POSTURE DETECTION AND CORRECTION

A Mini Project Report

Submitted in the partial fulfilment of the requirement for the award of the degree of Bachelor of Technology In

Computer Science and Systems Engineering

Submitted By

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CERTIFICATE

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This is to certify that this mini project entitled "**Posture Detection and Correction"** is a bonafide work carried out by **CH.L.G.V.PhaniSri (320114110009),Devarapu Satyaveni (320114110010),Devavarapu Neha(320114110011),Eedubilli Yashika Priya(320114110012)** Submitted in the fulfilment of the requirement for the award of the degree of Bachelor of Technology In Computer Science and Systems Engineering during the year 2020-2024.

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We express our thanks to all those who contributed for the successful completion of our project work.

With gratitude,

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DECLARATION

We hereby declare that project entitled “POSTURE DETECTION AND CORRECTION" has been submitted by us in partial fulfilment of requirement for the award of Degree of Bachelor of Technology by ANDHRA UNIVERSITY COLLEGE OF ENGINEERING FOR WOMEN, Visakhapatnam.

We also hereby declare that this project is the result of our own effort and that it has not been submitted to any other University for the award of any Degree.

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ABSTRACT

Posture detection and correction is the process of identifying and addressing improper alignment of the body while sitting, standing, moving or exercising . Poor posture can lead to a variety of health problems, including chronic pain, muscle imbalances, and reduced mobility. In recent years, technology has played an increasingly important role in posture detection and correction, with the development of wearable devices and software applications that use sensors and machine learning algorithms to monitor and improve posture.

The first step in posture detection and correction is to accurately identify improper alignment. This can be done through visual observation, as well as through the use of sensors that measure various parameters such as angle and pressure. Once improper alignment has been identified, corrective measures can be taken, which may include physical therapy exercises, ergonomic adjustments to the workplace or home environment, and posture training using wearable devices and software applications.

One of the key benefits of posture detection and correction is the prevention and reduction of pain and discomfort associated with poor posture. By maintaining proper alignment, individuals can reduce stress on their muscles and joints, leading to improved overall health and well-being. Additionally, good posture can improve confidence, appearance, and overall quality of life.

Overall, posture detection and correction is an important aspect of maintaining good health and preventing chronic pain and discomfort. With the help of technology and proper education, individuals can take proactive steps to improve their posture and reduce the risk of future health problems.

LIST OF FIGURES

POSTURE DETECTION AND CORRECTION

1.INTRODUCTION

1.1 INTRODUCTION TO PROJECT :

Posture detection and correction refers to the process of identifying and correcting improper body posture. Poor posture can lead to various health problems such as back pain, neck pain, headaches, and decreased mobility.
In this project,posture detection involves the evaluation of a person's posture, which can be done using technology such as posture detection software or posture-correcting devices. The evaluation typically looks at the alignment of the head, neck, spine, shoulders, hips, and feet. Once poor posture has been identified, posture correction techniques can be used to help improve alignment and reduce pain. These techniques can include exercises to strengthen and stretch specific muscles, adjustments to work or home environment, and the use of posture-correcting devices such as braces for posture-correcting shirts.

1.2 OBJECTIVE OF PROJECT:

The objective of a posture detection and correction project is to improve people's health and well-being by identifying and correcting poor body posture. This can be achieved through a variety of methods, such as:

1. Developing posture detection software or hardware to accurately detect and analyze a person's posture in real-time.
2. Developing exercises or tools to help people improve their posture, such as stretches, strengthening exercises, or posture-correcting devices.
3. Conducting research on the causes and consequences of poor posture, and using that research to inform the development of effective posture correction methods.

The ultimate goal of a posture detection and correction project is to help people maintain good posture, which can reduce pain, prevent injuries, and improve overall quality of life. By identifying and correcting poor posture, people can enjoy better physical health, increased mobility, and greater confidence and self-esteem.

1.3 ORGANIZATION OF PROJECT WORK:

A posture correction and recommendation project can involve multiple steps, including posture assessment, corrective exercises, and ongoing monitoring and feedback.

1. Posture Assessment: Begin by conducting a thorough posture assessment using a posture analysis tool or working with a healthcare professional. This assessment will help identify any imbalances or areas of weakness in the body that may be contributing to poor posture.
2. Customized Exercise Program: Based on the results of the posture assessment, create a customized exercise program that includes strengthening exercises to address weak muscles, stretches to improve flexibility, and posture-correcting exercises to improve alignment.
3. Implementation and Monitoring: Provide users with instructions on how to perform the exercises correctly and how often to do them. Use monitoring tools such as wearable devices, posture monitoring apps, or user feedback to track progress and make adjustments as necessary.
4. Feedback and Support: Provide ongoing feedback and support to users throughout the program. This can include progress reports, personalized coaching, or community support to encourage and motivate users.

1.4 PURPOSE OF THE PROJECT:

The purpose of this project is to improve the alignment of the body, which can help reduce pain, prevent injuries, and improve overall health and well-being. Poor posture can cause strain on muscles, joints, and ligaments, leading to pain in the neck, shoulders, back, and hips. It can also limit mobility and cause headaches and fatigue.
By correcting poor posture, individuals can improve their physical health and prevent long-term health problems. Good posture also promotes proper breathing and circulation, which can improve energy levels and cognitive function.
In addition to physical benefits, posture correction can also improve confidence and self-esteem. Good posture is associated with a more positive body image and can help individuals feel more confident in social situations and in their professional lives.

2.REQUIREMENTS SPECIFICATION

2.1 FUNCTIONAL REQUIREMENTS :

Functional requirements are a set of specifications that define what a software system or application is expected to do in terms of its features, functions, and capabilities. They describe the behavior of the system and outline the tasks it is expected to perform to meet the needs of its users or stakeholders. Functional requirements typically describe the inputs, processes, and outputs of the system, as well as the actions and responses that are expected of it. They are a critical part of software development and are used to guide the design, implementation, testing, and maintenance of the software.

The functional requirements of this project are:-

- To allow users to sign up to create an account and login.
- Detecting human pose: The program must be able to detect human pose from video input using the MediaPipe Pose model.
- Extract 3D landmark coordinates: The program must be able to extract 3D landmark coordinates from the detected human pose.
- Calculate correct angle: The program must calculate the angle between the vectors formed by the body joints.
- Visualize correct angle: The program must visualize the calculated angle using a horizontal bar of a specific color, depending on the angle value. The color of the bar should be green if the angle is less than 20 degrees, yellow if it is between 20 and 60 degrees, and red if it is greater than 60 degrees.
- Handle input from video source: The program must be able to handle input from a webcam or other video source.
- Handle errors: The program must handle errors gracefully and continue to run even if it cannot retrieve all necessary joint information from the MediaPipe model.
- Allow for customization: The program should allow for customization of certain parameters, such as the model complexity, landmark detection and tracking confidence thresholds, and font size and color for the text display.

2.2 NON-FUNCTIONAL REQUIREMENTS :

2.2.1 Performance: The system should be able to handle a high volume of users simultaneously without slowing down or crashing. Response time should be fast enough to provide a seamless user experience.

2.2.2 Security: The system should have robust security measures in place to protect users personal information and prevent unauthorized access, such as encryption of sensitive data,multi-factor authentication, and regular security audits.

2.2.3 Reliability: The system should be highly available and reliable, with minimal downtime and quick recovery in case of any failures.

2.2.4 Usability: The system should be easy to use and navigate, with a user-friendly interface and clear instructions or documentation.

2.2.5 Accessibility: The system should be accessible to all users, regardless of their abilities or disabilities. This could involve providing support for assistive technologies such as screen readers, keyboard shortcuts, or high-contrast display options.

2.2.6 Maintainability: The system should be easy to maintain and update, with modular architecture and clear separation of concerns. Code should well-documented and adhering to best practices.

2.2.7 Compatibility: The system should be compatible with a wide range of Devices, browsers,and operating systems, to ensure that users can access it from anywhere and on any device.

2.3 SOFTWARE REQUIREMENTS :

- Languages: HTML, CSS, Javascript, Python
- Software Required :

➢ Python 3.x: This is the programming language used to write the code.
➢ OpenCV: This is a computer vision library used for image and video processing.
➢ Mediapipe: This is a machine learning framework developed by Google for building pipelines to process perceptual data.

You can install OpenCV and Mediapipe via pip, which is a package installer for Python. Here are the commands to install OpenCV and Mediapipe:

pip install opencv-python-headless
pip install mediapipe

Once you have installed the necessary software, you can run the code using your preferred IDE or text editor.

2.4 HARDWARE REQUIREMENTS :

- A computer or laptop with a webcam
- A processor with a clock speed of at least 2 GHz
- 4GB or more of RAM
- A graphics card with support for OpenGL 3.0 or higher.
- Additionally, it is recommended to have an SSD for faster data access and storage.

2.5 TECHNOLOGIES USED IN THIS PROJECT :

2.5.1 HTML(Hyper Text Markup language):

It is a markup language used for creating and structuring content for the web. It consists of a set of tags and attributes that define the different elements of a web page, such as headings, paragraphs, images, links, and forms. HTML documents can be viewed in web browsers, which interpret the HTML code and display the content on the screen. HTML is a foundational technology for web development and is often used in conjunction with other languages like CSS and JavaScript to create dynamic and interactive web pages.

2.5.2 CSS(Cascading Style Sheets):

It is a styling language used to add styles and formatting to HTML documents. With CSS, web developers can control the layout, typography, colors, and other visual aspects of a webpage. CSS works by targeting HTML elements using selectors and applying styles to them. It allows for the separation of presentation and content, making it easier to maintain and update the design of a website. CSS can be used to create responsive designs that adapt to different screen sizes and devices, and it is supported by all modern web browsers.

2.5.3 Java Script:

JavaScript is a high-level programming language used for creating dynamic and interactive web pages. It allows developers to add behavior and interactivity to web pages by manipulating the Document Object Model (DOM) and responding to user events. JavaScript can be used for a variety of tasks including form validation, animation, and creating web-based games. It is supported by all modern web browsers and is an essential tool for

front-end web development.

2.5.4 Python:

Python is a high-level, interpreted programming language known for its simplicity, readability, and ease of use. It has a large standard library that provides many useful functions and modules, making it ideal for various applications like web development, data science,artificial intelligence, and automation. Python is dynamically typed, meaning that variable types are inferred at runtime, making it flexible and easy to learn. It is an open-source language with a vast community that continuously contributes to its growth and development, making it one of the most popular programming languages in the world. Here it is used as the main programming language for the project.

2.5.5 NumPy :

NumPy (short for Numerical Python) is a Python library that provides support for large, multi-dimensional arrays and matrices, along with a collection of mathematical functions to operate on these arrays. NumPy is widely used in data analysis, scientific computing, and machine learning due to its efficiency, simplicity, and flexibility. NumPy provides a powerful data structure called the nd-array (N-dimensional array), which allows for fast operations on large sets of data. It also provides functions for array manipulation, linear algebra, Fourier transform, and random number generation. Additionally, NumPy can be integrated with other python libraries to create powerful data analysis and visualization tools.It is used here to handle and manipulate the coordinate data from Mediapipe.

2.5.6 OpenCV :

OpenCV (Open Source Computer Vision) is a library of programming functions mainly used for real-time computer vision applications. It includes various image and video processing algorithms, such as feature detection, object detection and recognition, and motion analysis. OpenCV supports a wide range of programming languages, including Python, C++, and Java, and can be used on different platforms, such as Windows, Linux, macOS, and Android. It is widely used in various fields, including robotics, augmented reality, medical image processing, and more.

2.5.7 Mediapipe:

Mediapipe is a Google-developed open-source framework for building machine learning models and pipelines for various media processing tasks, such as video and audio analysis. It provides a collection of pre-built ML models and transforms, as well as tools for building custom models and pipelines using a simple and flexible API.

Mediapipe can be used for a wide range of applications, including gesture recognition, face detection and tracking, pose estimation, object detection and tracking, and more. It offers support for various input sources, such as webcams, video files, and image sequences, and can be used with popular programming languages like C++, Python, and JavaScript.
One of the notable features of Mediapipe is its ability to run ML models efficiently on a variety of devices, including CPUs, GPUs, and even mobile and edge devices.

3.SYSTEM ANALYSIS

It is a process of collecting and interpreting facts, identifying the problems, and decomposition of a system into its components. System analysis is conducted for the purpose of studying a system or its parts in order to identify its objectives.

3.1 PROBLEM STATEMENT :

To develop a real-time posture correction system for performing exercises using computer vision. The system should use a webcam to capture video and analyze the user's body position using pose estimation techniques. The system should then provide real-time feedback to the user on their posture, indicating whether they are correctly performing the exercise or if they need to adjust their position. The feedback should be provided through a graphical interface overlaid on the video stream, with a visual indicator of the user's current posture and an ergonomics bar showing how well the user is performing the exercise. The system should also track the user's progress over time, storing data on their posture and providing feedback on areas for improvement. Finally, the system should be user-friendly and accessible, with clear instructions on how to use it and guidance on correct posture for performing different exercises.

3.2 MODULES :

Our software system infrastructure can be divided into modules based on functionalities.The module are classified are as follows:

3.2.1 User Mst Module:

USER MODULE :

A user module for posture detection and correction could be used to provide guidance and exercises to users to improve their posture over time. Here's an example of how such a module could work:

- **Posture feedback:**
  The posture detection system would analyze the posture of the user, and provide feedback on their posture quality, such as a posture score, a posture rating, or a visual representation of their posture. This feedback could be provided in real-time or as a summary at the end of a session.

- **Posture analysis**:
  The posture correction module would analyze the posture of the user, and provide feedback on their posture quality, such as a posture score, a posture rating, or a visual

representation of their posture. This feedback could be provided in real-time or as a summary at the end of a session.

- **Posture guidance:**
  The module could provide guidance to users on how to improve their posture, based on their individual needs and goals. The guidance could include visual cues, instructional videos, or personalized recommendations based on their posture data.

- **Posture exercises:**
  The module could provide posture correction exercises to users, tailored to their specific posture needs and goals. These exercises could include stretching, strengthening, or mobility exercises designed to improve posture and prevent injury.

- **Progress tracking:**
  The posture correction module could track the user's progress over time, and provide feedback on their posture improvement. This could include graphs, charts, or other visualizations of their posture score or rating over time, as well as personalized feedback on their progress.

- **Goal setting:**
  The module could allow users to set goals for their posture improvement, such as a target posture score or a target duration of good posture. The module could provide guidance and feedback to help users achieve their goals.

- **Notification:**
  The module could send notifications to users to remind them to check their posture, or to perform exercises to improve their posture. The notifications could be personalized based on the user's needs and preferences.

  Overall, a user module for posture detection and correction could help users to be more aware of their posture, and to take action to improve their posture over time. By providing personalized feedback, guidance, exercises, progress tracking, and goal setting, the module could help users to achieve their posture goals and improve their overall health and well-being.

