The final stage involves tracking user progress over time. The system generates a Monthly Performance Report, which is accessible under the "Report System" section. This report provides insights into the user's exercise history, including the number of correct and incorrect poses detected. By reviewing this data, users can assess their improvement, identify areas where they need to focus more, and make necessary adjustments to their practice routine. Once the report is reviewed, the user can choose to continue exercising or end the session.

## IV. Implementation:

The modules are:

### A. USER_REGISTRATION/LOGIN:-

When a user first visits the registration page, they will need to fill out a form with their username, a secure password, and their mobile number. The username helps identify their profile, the password keeps their account secure, and the mobile number is used to send an OTP (One-Time Password) for verification. After submitting the form, the system will send an OTP to the provided mobile number. The user must enter the OTP they received to verify their identity. Once the correct OTP is entered, the registration process is complete, and the user is redirected to their dashboard. On this dashboard, they will find different sections like All Courses, Health, My Courses, and Report, where they can begin exploring and using the platform. This process ensures a secure registration and allows the user to proceed with their personalized yoga journey.

### B. DESHBOARD SECTION:-

The dashboard of the platform is divided into four main sections: All Courses, Health, My Courses, and Report.In the All Courses section, users can explore all the yoga exercises available on the platform. Each exercise is presented with a brief description, highlighting its benefits, difficulty level (beginner, intermediate, advanced), and any special instructions to follow. This allows users to browse and choose from a wide range of yoga exercises suitable for their needs. The Health section is designed to personalize the yoga experience. Users need to enter their weight, height, and details about any specific health issues they may have, such as back pain, knee pain, stress, or flexibility issues. The system then filters and shows only the exercises that are appropriate for the user's health condition. For instance, if a user selects "Back Pain," the system will suggest exercises that help relieve back pain, ensuring that the exercises are safe and beneficial for their specific health needs .In the **My Courses** section, users can view the courses that have been specially recommended based on their health profile and preferences. Here, they can select a particular exercise and begin practicing it. The user is prompted to choose how they want to practice the exercise—either through their **webcam** (on a computer) or a **mobile camera**. This section allows users to follow along with the exercises that are best suited for them. Finally, the **Report** section tracks the user's progress and consistency in their yoga practice. It provides detailed information on how often the user practices yoga, which exercises they have completed, and any improvements they've made over time, such as increased flexibility or correct pose detection. The system may even display charts or graphs to visually represent the user's progress, motivating them to continue their practice and monitor their growth.

### C. Performing Yoga Exercises (Pose Detection):-

Once the user selects an exercise from the My Courses section,they need to choose which device they want to use for performing the yoga pose. They can either use a webcam (on a desktop or laptop) or a mobile camera (on a smartphone). After selecting their preferred device, the user is prompted to set it up in a way that can clearly capture their movements during the exercise.

Once the camera is set up, the system will play a tutorial video that demonstrates how to properly perform the yoga exercise. The video guides the user step-by-step on how to position their body, how to breathe properly, and explains the importance of each movement. This ensures that the user understands exactly how to perform the pose before starting. As the user begins the exercise, the system uses computer vision technology to detect their pose in real-time. It analyzes the user's body through the camera feed using tools like MediaPipe or OpenPose. The system identifies key points on the user's body (such as the arms, legs, and spine) and compares them to the correct pose for that particular exercise. Based on this comparison, the system provides feedback to the user, helping them adjust their position if needed, ensuring they perform the exercise correctly. This process allows the user to receive real-time guidance and improve their form during practice.

# V. Result

Fig.1.1 Registration Page


In Fig.1.1, the user can register by adding their personal information such as username, password, contact number by which the system will have their particular data for storing the data which perform by particular user.


Fig. 1.2 Login Page

Fig. 1.2 ,the Yoga Pose Detection login page has a simple design with a yoga pose image on the left and a login form on the right. The form includes fields for entering a username and password, along with "Login" and "Sign In" buttons for user access. The layout is clean and easy to navigate.


Fig.1.3 OTP Verification

Fig.1.3,the OTP verification page allows users to securely confirm their identity by entering a one-time password. After entering the OTP in the input field, users can click the "Verify OTP" button to complete the authentication process. This ensures secure access and prevents unauthorized logins.