3.2.2 Admin Mst Modules :

ADMIN MODULE :
An admin module for posture detection and correction could be used to manage and analyze data collected by a posture detection system. Here's an example of how such a module could work:

- **Data collection:**
  The posture detection system would collect data on the posture of users, such as their body position, movement, and alignment, using sensors, cameras, or other devices.

- **Data storage:**
  The data would be stored in a database, with each record representing a posture observation. The data could be organized by user, time, location, or other relevant factors.

- **Admin interface:**
  The admin module would provide an interface for administrators to view and analyze the posture data. The interface could include features such as:
  1.DashBoard
  2.User Management
  3.Posture Analysis
  4.Reporting

- **Security:**
  The admin module would need to be secured with appropriate authentication and authorization measures to protect the privacy and security of user data.

  Overall, an admin module for posture detection and correction could help administrators monitor and improve the posture of users, promote better health and wellness, and reduce the risk of injury or strain. By providing tools for posture analysis, program management, and reporting, the module could help administrators to customize the posture correction program for each user, and to track their progress over time.

4.FEASIBILITY STUDY

4.1 INTRODUCTION TO FEASIBILITY STUDY :

A feasibility study is an analysis of the practicality of a proposed project or system. It helps to determine if the project is worth pursuing and if it can be successfully completed within a given time frame and budget.

4.2 TECHNICAL FEASIBILITY :

Technical feasibility for the posture detection and correction system involves evaluating whether the required technology exists and is readily available to support the system, as well as determining whether the technology can be integrated into the system without major obstacles. Here are some key technical considerations for the posture detection and correction system:

- **Hardware:**
  The system requires hardware components, such as cameras or sensors, to detect and capture data related to user posture. The feasibility of the system relies on the availability of suitable hardware components that can provide the required data accuracy and speed.

- **Software:**
  The system requires software components, such as image processing and machine learning algorithms, to analyze the posture data and provide feedback. The feasibility of the system relies on the availability of suitable software components that can provide the required accuracy and speed.

- **Data storage:**
  The system requires a data storage solution to store posture data for future analysis and feedback. The feasibility of the system relies on the availability of suitable data storage solutions that can handle the expected data volume and ensure data security.

- **Network:**
  The system requires a network infrastructure to transmit posture data from the hardware to the software components. The feasibility of the system relies on the availability of suitable network infrastructure that can provide the required speed and security.

- **Integration:**
  The system requires the integration of hardware, software, data storage, and network components to create a seamless and effective system. The feasibility of the system relies on the ability to integrate these components effectively and without major obstacles.

- **User interface:**
  The system requires a user interface to allow users to interact with the system, receive feedback, and correct their posture. The feasibility of the system relies on the availability of suitable user interface components that can provide a good user experience and are easy to use.

Overall, the technical feasibility of the posture detection and correction system relies on the availability of suitable hardware, software, data storage, network, and user interface components, as well as the ability to integrate these components effectively. A thorough technical feasibility study can help identify any potential technical obstacles or limitations and determine the feasibility of the system.

4.3 OPERATIONAL FEASIBILITY :

Operational feasibility for the posture detection and correction system involves evaluating whether the proposed system can be implemented within the existing operational environment and whether it aligns with the goals of the organization. Here are some key operational considerations for the posture detection and correction system:

- **User Acceptance:**
  The success of the posture detection and correction system relies on user acceptance and adoption. The feasibility of the system relies on whether users are willing to use the system and follow the feedback and guidance provided.

- **Availability of resources:**
  The feasibility of the system relies on the availability of resources such as hardware, software, and personnel to implement and maintain the system. It is important to consider whether the organization has the necessary resources to support the system.

- **Integration with existing systems:**
  The feasibility of the system relies on its ability to integrate with existing systems, such as HR or wellness programs, to ensure that it aligns with the goals and objectives of the organization.

- **Training and support:**
  The feasibility of the system relies on the availability of training and support for users and IT staff to ensure that the system is effectively implemented and maintained.

- **Privacy and security:**
  The feasibility of the system relies on the ability to ensure the privacy and security of user data. It is important to consider whether the organization has the necessary policies and procedures in place to ensure that user data is protected.

- **Cost-effectiveness:**
  The feasibility of the system relies on whether it is cost-effective to implement and maintain. It is important to consider the initial and ongoing costs associated with the system and whether the benefits of the system outweigh the costs.

Overall, the operational feasibility of the posture detection and correction system relies on user acceptance, resource availability, integration with existing systems, training and support, privacy and security, and cost-effectiveness. A thorough operational feasibility study can help identify any potential operational obstacles or limitations and determine the feasibility of the system within the organization

4.4 ECONOMIC FEASIBILITY :

Economic feasibility is an important factor to consider when developing a posture detection and correction system. This involves analyzing the costs and benefits of the system to determine whether it is financially feasible to implement. Here are some key economic considerations for the posture detection and correction system:

- **Development costs:**
  The development costs of the system will include hardware, software, and personnel costs associated with designing and implementing the system. These costs will need to be weighed against the potential benefits of the system.

- **Operating costs:**
  The operating costs of the system will include ongoing maintenance, hardware and software upgrades, and personnel costs. It is important to estimate these costs over the lifetime of the system and ensure that the benefits of the system outweigh the costs.

- **Return on investment (ROI):**
  The ROI of the system will depend on the potential benefits of the system, such as reduced healthcare costs and increased productivity. It is important to estimate the potential ROI of the system and ensure that it is financially viable.

- **Market demand:**
  The economic feasibility of the system will also depend on the market demand for the system. It is important to conduct market research to determine whether there is a sufficient demand for the system to make it economically viable.

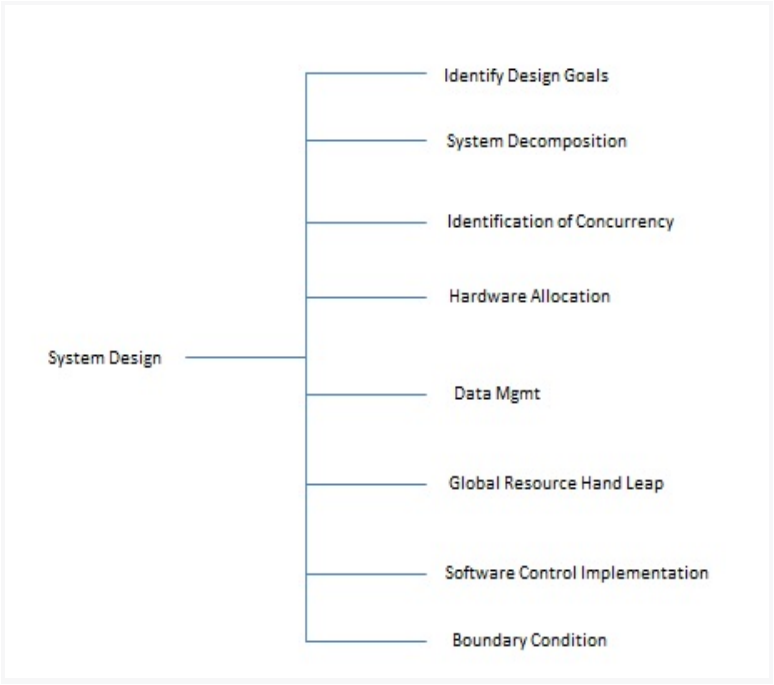
- **Competition:**
  The economic feasibility of the system will also depend on the competition in the market. It is important to analyze the competitive landscape and determine whether the system has a unique value proposition that can differentiate it from competitors.

- **Scalability:**
  The economic feasibility of the system will also depend on its scalability. It is important to analyze whether the system can be scaled to meet the needs of a larger market and whether the costs and benefits of the system will remain consistent as it scales.

Overall, the economic feasibility of the posture detection and correction system relies on the development and operating costs, potential ROI, market demand, competition, and scalability. A thorough economic feasibility study can help identify any potential economic obstacles or limitations and determine the economic viability of the system.

5.SYSTEM DESIGN

System design in OOSE involves a series of steps that help to identify the system requirements, define the objects that make up the system, model the system's behavior, and design the system implementation. The OOSE methodology provides a structured approach to system design that can help to create robust and scalable software systems.



5.1 INTRODUCTION

The system design and implementation provide following capabilities:

- Performance and capacity analysis of planned and existing systems.
- Design of technical architecture of new IT services.
- System Deployment

5.1.1 Inputs to System Design :

System Design takes the following inputs :

- Statement of work
- Requirement determination plan
- Current situation analysis
- Proposed system requirements including a conceptual data model, modified DFDs, and Metadata (data about data).

5.1.2 Outputs for System Design :

System Design gives the following outputs :

- Infrastructure and organizational changes for the proposed system.
- A data schema, often a relational schema.
- Metadata to define the tables/files and columns/data-items.
- A function hierarchy diagram or web page map that graphically describes the program structure.
- Actual or pseudocode for each module in the program.

5.2 UNIFIED MODELING LANGUAGE

The Unified Modelling Language(UML) is a standardized modeling language consisting of an integrated set of diagrams,developed to help system and software developers for specifying, visualizing, constructing and documenting the artifacts of software systems, as well as for business modeling and other non-software systems.
UML is linked with object oriented design and analysis. UML makes the use of elements and forms associations between them to form diagrams. Diagrams in UML can be broadly classified as:

1.Structural Diagrams

- Class Diagram
- Composite Structure Diagram
- Object Diagram
- Component Diagram
- Deployment Diagram

2.Behavioural Diagrams

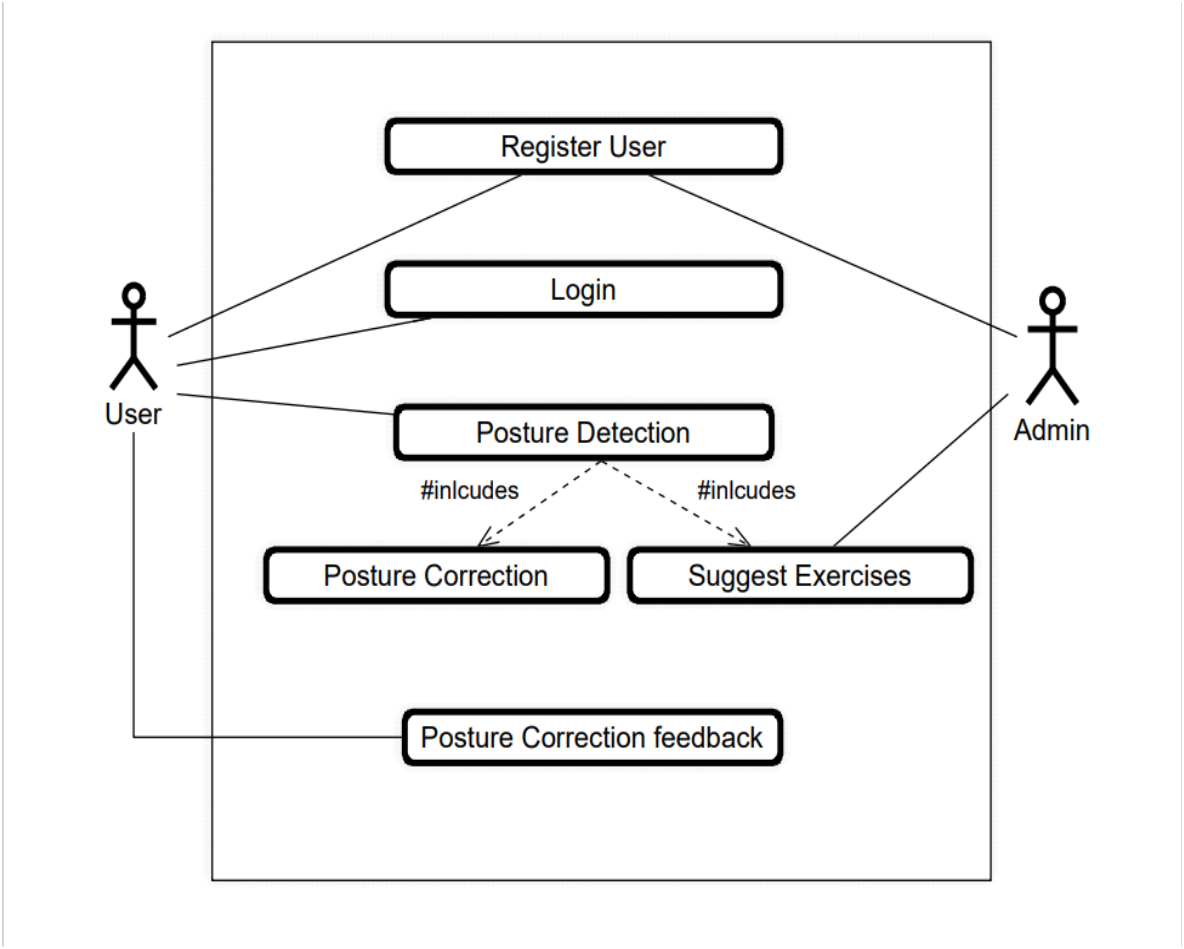
- State Chart
- Use case Diagram
- Activity Diagram
- Sequence Diagram

UML is specifically constructed through two different domains .They are:

- ❖ UML Analysis Modeling,which focuses on user and structural models.
- ❖ UML Design Modeling,which focuses on behavioral modeling,implementation modeling and environment modeling views.

Some of the UML diagrams related to the project are

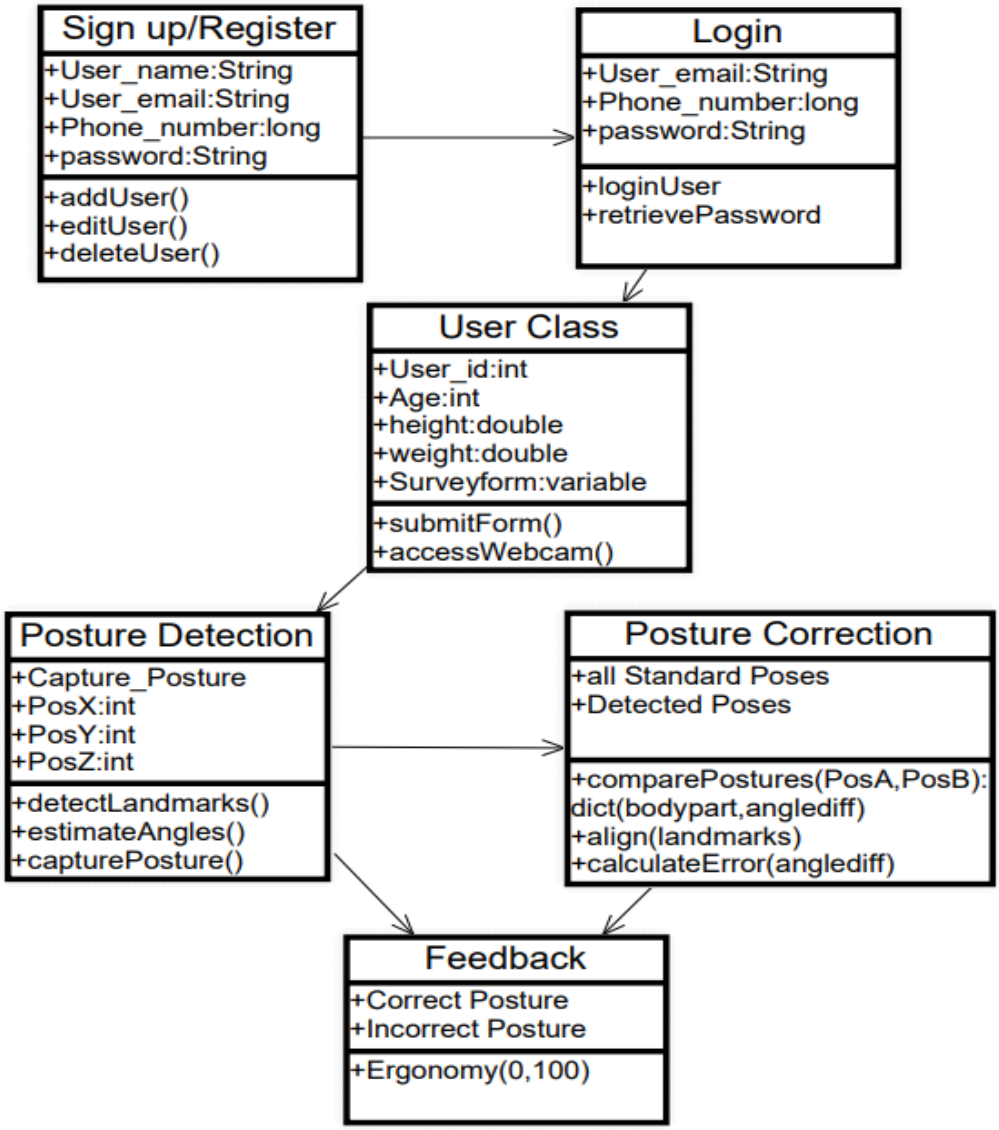
5.2.1 USE-CASE DIAGRAM



A use case diagram is used to represent the dynamic behavior of a system. It encapsulates the system's functionality by incorporating use cases, actors, and their relationships.

The main purpose of a use case diagram is to portray the dynamic aspect of a system. It invokes persons, use cases, and several things that invoke the actors and elements accountable for the implementation of use case diagrams. It represents how an entity from the external environment can interact with a part of the system.

5.2.2. CLASS DIAGRAM :

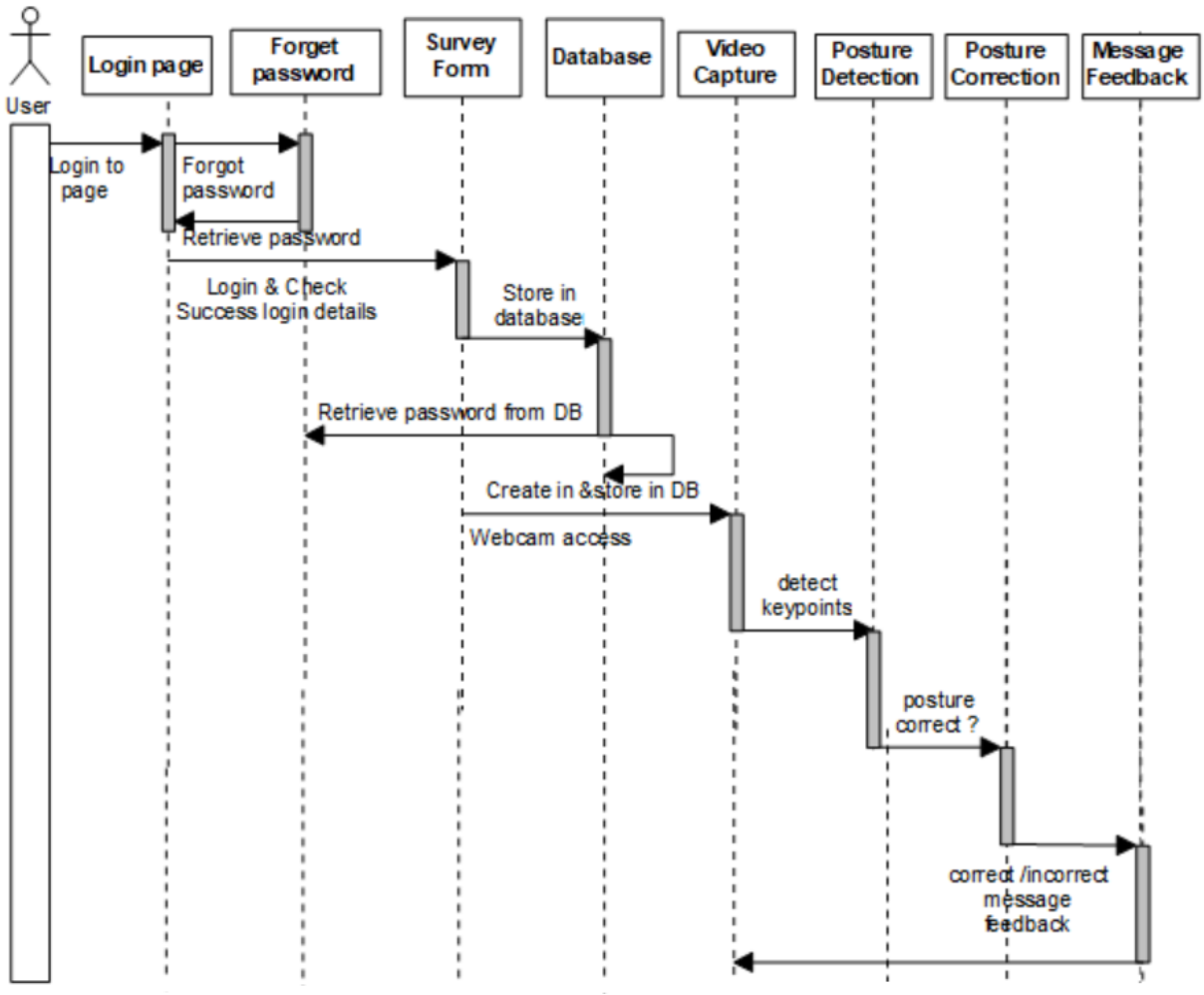


Class diagram describes the attributes and operations of a class and also the constraints imposed on the system. The class diagrams are widely used in the modeling of object-oriented systems because they are the only UML diagrams, which can be mapped directly with object-oriented languages.

The purpose of the class diagram is to model the static view of an application.

- Name of the class
- Each element and representation
- Attributes and methods

5.2.3. SEQUENCE DIAGRAM



The sequence diagram represents the flow of messages in the system and is also termed as an event diagram. It helps in envisioning several dynamic scenarios. It portrays the communication between any two lifelines as a time-ordered sequence of events, such that these lifelines took part at the run time.

The purpose of the sequence diagram is

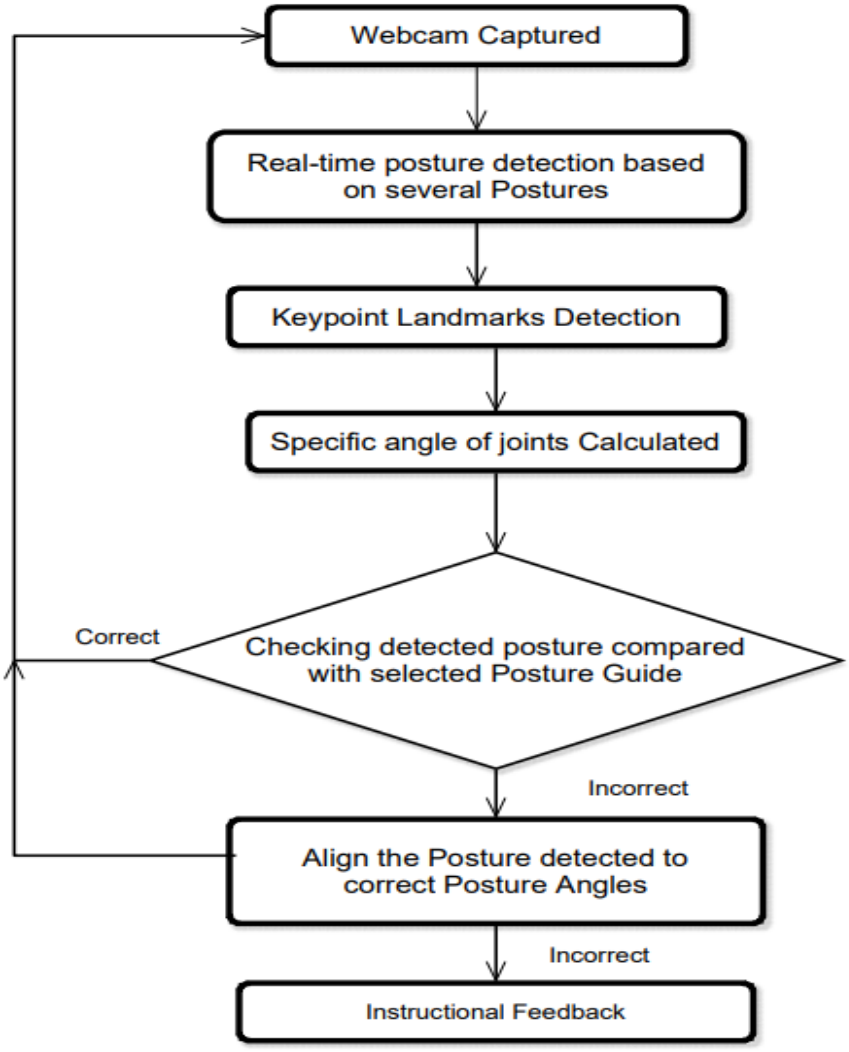
- To model high-level interaction among active objects within a system.
- To model interaction among objects inside a collaboration realizing a use case.
- It either models generic interactions or some certain instances of interaction.

5.2.4.STATE CHART DIAGRAM

A Statechart diagram describes a state machine. A state machine can be defined as a machine which defines different states of an object and these states are controlled by external or internal events.

Statechart diagram describes the flow of control from one state to another state. States are defined as a condition in which an object exists and it changes when some event is triggered.

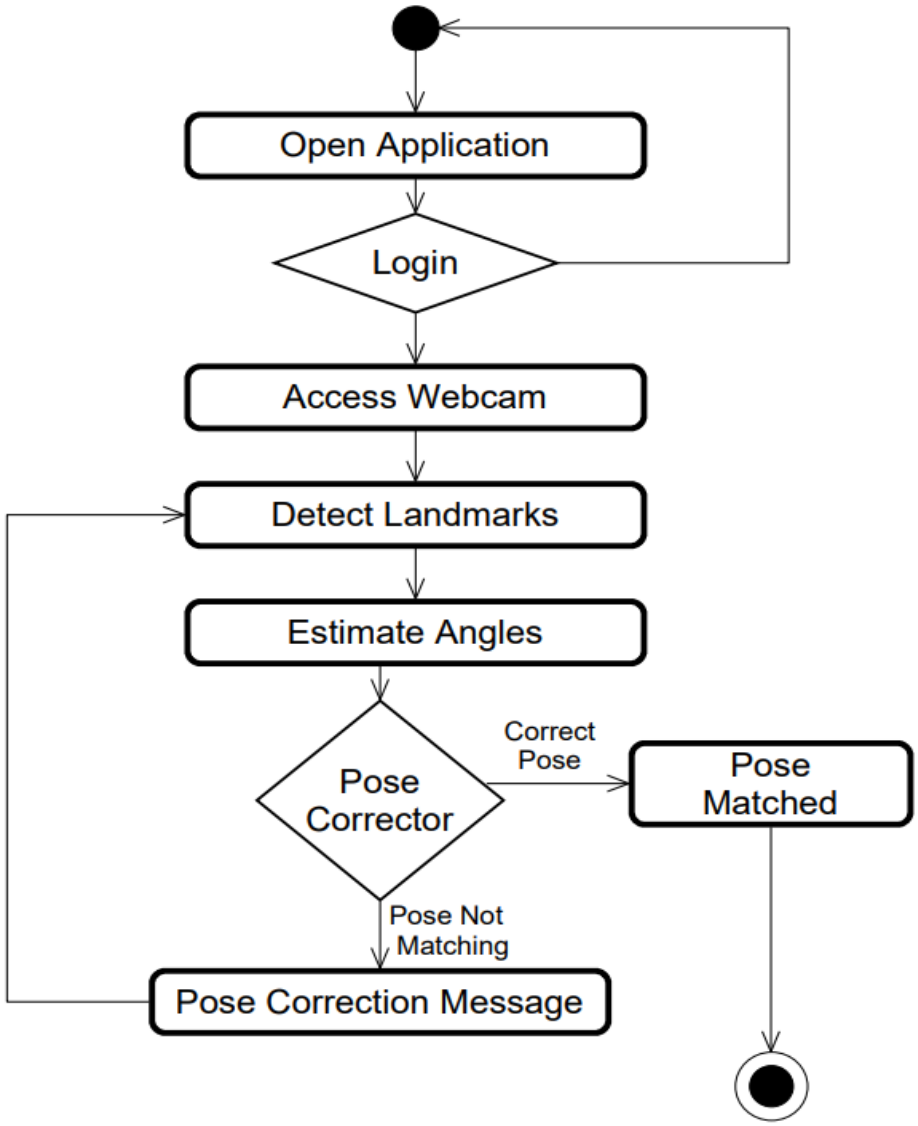
State diagrams are useful in all forms of object -oriented programming.



5.2.5.ACTIVITY DIAGRAM

The activity diagram helps in envisioning the workflow from one activity to another. It puts emphasis on the condition of flow and the order in which it occurs. The flow can be sequential, branched, or concurrent, and to deal with such kinds of flows, the activity diagram has come up with a fork, join, etc.

The purpose of the activity diagram is to demonstrate the flow of control within the system rather than the implementation. It models the concurrent and sequential activities.



6.NORMALIZATION

In the data world, there is a common process called data normalization by which you organize data in such a way as to reduce and even eliminate data redundancy, effectively increasing the cohesiveness of data entities.Data normalization only deals with data and not behavior.We need to consider both when normalizing our object schema.
There are different types of normalization techniques that can be used in posture detection and correction projects using machine learning. The choice of normalization technique depends on the type of data being used and the specific requirements of the project. Here are some examples of normalization techniques that can be used in posture detection and correction projects:

1. Z-score normalization: This technique scales the data so that the mean is 0 and the standard deviation is 1. It is commonly used when the data follows a normal distribution.
2. Min-max normalization: This technique scales the data to a range between 0 and 1. It is commonly used when the range of the data is known and it is desired to scale the data to a fixed range.
3. Mean normalization: This technique scales the data so that the mean is 0 and the range of the data is preserved.
4. Unit vector normalization: This technique scales the data so that the magnitude of each vector is 1. It is commonly used when working with vectors.

In posture detection and correction projects, it is common to normalize the data before feeding it into a machine learning model to ensure that the data is on a comparable scale and to improve the accuracy of the model. The specific normalization technique used will depend on the data being used and the requirements of the project.