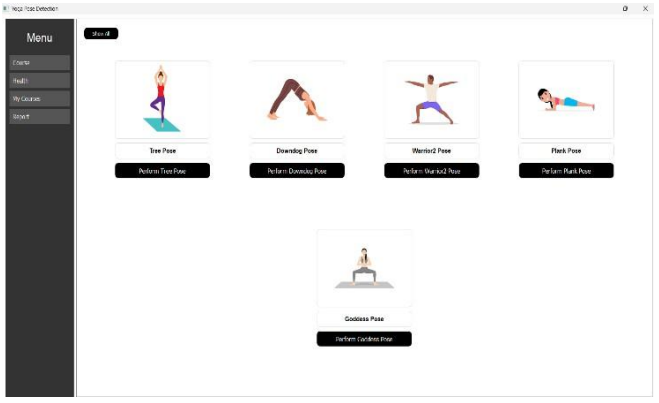


Fig. 1.4 ALL course

Fig. 1.4 ,this page allows users to choose and perform different yoga poses by selecting from various options like Tree Pose, Down dog Pose, Warrior2 Pose, Plank Pose, and Goddess Pose. Each pose has a corresponding "Perform" button, which likely starts an exercise session. . The "Show All" button may be used to display all available yoga poses at once.


Fig. 1.5 Health page

Fig. 1.5,this page allows users to enter their health details, including weight, height, and any specific health conditions like back pain. The dropdown menu lets users select a condition, and the "Submit Health Data" button saves the information. This data might help personalize yoga recommendations based on the user's health needs.


Fig.1.6 My Course

Fig.1.6 ,this page offers yoga routines for specific health issues like headaches and joint pain. Users can select a condition and click the respective button to start a guided yoga session designed to help relieve their symptoms.

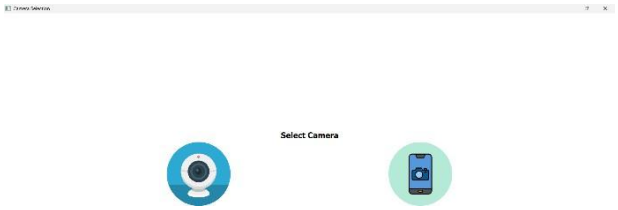


Fig. 1.7 camera selection

Fig.1.7,this screen allows users to choose a camera for tracking their yoga poses. They can either use a webcam (left option) or a mobile phone camera (right option). The selected camera will likely help the system monitor and guide yoga movements. This ensures proper posture detection during exercises.

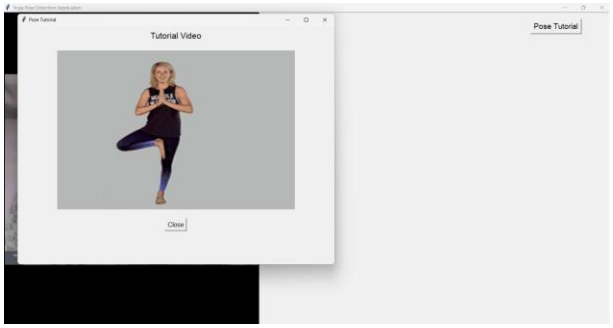


Fig.1.8 Tutorial page

Fig.1.8,This screen provides a tutorial video for a yoga pose. When the user clicks the "Pose Tutorial" button, a pop-up window appears, showing a demonstration of the selected pose. This helps users learn and follow the correct posture. The "Close" button allows them to exit the tutorial.

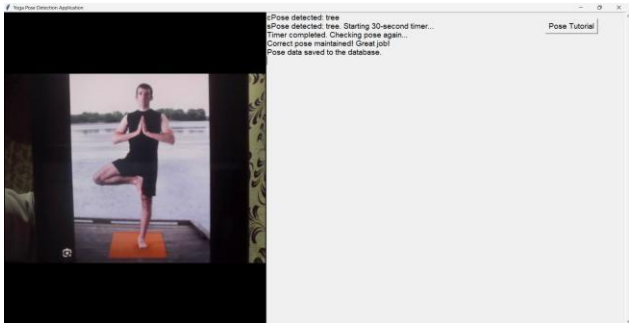


Fig.1.9 pose detection

Fig.1.9,this screen shows the yoga pose detection feature. The camera captures the user's pose and checks if it matches the correct posture. A timer runs for 30 seconds to ensure the pose is held properly. If successful, a message confirms the correct pose, and the data is saved to the database.