Normalization techniques can be used in several ways in a posture detection and correction project. Here are a few examples:

1. Input normalization: If your posture detection system uses sensors or other devices to capture data about a person's posture, it's important to normalize the input data to ensure that it is consistent and reliable. This might involve scaling the input data to a specific range or normalizing it to have a mean of zero and a standard deviation of one.
2. Posture classification: Once you have normalized the input data, you can use normalization techniques to improve the accuracy of posture classification. For example, you might use feature scaling to ensure that different features (such as the

angle of the neck or the curvature of the spine) are weighted equally in the classification process.

3. Output normalization: If your posture correction system provides feedback to the user about their posture, you may want to normalize the output data to make it more intuitive and actionable. For example, you might convert the output data into a scale from 0-100, where 0 represents poor posture and 100 represents perfect posture.

Overall, Normalization is an important preprocessing step in posture detection and correction tasks that can help to improve the performance and stability of the model during training the inference.Normalization techniques can help to improve the accuracy and usability of a posture detection and correction system by ensuring that input data is consistent, classification is fair, and output data is intuitive.

7.CODE TEMPLATES

global.css:

```
global.css > :root
:root {
  /* fonts */
  --font-petrona: Petrona;
  --font-roboto: Roboto;
  --font-lato: Lato;
  --h3: "Open Sans";
  --font-inter: Inter;
  --font-inherit: inherit;

  /* font sizes */
  --font-size-xs: 14px;
  --font-size-sm: 15px;
  --font-size-base: 20px;
  --font-size-lg: 23px;
  --font-size-xl: 25px;
  --font-size-2xl: 29px;
  --font-size-3xl: 30px;
  --h3-size: 32px;
  --font-size-5xl: 34px;
  --font-size-6xl: 35px;
  --font-size-7xl: 36px;
  --font-size-8xl: 40px;
  --font-size-9xl: 55px;

  /* Colors */
  --color-darkolivegreen: #7f6840;
  --color-dimgray-100: #5a5a5a;
  --color-dimgray-200: #4d5557;
  --color-saddlebrown-100: #682406;
  --color-saddlebrown-200: #4a1a11;
  --color-mediumseagreen: #2ecc71;
  --color-darkgray: #aaa;
  --color-white: #fff;
  --color-whitesmoke-100: #efefef;
  --color-teal: #09869a;
  --color-darkslategray-100: #454545;
  --color-black: #000;
```

```
  --color-gray-100: #272626;
  --color-gray-200: rgba(255, 255, 255, 0.5);
  --color-lightgray: #ccc;
  --color-gainsboro: #e7e6e6;
  --color-cornflowerblue: #00a3ff;

  /* Paddings */
  --padding-md: 20px;

  /* border radiuses */
  --br-xs: 3px;
  --br-sm: 6px;
  --br-md: 20px;
  --br-lg: 24px;
  --br-xl: 40px;
}
```

index.html:

```
        <div class="l4"></div>
        <b class="terms-condition">Terms & Condition</b>
      </div>
      <div class="useful-links">
        <div class="web-design-development-container">
          <ul class="privacy-policy-terms-and-condi">
            <li class="privacy-policy">Web Design</li>
            <li class="privacy-policy">Development</li>
            <li class="privacy-policy">Copywriting</li>
            <li class="privacy-policy">Marketing</li>
            <li>Press Releases</li>
          </ul>
        </div>
        <div class="l2"></div>
        <b class="useful-links1">Useful Links</b>
      </div>
      <div class="about-us">
        <div class="together-with-our">
          Together with our users, we strive to create a healthier, happier
          world. Free of pain and the countless other issues stemming from
          poor health.
        </div>
        <div class="l1"></div>
        <b class="about-us1">About Us</b>
      </div>
    </div>
    <div class="customers">
      <div class="img-bg">
        <img class="rectangle-icon" alt="" src="public/rectangle@2x.png" />
        <div class="rectangle2"></div>
      </div>
      <div class="copyright-2023-container">
        Copyright © 2023 Physio . All rights reserved.
        <a class="terms-of-use" href="https://www.fitnessblender.com/page/terms-of-use-agreement" target="_blank"><span
          class="terms-of-use1">Terms of Use</span></a>
        <a class="terms-of-use" href="https://www.fitnessblender.com/page/privacy-policy" target="_blank"><span
```

```
  <script>
    var alreadyAUser = document.getElementById("alreadyAUser");
    if (alreadyAUser) {
      alreadyAUser.addEventListener("click", function (e) {
        window.location.href = "./login.html";
      });
    }
    var signupbutton = document.getElementById("signupbutton");
    if (signupbutton) {
      signupbutton.addEventListener("click", function (e) {
        window.location.href = "./home.html";
      });
    }
  </script>
</body>
</html>
```

index.css:

```
index.css > body
1   body {
2     margin: 0;
3     line-height: normal;
4   }
5
6   .sign-up-child {
7     position: absolute;
8     top: 0;
9     left: 0;
10    background: linear-gradient(180deg, #fbeadd, #fff);
11    width: 1440px;
12    height: 1024px;
13  }
14
15  .sign-up-inner,
16  .sign-up-item {
17    position: absolute;
18    top: 654px;
19    left: 1027px;
20    width: 580px;
21    height: 580px;
22  }
23
24  .sign-up-inner {
25    top: 0;
26    left: 107px;
27    width: 280px;
28    height: 280px;
29  }
30
31  .already-a-user {
32    text-decoration: none;
33    position: absolute;
34    top: 807px;
35    left: 625px;
36    font-weight: 600;
37    color: inherit;
```

login.html:

```
login.html > html > head
1   <!DOCTYPE html>
2   <html>
3   <head>
4     <meta charset="utf-8" />
5     <meta name="viewport" content="initial-scale=1, width=device-width" />
6
7     <link rel="stylesheet" href="./global.css" />
8     <link rel="stylesheet" href="./login.css" />
9
10    <link rel="stylesheet" href="https://fonts.googleapis.com/css2?family=Lato:wght@300;600;700&display=swap" />
11    <link rel="stylesheet" href="https://fonts.googleapis.com/css2?family=Roboto:ital,wght@0,100;1,700&display=swap" />
12    <link rel="stylesheet" href="https://fonts.googleapis.com/css2?family=Petrona:wght@400&display=swap" />
13    <link rel="stylesheet" href="https://fonts.googleapis.com/css2?family=Inter:wght@400;600;700&display=swap" />
14    <link rel="stylesheet" href="https://fonts.googleapis.com/css2?family=Open Sans:wght@400;600;700&display=swap" />
15  </head>
16
17  <body>
18    <div class="login">
19      <div class="login-child"></div>
20      <img class="login-item" alt="" src="public/ellipse-1.svg" /><img class="login-inner" alt=""
21        src="public/ellipse-6.svg" /><a class="new-sign-up" id="newSignUp">New? Sign up</a>
22      <div class="forgot-password">Forgot Password?</div>
23      <img class="woman-doing-yoga-21" alt="" src="public/woman-doing-yoga-2@2x.png" />
24      <div class="form1">
25        <b class="login1">LOGIN</b><input class="email1" type="email" placeholder="E-mail" /><input class="password"
26          type="password" placeholder="Password" /><button class="loginbutton" id="loginbutton">
27          <div class="rectangle1"></div>
28          <div class="login2">Login</div>
29        </button>
30      </div>
31      <img class="p3-icon1" alt="" src="public/p3@2x.png" /><img class="p2-icon1" alt="" src="public/p2@2x.png" /><img
32        class="p1-icon1" alt="" src="public/p1@2x.png" />
33      <div class="control-your-body1">Control your body to free your soul</div>
34      <div class="a-good-stance1">
35        A Good Stance and Posture reflect a Proper State of Mind
36      </div>
```

```
  <script>
    var newSignUp = document.getElementById("newSignUp");
    if (newSignUp) {
      newSignUp.addEventListener("click", function (e) {
        window.location.href = "/";
      });
    }

    var loginbutton = document.getElementById("loginbutton");
    if (loginbutton) {
      loginbutton.addEventListener("click", function (e) {
        window.location.href = "./home.html";
      });
    }
  </script>
</body>

</html>
```

login.css:

```
login.css > .a-good-stance1
body {
  margin: 0;
  line-height: normal;
}

.login-child {
  position: absolute;
  top: 0;
  left: 0;
  background: linear-gradient(180deg, #fbeadd, #fff);
  width: 1440px;
  height: 1024px;
}

.login-inner,
.login-item {
  position: absolute;
  top: 654px;
  left: 1027px;
  width: 580px;
  height: 580px;
}

.login-inner {
  top: 0;
  left: 107px;
  width: 280px;
  height: 280px;
}

.forgot-password,
.new-sign-up {
  position: absolute;
  font-weight: 600;
  display: inline-block;
}
```

home.html:

```
home.html > html > body
<!DOCTYPE html>
<html>
<head>
  <meta charset="utf-8" />
  <meta name="viewport" content="initial-scale=1, width=device-width" />

  <link rel="stylesheet" href="./global.css" />
  <link rel="stylesheet" href="./home.css" />

  <link rel="stylesheet" href="https://fonts.googleapis.com/css2?family=Lato:wght@300;600;700&display=swap" />
  <link rel="stylesheet" href="https://fonts.googleapis.com/css2?family=Roboto:ital,wght@0,100;1,700&display=swap" />
  <link rel="stylesheet" href="https://fonts.googleapis.com/css2?family=Petrona:wght@400&display=swap" />
  <link rel="stylesheet" href="https://fonts.googleapis.com/css2?family=Inter:wght@400;600;700&display=swap" />
  <link rel="stylesheet" href="https://fonts.googleapis.com/css2?family=Open Sans:wght@400;600;700&display=swap" />
</head>
<body>
  <div class="home">
    <div class="footer">
      <div class="contact-us">
        <div class="examplemailcom-91-234-container">
          <p class="examplemailcom">example@mail.com</p>
          <p class="examplemailcom">+91 234 567 890</p>
          <p class="laneindia">457 Lane,India</p>
        </div>
        <div class="l4"></div>
        <b class="contact-us1">Contact Us</b>
      </div>
      <div class="tandc">
        <div class="privacy-policy-terms-container">
          <ul class="privacy-policy-terms-and-condi">
            <li class="privacy-policy">Privacy Policy</li>
            <li class="privacy-policy">Terms and Conditions</li>
            <li class="privacy-policy">Disclaimer</li>
            <li class="privacy-policy">Support</li>
            <li>FAQ</li>
          </ul>
```

```
        <div class="l4"></div>
        <b class="terms-condition">Terms & Condition</b>
      </div>
      <div class="useful-links">
        <div class="web-design-development-container">
          <ul class="privacy-policy-terms-and-condi">
            <li class="privacy-policy">Web Design</li>
            <li class="privacy-policy">Development</li>
            <li class="privacy-policy">Copywriting</li>
            <li class="privacy-policy">Marketing</li>
            <li>Press Releases</li>
          </ul>
        </div>
        <div class="l2"></div>
        <b class="useful-links1">Useful Links</b>
      </div>
      <div class="about-us">
        <div class="together-with-our">
          Together with our users, we strive to create a healthier, happier
          world. Free of pain and the countless other issues stemming from
          poor health.
        </div>
        <div class="l1"></div>
        <b class="about-us1">About Us</b>
      </div>
    </div>
    <div class="customers">
      <div class="img-bg">
        <img class="rectangle-icon" alt="" src="public/rectangle@2x.png" />
        <div class="rectangle2"></div>
      </div>
      <div class="copyright-2023-container">
        Copyright © 2023 Physio . All rights reserved.
        <a class="terms-of-use" href="https://www.fitnessblender.com/page/terms-of-use-agreement" target="_blank"><span
          class="terms-of-use1">Terms of Use</span></a>
        <a class="terms-of-use" href="https://www.fitnessblender.com/page/privacy-policy" target="_blank"><span
```

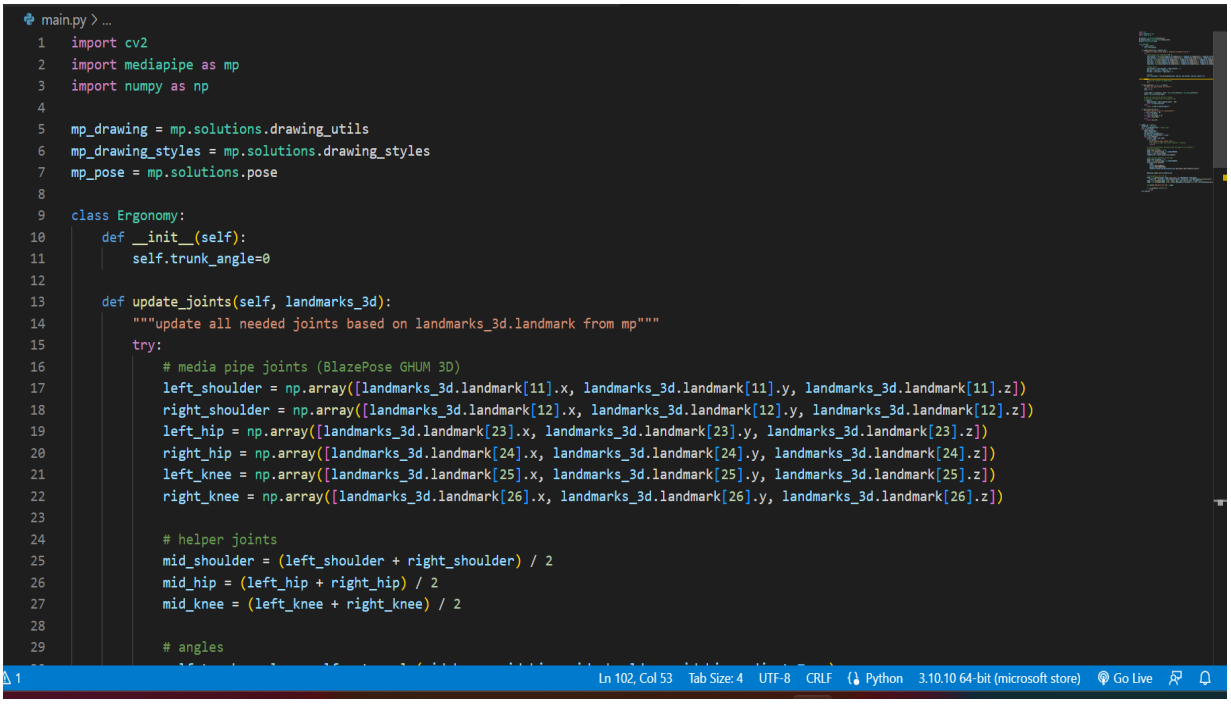
home.css:

```
home.css > body
1   body {
2     line-height: normal;
3     width: fit-content;
4   block-size: fit-content;
5   }
6   body::-webkit-scrollbar {
7     display: none;
8   }
9   .examplemailcom {
10    position: relative;
11    color: #09869a;
12    font-weight: bold;
13    font-family: "Anonymous Pro", monospace;
14    letter-spacing: 7px;
15    overflow: hidden;
16    border-right: 2px solid #09869a;
17    white-space: nowrap;
18    animation: typewriter 4s steps(44) 1.5s 1 normal both,
19      blinkTextCursor 500ms infinite;
20  }
21  @keyframes typewriter {
22    from {
23      width: 0;
24    }
25    to {
26      width: 710px;
27    }
28  }
29  @keyframes blinkTextCursor {
30    from {
31      border-right-color: #09869a;
32    }
33    to {
34      border-right-color: transparent;
35    }
36  }
```

package.json:

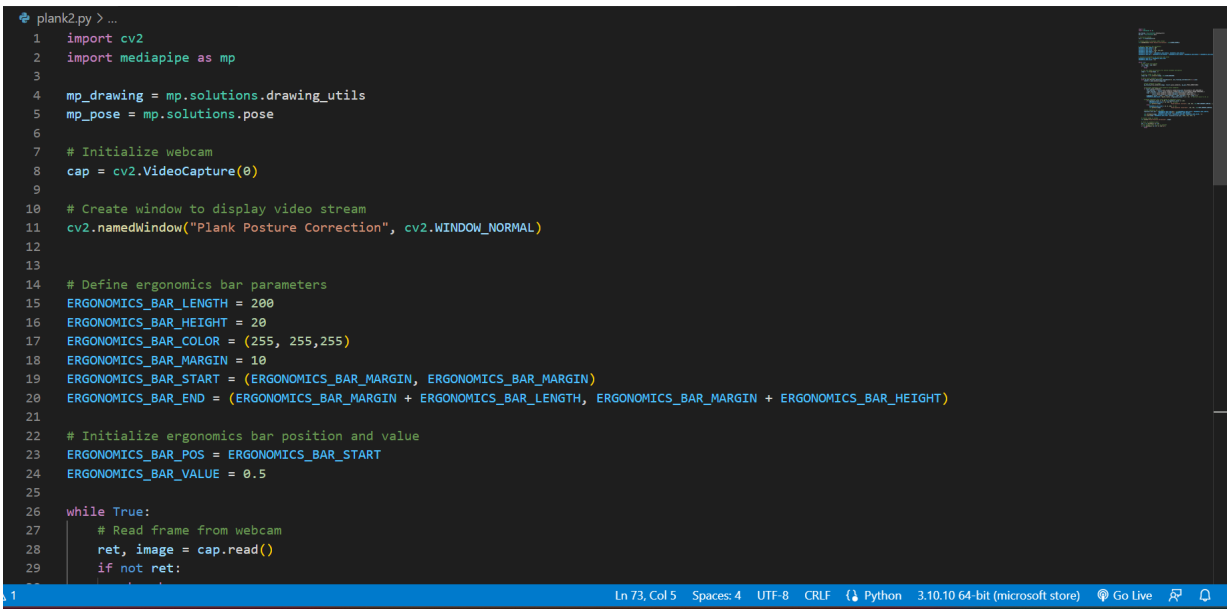
```
package.json > ...
1   {
2     "name": "physio",
3     "version": "1.0.0",
4     "description": "",
      Debug
5     "scripts": {
6       "start": "parcel ./*.html",
7       "build": "parcel build ./*.html --dist-dir ./build"
8     },
9     "author": "",
10    "license": "ISC",
11    "devDependencies": {
12      "parcel": "^2.7.0"
13    }
14  }
15
```

Standing Posture Correction .py file:-



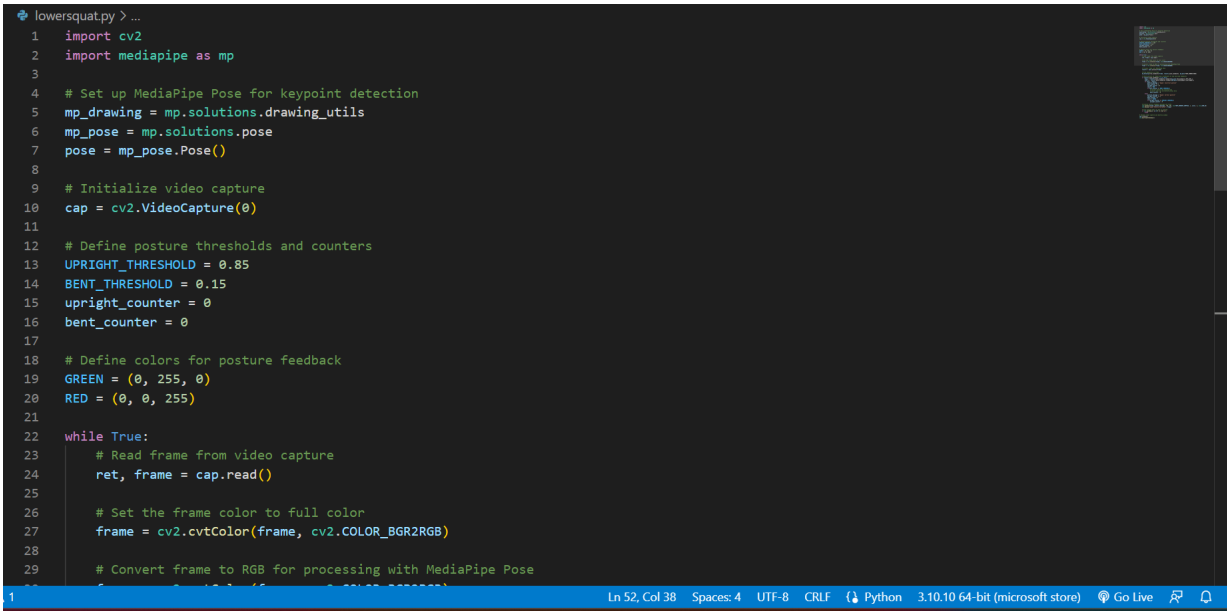
```python
import cv2
import mediapipe as mp
import numpy as np

mp_drawing = mp.solutions.drawing_utils
mp_drawing_styles = mp.solutions.drawing_styles
mp_pose = mp.solutions.pose

class Ergonomy:
    def __init__(self):
        self.trunk_angle=0

    def update_joints(self, landmarks_3d):
        """update all needed joints based on landmarks_3d.landmark from mp"""
        try:
            # media pipe joints (BlazePose GHUM 3D)
            left_shoulder = np.array([landmarks_3d.landmark[11].x, landmarks_3d.landmark[11].y, landmarks_3d.landmark[11].z])
            right_shoulder = np.array([landmarks_3d.landmark[12].x, landmarks_3d.landmark[12].y, landmarks_3d.landmark[12].z])
            left_hip = np.array([landmarks_3d.landmark[23].x, landmarks_3d.landmark[23].y, landmarks_3d.landmark[23].z])
            right_hip = np.array([landmarks_3d.landmark[24].x, landmarks_3d.landmark[24].y, landmarks_3d.landmark[24].z])
            left_knee = np.array([landmarks_3d.landmark[25].x, landmarks_3d.landmark[25].y, landmarks_3d.landmark[25].z])
            right_knee = np.array([landmarks_3d.landmark[26].x, landmarks_3d.landmark[26].y, landmarks_3d.landmark[26].z])

            # helper joints
            mid_shoulder = (left_shoulder + right_shoulder) / 2
            mid_hip = (left_hip + right_hip) / 2
            mid_knee = (left_knee + right_knee) / 2

            # angles
```

Plank Exercise Correction code:-



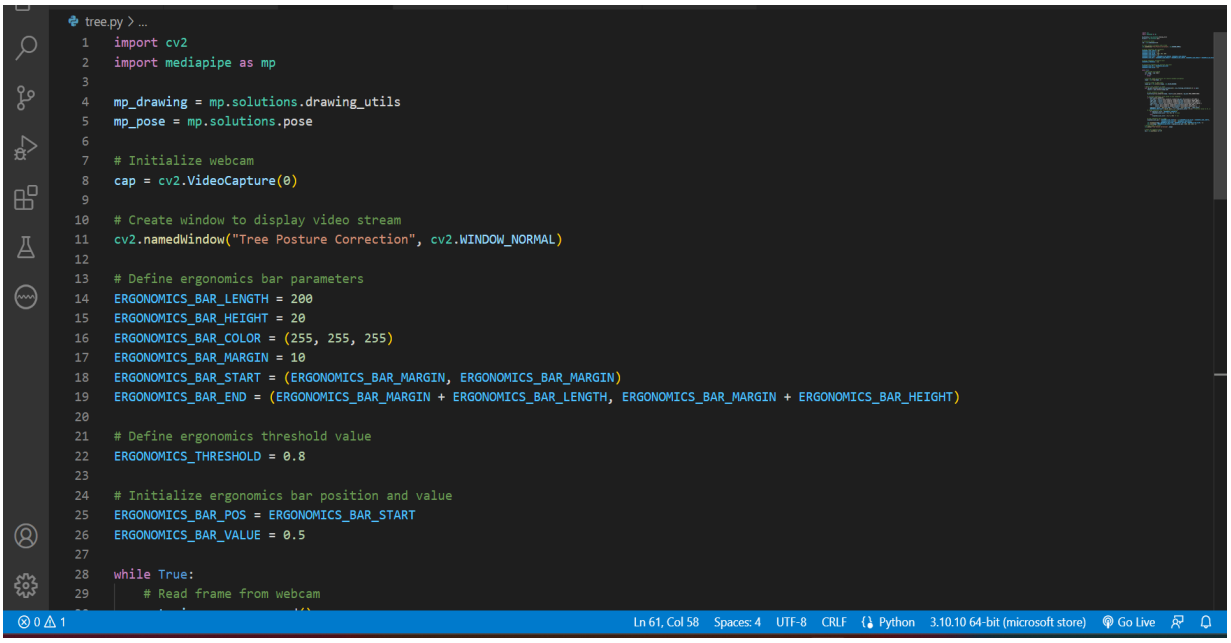
```python
import cv2
import mediapipe as mp

mp_drawing = mp.solutions.drawing_utils
mp_pose = mp.solutions.pose

# Initialize webcam
cap = cv2.VideoCapture(0)

# Create window to display video stream
cv2.namedWindow("Plank Posture Correction", cv2.WINDOW_NORMAL)


# Define ergonomics bar parameters
ERGONOMICS_BAR_LENGTH = 200
ERGONOMICS_BAR_HEIGHT = 20
ERGONOMICS_BAR_COLOR = (255, 255,255)
ERGONOMICS_BAR_MARGIN = 10
ERGONOMICS_BAR_START = (ERGONOMICS_BAR_MARGIN, ERGONOMICS_BAR_MARGIN)
ERGONOMICS_BAR_END = (ERGONOMICS_BAR_MARGIN + ERGONOMICS_BAR_LENGTH, ERGONOMICS_BAR_MARGIN + ERGONOMICS_BAR_HEIGHT)

# Initialize ergonomics bar position and value
ERGONOMICS_BAR_POS = ERGONOMICS_BAR_START
ERGONOMICS_BAR_VALUE = 0.5

while True:
    # Read frame from webcam
    ret, image = cap.read()
    if not ret:
```

Lower Squat Exercise Correction code:-



```python
import cv2
import mediapipe as mp

# Set up MediaPipe Pose for keypoint detection
mp_drawing = mp.solutions.drawing_utils
mp_pose = mp.solutions.pose
pose = mp_pose.Pose()

# Initialize video capture
cap = cv2.VideoCapture(0)

# Define posture thresholds and counters
UPRIGHT_THRESHOLD = 0.85
BENT_THRESHOLD = 0.15
upright_counter = 0
bent_counter = 0

# Define colors for posture feedback
GREEN = (0, 255, 0)
RED = (0, 0, 255)

while True:
    # Read frame from video capture
    ret, frame = cap.read()

    # Set the frame color to full color
    frame = cv2.cvtColor(frame, cv2.COLOR_BGR2RGB)

    # Convert frame to RGB for processing with MediaPipe Pose
```

Tree Posture Correction Code:-



```python
import cv2
import mediapipe as mp

mp_drawing = mp.solutions.drawing_utils
mp_pose = mp.solutions.pose

# Initialize webcam
cap = cv2.VideoCapture(0)

# Create window to display video stream
cv2.namedWindow("Tree Posture Correction", cv2.WINDOW_NORMAL)

# Define ergonomics bar parameters
ERGONOMICS_BAR_LENGTH = 200
ERGONOMICS_BAR_HEIGHT = 20
ERGONOMICS_BAR_COLOR = (255, 255, 255)
ERGONOMICS_BAR_MARGIN = 10
ERGONOMICS_BAR_START = (ERGONOMICS_BAR_MARGIN, ERGONOMICS_BAR_MARGIN)
ERGONOMICS_BAR_END = (ERGONOMICS_BAR_MARGIN + ERGONOMICS_BAR_LENGTH, ERGONOMICS_BAR_MARGIN + ERGONOMICS_BAR_HEIGHT)

# Define ergonomics threshold value
ERGONOMICS_THRESHOLD = 0.8

# Initialize ergonomics bar position and value
ERGONOMICS_BAR_POS = ERGONOMICS_BAR_START
ERGONOMICS_BAR_VALUE = 0.5

while True:
    # Read frame from webcam
```

webcam.html:

webcam.html > html > head > style

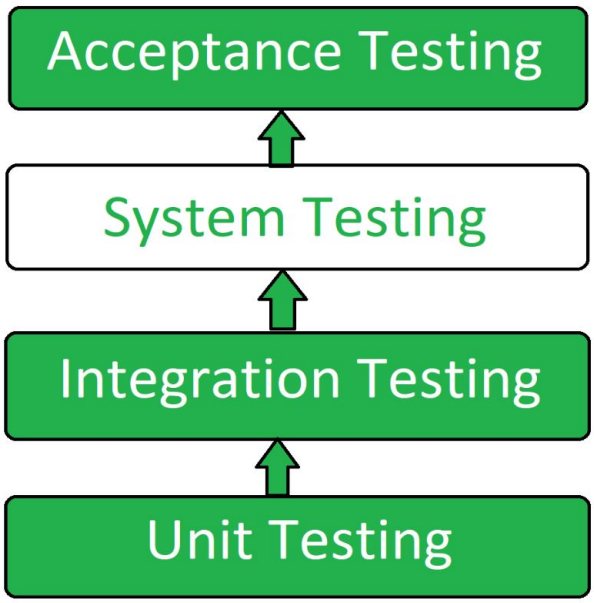
```
<!DOCTYPE html>
<html>

<head>

    <style>···
    </style>
</head>

<body>
    <header class="header">
        <div class="physio-high-resolution-logo-bl-parent">
            <img class="physio-high-resolution-logo-bl-icon" alt=""
                src="public/physiohighresolutionlogoblackontransparentbackground-1@2x.png" />
            <div class="buttons">
                <div class="contact-us-parent" style="font-size: xx-large;">
                    <button class="contact-us4" id="contactUs" style="margin-inline-start: 86px;">Contact Us</button>
                    <button class="about-us3" id="aboutUs" style="margin-inline-start: 50px;">About
                        Us</button><button class="home1" id="home" style="margin-block-end: 86px;">Home</button>
                </div>
            </div>
        </div>
    </header>
    <div style="margin-left: 75px;margin-right: 75px;">
        <h1 class="Welcome" style="font-family: cursive;">
            WELCOME TO PHYSIO
        </h1>
        <div>
            <p class="description">
                "Your posture is a reflection of how you see yourself. So, if you don't like what you see, change it.
            </p>
        </div>

    </div>

    <div class="list_element">