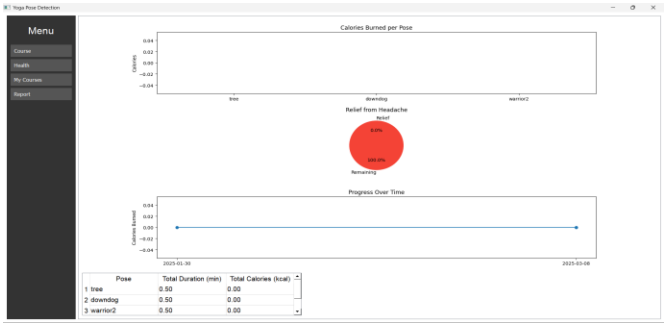


Fig.10.0 report section

Fig.10.0 ,This screen shows a personalized report of yoga progress. It tracks the duration of different poses, calories burned, and progress over time. There is also a section for health benefits like headache relief. The side menu allows navigation to different sections like courses, health, and reports.

## VI. Discussion and Conclusion

The Yoga Pose Detection and Healthcare project integrates technology with fitness, providing a personalized platform for users to practice yoga. Using real-time pose detection and computer vision, the system ensures that users perform exercises with the correct form, reducing the risk of injury and improving effectiveness. By tailoring exercises based on the user's health profile, the system suggests appropriate poses for conditions like back pain or stress. Tutorial videos guide users through each exercise, and real-time feedback helps them adjust their form, making the practice more efficient. The flexibility of using either a webcam or mobile camera makes the platform accessible to users with different devices.

The project offers a comprehensive solution for practicing yoga safely and effectively. With personalized exercise recommendations, visual tutorials, and real-time feedback, users can enhance their practice and overall health. Although challenges may arise with environmental factors and diverse body types, the system shows great potential to make yoga more accessible and beneficial to a wider audience, encouraging healthier lifestyles for all.

## VII. Future Scope

Imagine having a personalized yoga instructor right at your fingertips. Your journey begins with a simple, secure sign-up, where you create an account and verify it with a code sent to your phone. Once inside, you're greeted with four key areas: a library of all yoga exercises, a section for your personal health details, a customized yoga program, and a progress report. The magic lies in how your personal information – weight, height, and any pain points – shapes your experience. You tell the app where you hurt, and it recommends specific yoga routines designed to help. When you choose a routine, you get to see a mini-tutorial, like a quick demo, showing you how to do each exercise correctly. Then, when you're ready to practice, you can use either your phone or computer camera. A tutorial video guides you through each pose, and the app uses its smart camera to watch you. If you're doing something wrong, it gently lets you know, like a real teacher would. Finally, you can check your progress over the whole month, seeing how consistent you've been and how much you've improved. It's like having a digital yoga buddy that knows your body and helps you get better every day.

## VIII. Reference

[1] Johnson, M., & Lee, H. (2020). "Real-time Yoga Pose Detection Using Mediapipe." Proceedings of the IEEE Conference on Computer Vision.

[2] Chen, Z., et al. (2021). "Custom CNN for Yoga Pose Classification." International Journal of Computer Applications.

[3] Gupta, R., & Singh, A. (2022). "YOLOv5 and Transfer Learning for Pose Detection." Journal of Machine Learning Research.

[4] Gupta, R., & Singh, A. (2022). "YOLOv5 and Transfer Learning for Pose Detection." Journal of Machine Learning Research.

[5] Zhang, Y., & Li, W. (2023). "Real-Time Human Pose Estimation Using YOLOv7 and Deep Learning Techniques." IEEE Transactions on Pattern Analysis and Machine Intelligence.