```

```
        <div class="list_inner" style="justify-content: center;">
            <div class="icon" style="justify-content: center;">
                <div class="icon_inside" style="justify-content: center;">
                    <div style="justify-content: center;"><img src="public\pngwing.com.png" alt=""></div>
                    <div class="plus" style="text-align: center;">
                        Standing
                    </div>

                    <button class="btn-43">
                        <span class="old">Wanna try?</span>
                        <span class="new">Let's go</span>
                    </button>

                </div>
            </div>
        </div>
        <div class="list_inner">
            <div class="icon">
                <div class="icon_inside">
                    <div><img src="public\pngwing.com (1).png" alt=""></div>
                    <div class="plus" style="text-align: center;">
                        Squad
                    </div>

                    <button class="btn-43">
                        <span class="old">Wanna try?</span>
                        <span class="new">Let's go</span>
                    </button>

                </div>
            </div>
        </div>
        <div class="list_inner">
            <div class="icon">
                <div class="icon_inside">
```

8.SYSTEM TESTING

8.1 INTRODUCTION:

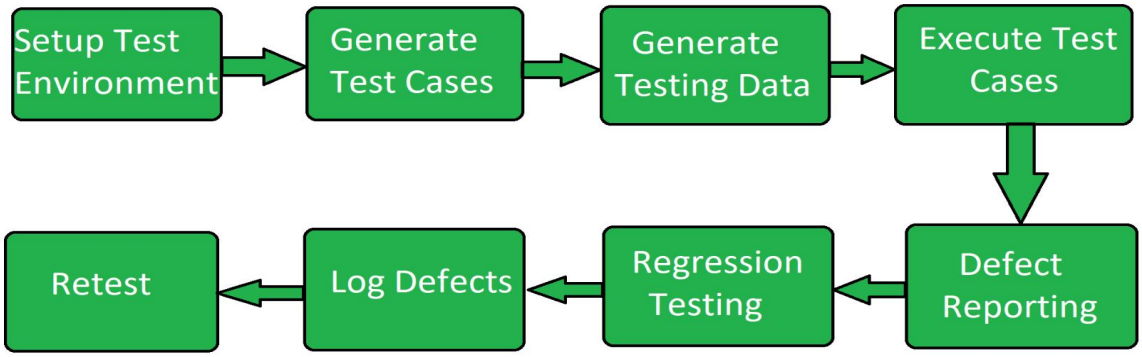
System Testing is a type of software testing that is performed on a complete integrated system to evaluate the compliance of the system with the corresponding requirements. It tests if the system meets the specified requirements and if it is suitable for delivery to the end-users.It evaluates the overall functionality and performance of a complete and fully integrated software solution.This type of testing is performed after the integration testing and before the acceptance testing.The result of system testing is the observed behavior of a component or a system when it is tested.



8.2 SYSTEM TESTING PROCESS :

System Testing is performed in the following steps:

- **Test Environment Setup:** Create testing environment for better quality testing.
- **Create Test Case:** Generate test case for the testing process.
- **Create Test Data:** Generate the data that is to be tested.
- **Execute Test Case:** After the generation of the test case and the test data, test cases are executed.
- **Defect Reporting:** Defects in the system are detected.
- **Regression Testing:** It is carried out to test the side effects of the testing process.
- **Log Defects:** Defects are fixed in this step.
- **Retest:** If the test is not successful then again the test is performed.



8.3 TYPES OF SYSTEM TESTING :

System testing is divided into more than 50 types, but software testing companies typically use some of them. These are listed below:

- **Regression Testing** :Regression testing is performed under system testing to confirm and identify if there's any defect in the system due to modification in any other part of the system.
- **Load Testing :**Load testing is performed under system testing to clarify whether the system can work under real-time loads or not.
- **Functional Testing :**Functional testing of a system is performed to find if there's any missing function in the system.Testers can add functions to improve the quality of system.
- **Recovery Testing :**Recovery testing of a system is performed under system testing to confirm reliability, trustworthiness, accountability of the system and all are lying on recouping skills of the system. It should be able to recover from all the possible system crashes successfully.
- **Migration Testing :**Migration testing is performed to ensure that if the system needs to be modified in new infrastructure so it should be modified without any issue.
- **Usability Testing :**The purpose of this testing is to make sure that the system is well familiar with the user and it meets its objective for what it is supposed to do.

8.4 TEST CASES :

Here are some test cases for posture detection and correction:

- Correct posture: The first test case should involve a person with correct posture. This will be the baseline for the detection system, and it should show that the system is able to detect good posture accurately.

- Incorrect posture: The second test case should involve a person with poor posture. This will test the system's ability to detect poor posture accurately.
- Gradual correction: The third test case should involve a person with poor posture who gradually corrects their posture over time. This will test the system's ability to detect and track changes in posture.
- Sudden correction: The fourth test case should involve a person with poor posture who suddenly corrects their posture. This will test the system's ability to detect sudden changes in posture.
- Different positions: The fifth test case should involve a person in different positions, such as standing, sitting, or lying down. This will test the system's ability to detect and correct posture across different positions.
- Real-world scenarios: The seventh test case should involve the system being used in a real-world scenario, such as an office or gym. This will test the system's ability to detect and correct posture in a practical setting.
- User feedback: The eighth test case should involve getting feedback from users who have used the posture detection and correction system. This will provide insight into the system's usability and effectiveness, and help identify any areas for improvement.

S.No.	Test Case Objective	Steps	Expected Output	Status
1.	User Registration and login	1.User must register successfully. 2.User must be able to login. 3. User must be able to retrieve password if forgotten.	User successfully registered and logged in.	Pass
2.	Posture detection	1.Webcam should be accessed. 2. Posture of the user must be detected correctly. 3.User landmark key points must be detected accurately and shown correctly.	Webcam should be accessed successfully and the output screen should show user's feedback via keypoints lines.	Pass
3.	Correct Posture	This should involve a person with correct posture. It	It gives green "correct posture" ergonomy feedback.	Pass

		should show that the system is able to detect good posture accurately		
4.	Incorrect Posture	This should involve a person with incorrect posture. It should show that the system is able to detect bad posture accurately.	It gives red “Incorrect posture” ergonomy feedback	Pass
5.	Gradual correction	It should involve a person with poor posture who gradually corrects their posture over time.	It provides respective ergonomy feedback. Red for Incorrect Posture and Green for Correct Posture.	Pass
6.	Sudden correction	It should involve a person with poor posture who suddenly corrects their posture.	It provides respective ergonomy feedback. Red for Incorrect Posture and Green for Correct Posture.	Pass
7.	Different postures	It should involve a person in different positions, such as standing, plank, Squat,etc...	It provides respective ergonomy feedback. Red for Incorrect Posture and Green for Correct Posture for any posture	Pass

8.	Real-world scenarios	It should involve the system being used in a real-world scenario, such as an office or gym, home,etc..	It provides respective ergonomy feedback. Red for Incorrect Posture and Green for Correct Posture at any place.	Pass
9.	User feedback	It should involve getting feedback from users who have used the posture detection and correction system.	Users feedback on the system.	Pass/Fail

Overall, these test cases will help ensure that the posture detection and correction system is accurate, reliable, and effective for a range of users and scenarios.

8.5 ADVANTAGES OF SYSTEM TESTING :

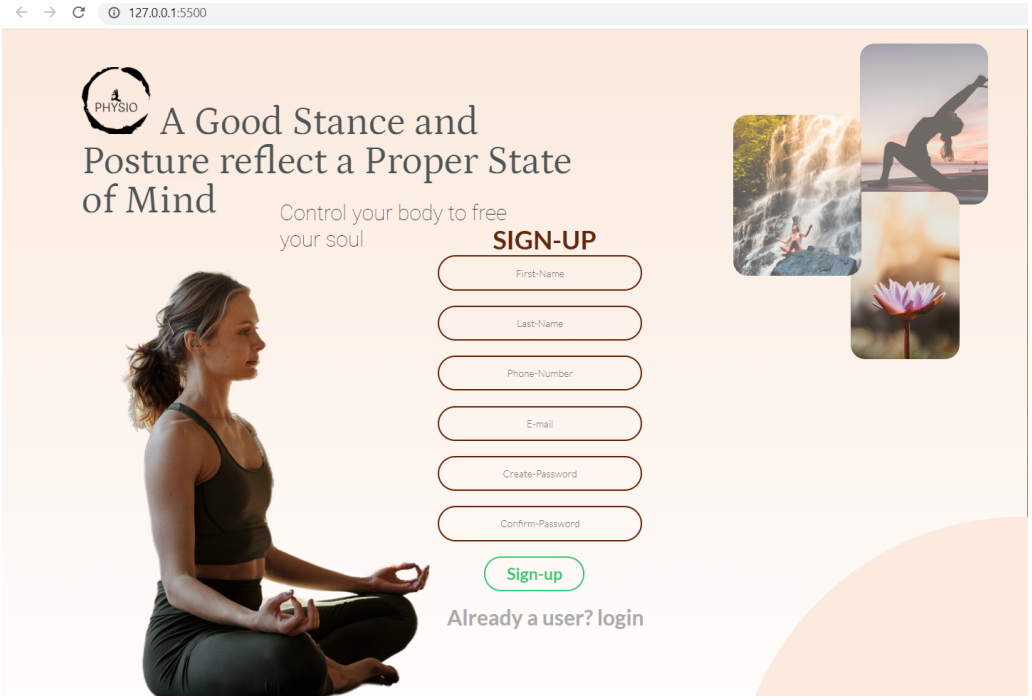
- Helps to validate the requirements and ensure the system meets the user needs.
- Improves system reliability and quality.
- Facilitates collaboration and communication between development and testing teams.
- Enhances the overall performance of the system.
- Increases user confidence and reduces risks.

8.6 DISADVANTAGES OF SYSTEM TESTING :

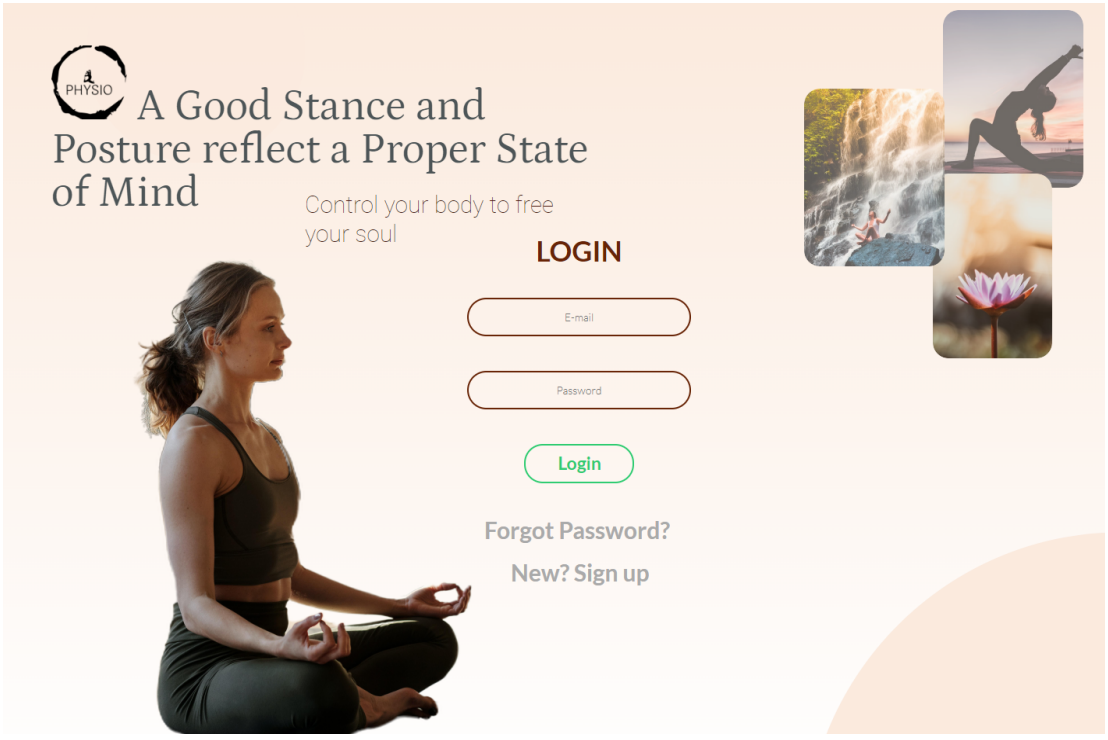
- Can be time-consuming and expensive.
- Requires adequate resources and infrastructure.
- Can be complex and challenging, especially for large and complex systems.

9. OUTPUT SCREENS

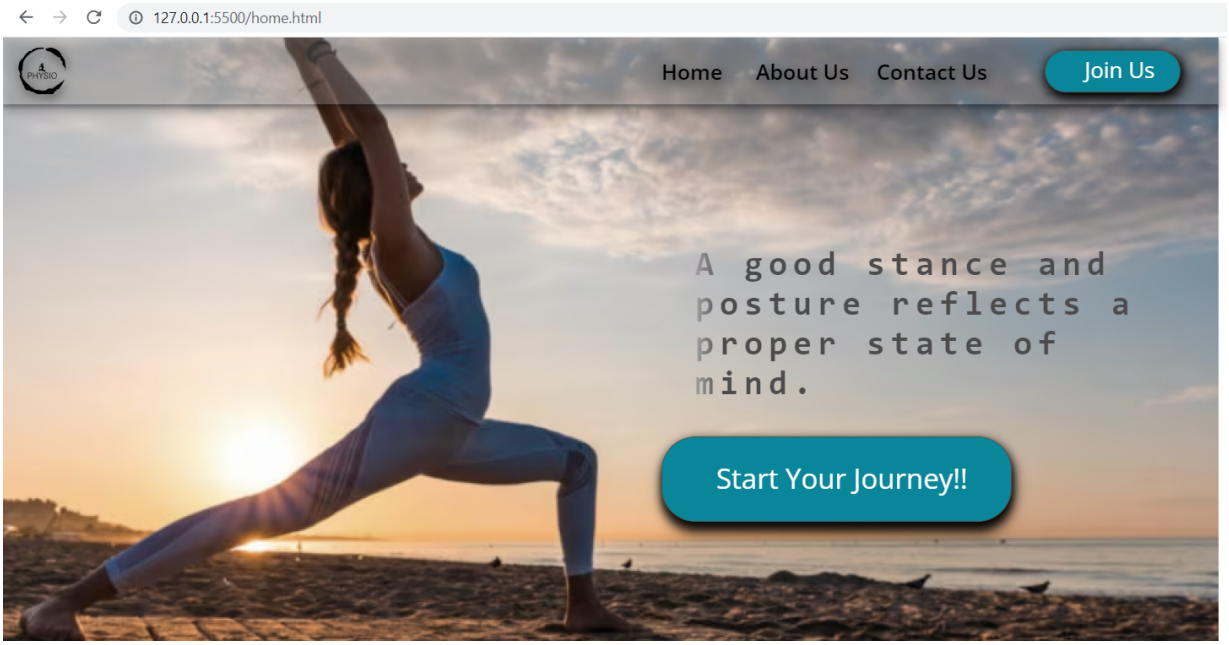
9.1 SIGN-UP PAGE:

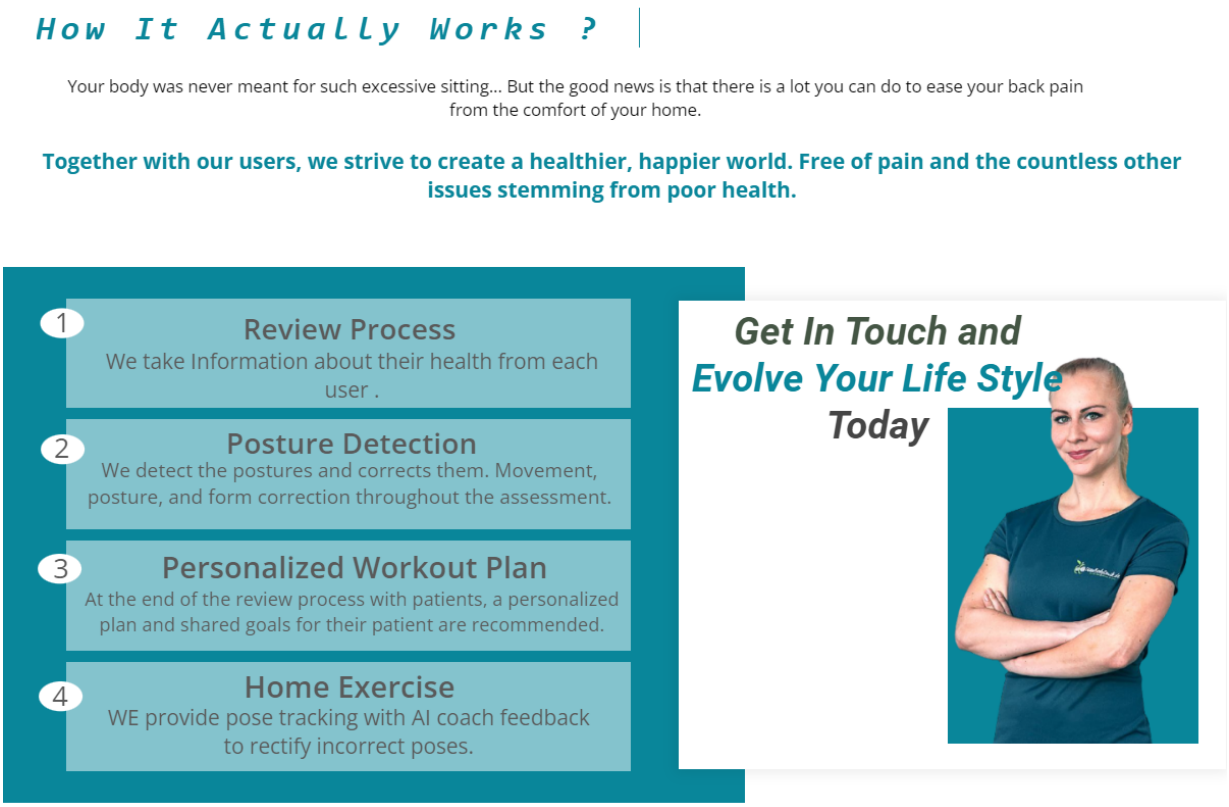


9.2 LOGIN PAGE:

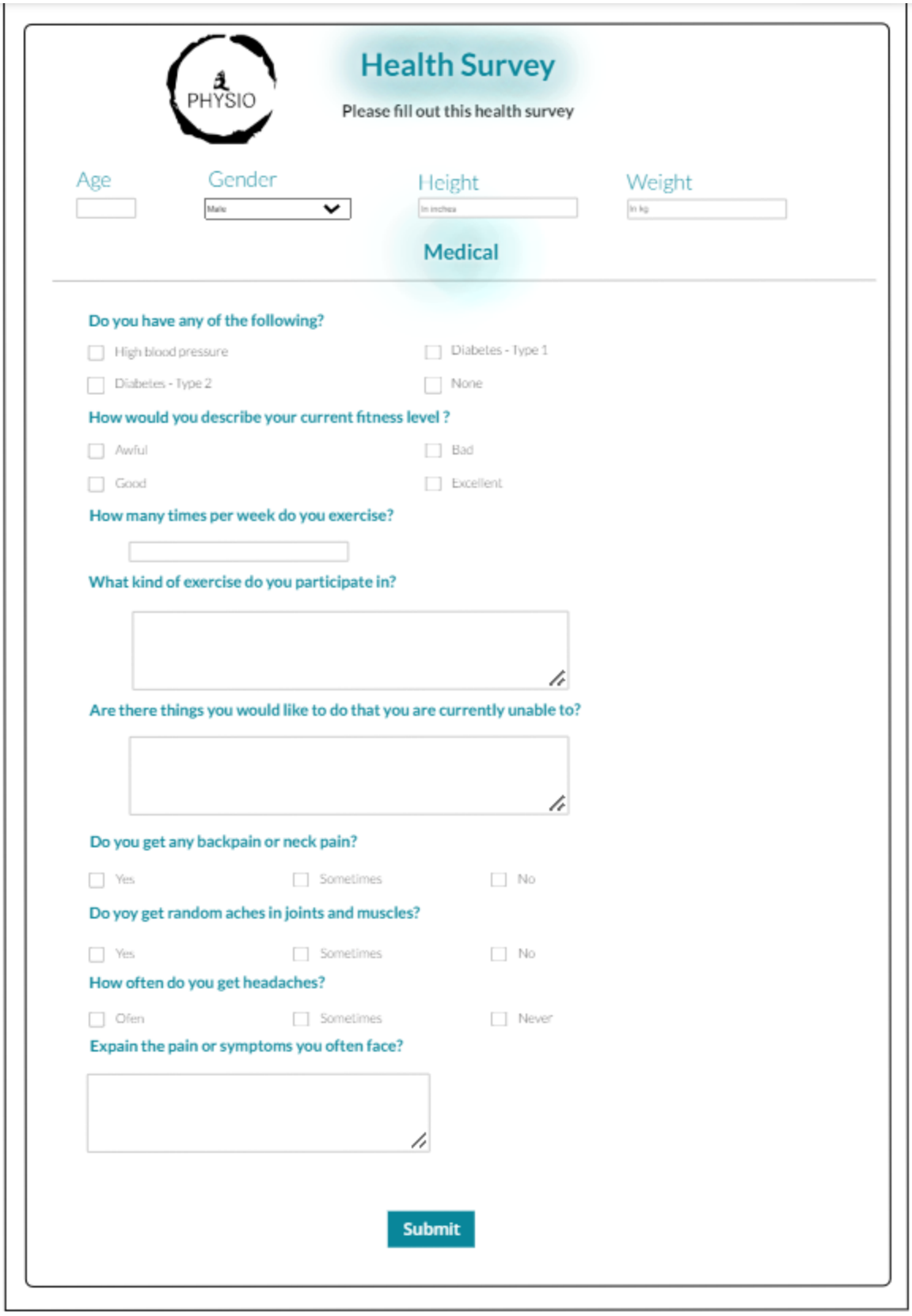


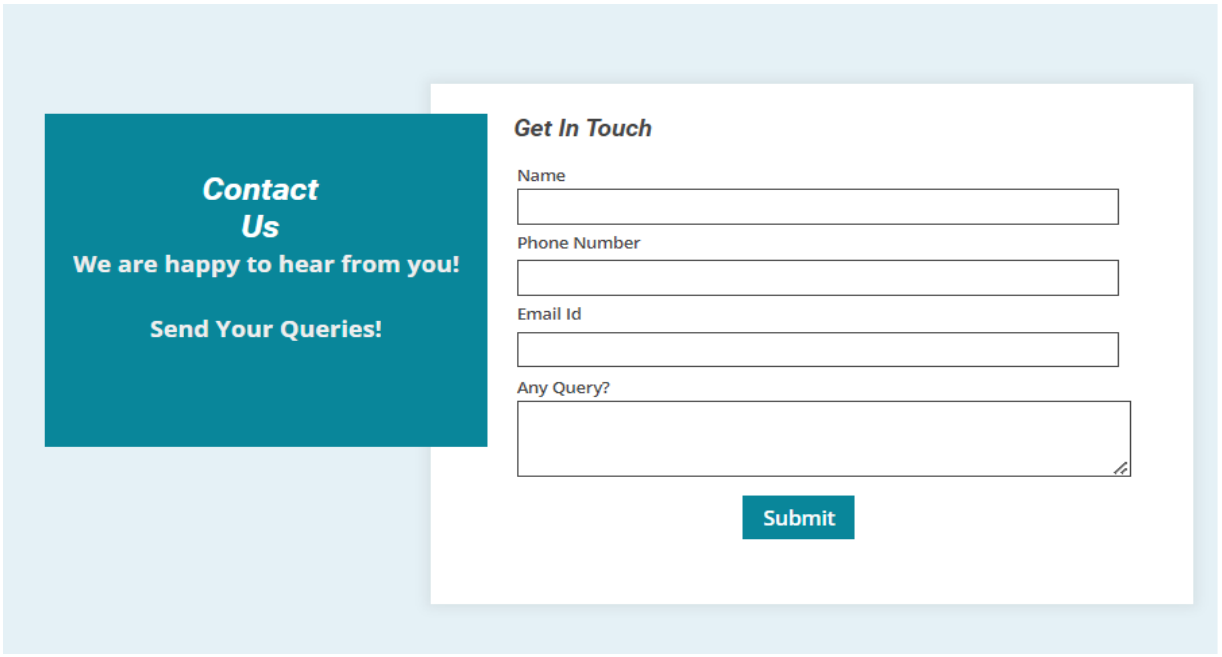
9.3 HOME-PAGE:

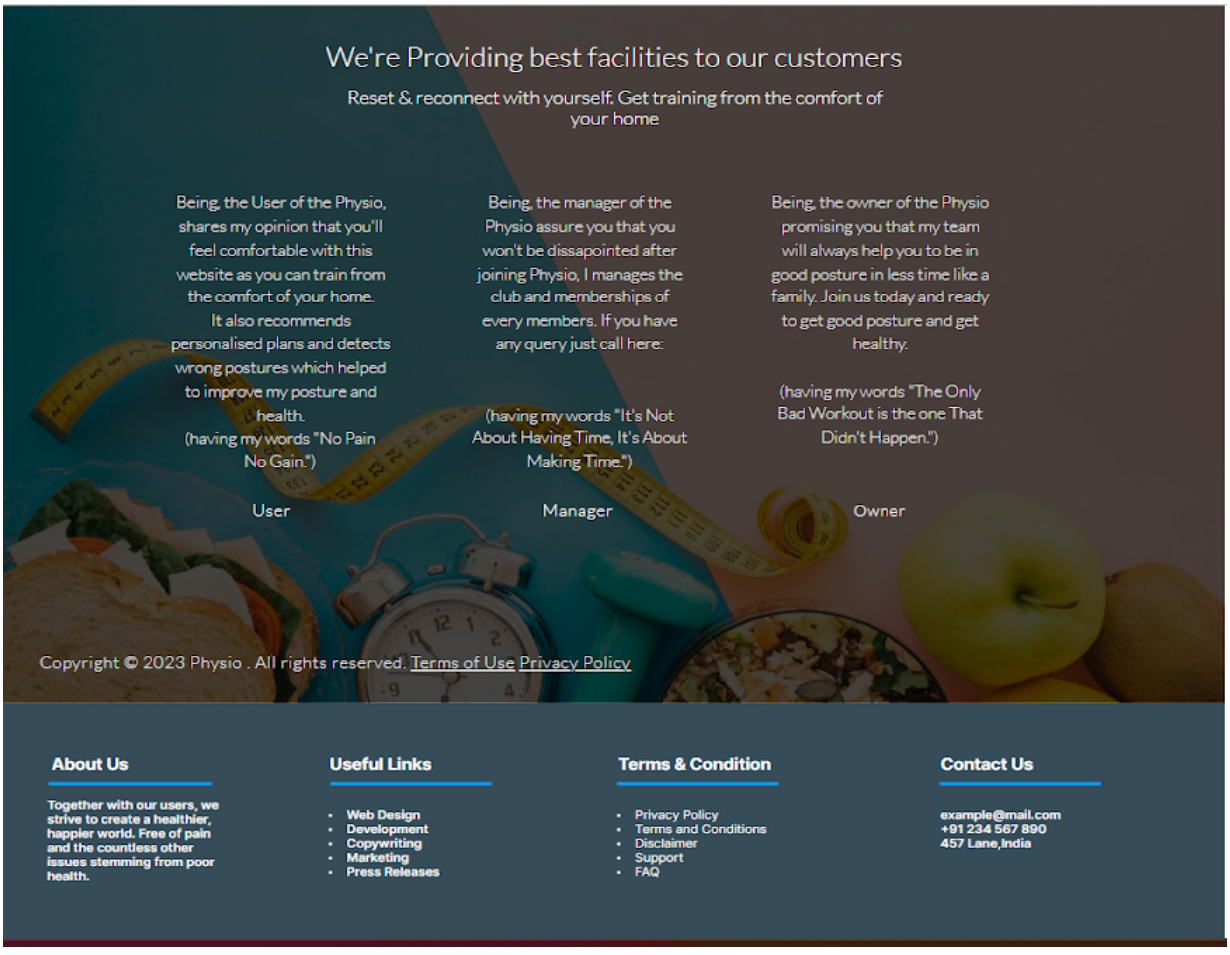

127.0.0.1:5500/home.html
Home
About Us
Contact Us
Join Us
A good stance and posture reflects a proper state of mind.
Start Your Journey!!


How It Actually Works ?
Your body was never meant for such excessive sitting... But the good news is that there is a lot you can do to ease your back pain from the comfort of your home.
Together with our users, we strive to create a healthier, happier world. Free of pain and the countless other issues stemming from poor health.
1
Review Process
We take Information about their health from each user .
2
Posture Detection
We detect the postures and corrects them. Movement, posture, and form correction throughout the assessment.
3
Personalized Workout Plan
At the end of the review process with patients, a personalized plan and shared goals for their patient are recommended.
4
Home Exercise
WE provide pose tracking with AI coach feedback to rectify incorrect poses.
Get In Touch and
Evolve Your Life Style
Today

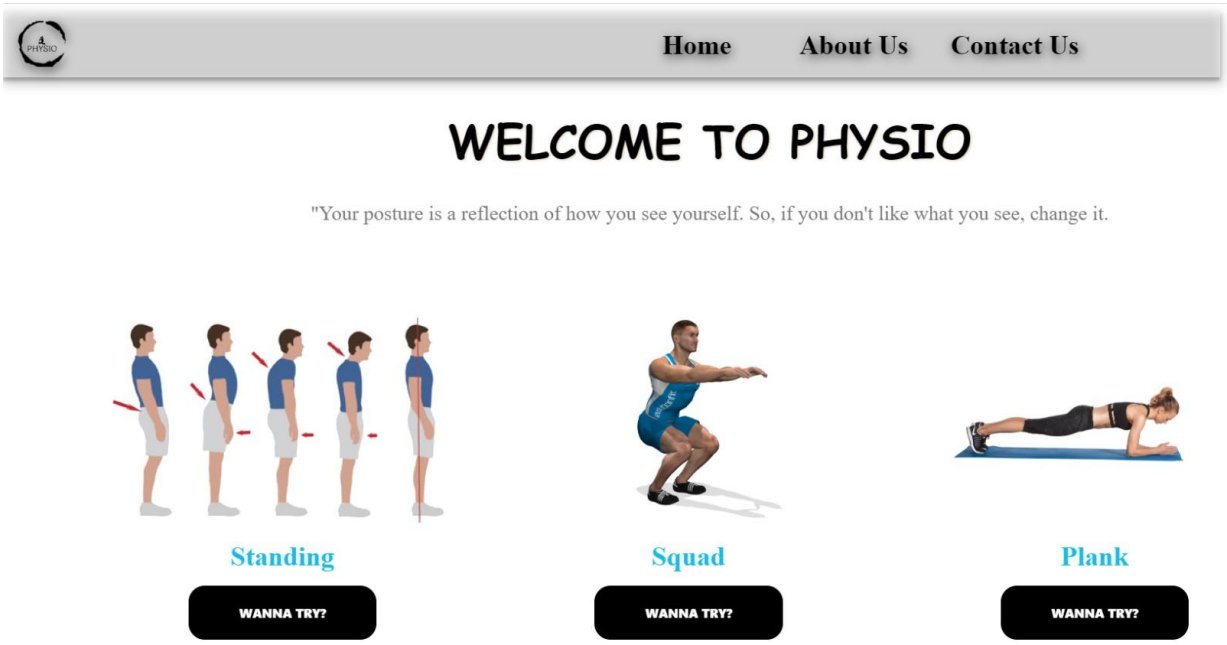
.


PHYSIO
Health Survey
Please fill out this health survey
Age
Gender
Male
Height
In inches
Weight
In kg
Medical
Do you have any of the following?
High blood pressure
Diabetes - Type 1
Diabetes - Type 2
None
How would you describe your current fitness level ?
Awful
Bad
Good
Excellent
How many times per week do you exercise?
What kind of exercise do you participate in?
Are there things you would like to do that you are currently unable to?
Do you get any backpain or neck pain?
Yes
Sometimes
No
Do yoy get random aches in joints and muscles?
Yes
Sometimes
No
How often do you get headaches?
Ofen
Sometimes
Never
Expain the pain or symptoms you often face?
Submit


Contact
Us
We are happy to hear from you!
Send Your Queries!
Get In Touch
Name
Phone Number
Email Id
Any Query?
Submit

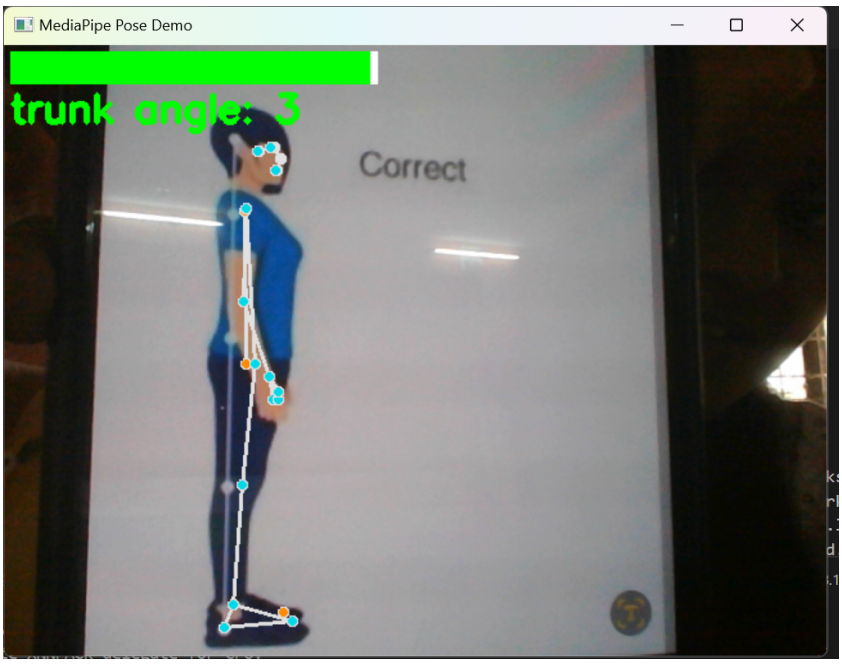

We're Providing best facilities to our customers
Reset & reconnect with yourself. Get training from the comfort of your home
Being, the User of the Physio, shares my opinion that you'll feel comfortable with this website as you can train from the comfort of your home. It also recommends personalised plans and detects wrong postures which helped to improve my posture and health. (having my words "No Pain No Gain.")
User
Being, the manager of the Physio assure you that you won't be dissapointed after joining Physio, I manages the club and memberships of every members. If you have any query just call here:
(having my words "It's Not About Having Time, It's About Making Time.")
Manager
Being, the owner of the Physio promising you that my team will always help you to be in good posture in less time like a family. Join us today and ready to get good posture and get healthy.
(having my words "The Only Bad Workout is the one That Didn't Happen.")
Owner
Copyright © 2023 Physio . All rights reserved. Terms of Use Privacy Policy
About Us
Together with our users, we strive to create a healthier, happier world. Free of pain and the countless other issues stemming from poor health.
Useful Links
Web Design
Development
Copywriting
Marketing
Press Releases
Terms & Condition
Privacy Policy
Terms and Conditions
Disclaimer
Support
FAQ
Contact Us
example@mail.com
+91 234 567 890
457 Lane,India

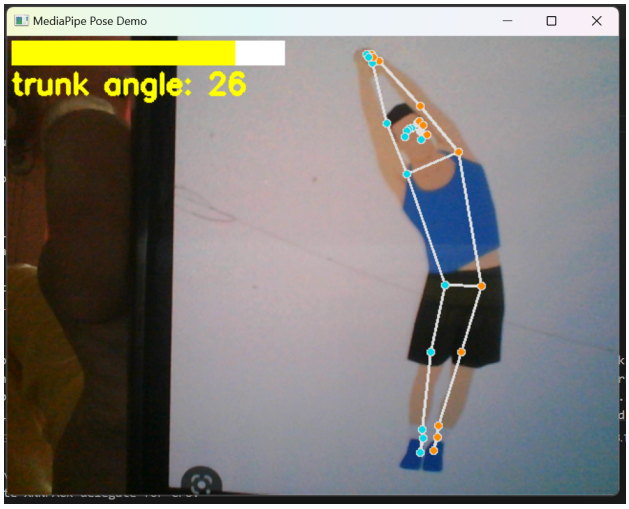
9.4 DASHBOARD :



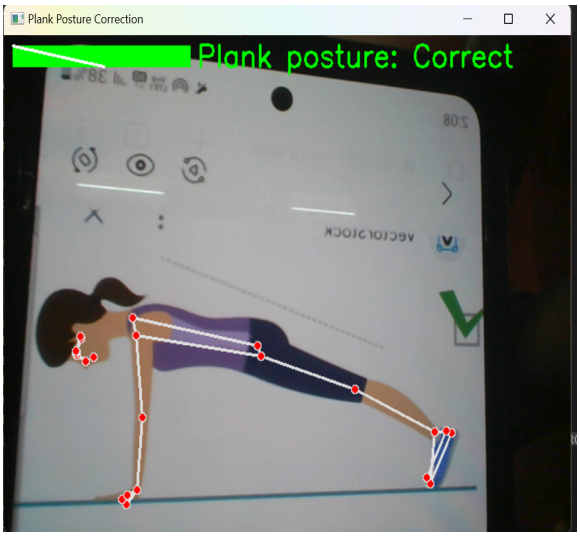
9.5 EXERCISE CORRECTION OUTPUTS :

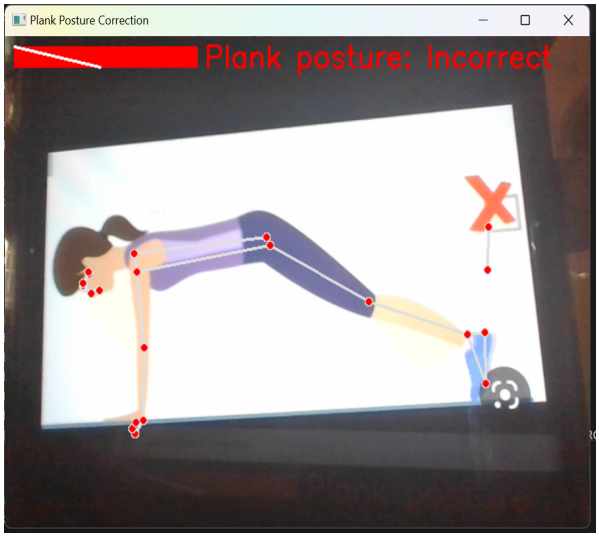
9.5.1.Standing Posture Correction



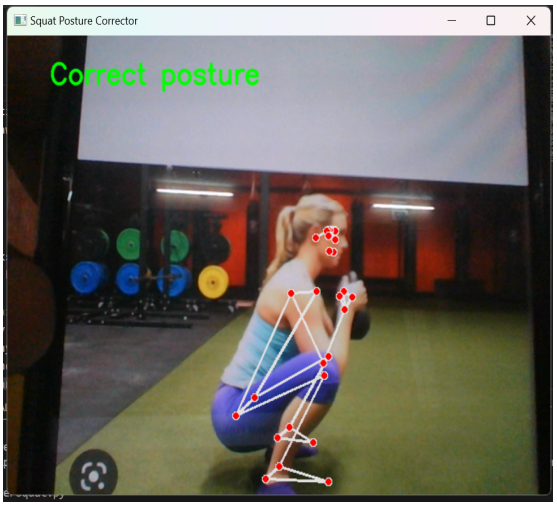


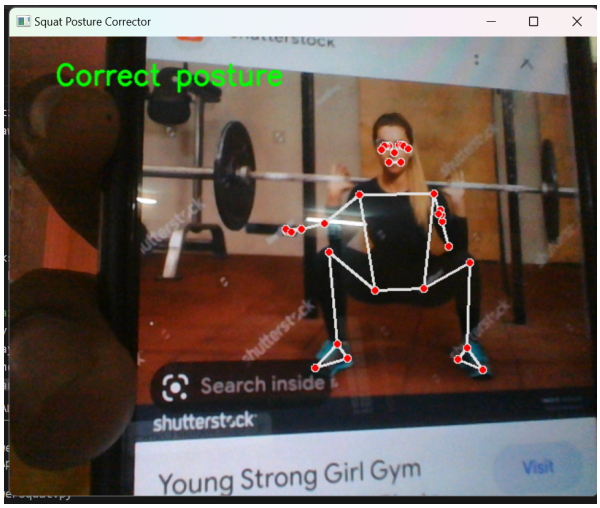
9.5.2. Plank Exercise Posture Correction

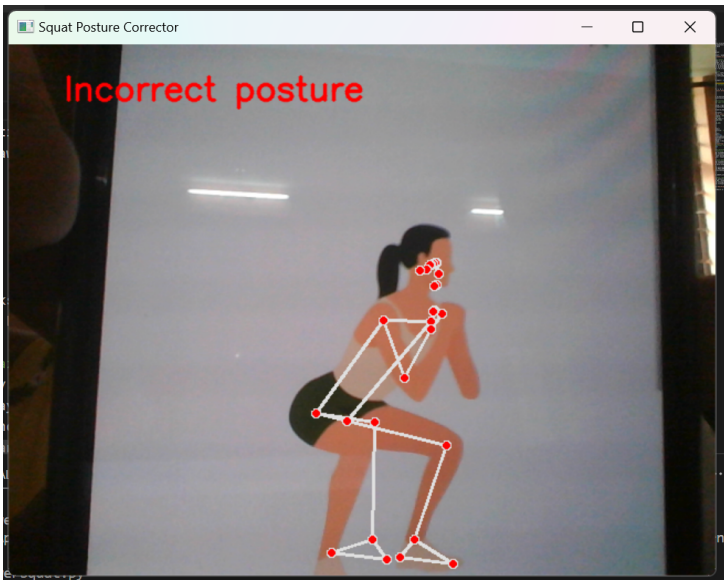




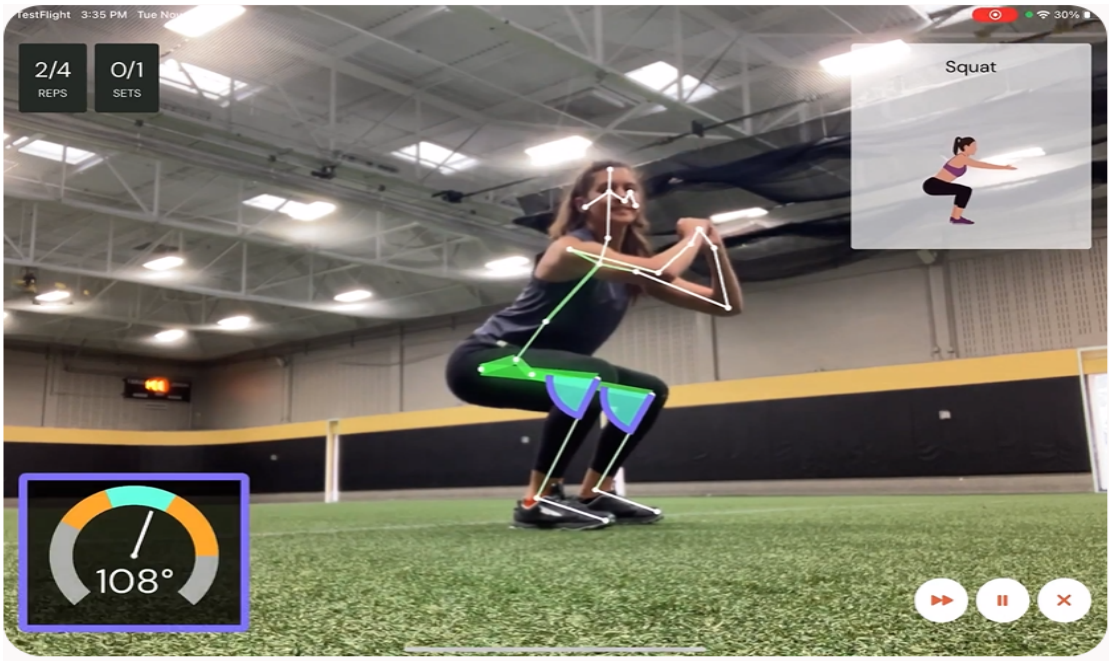
9.5.3. LowerSquat Exercise Posture Correction







9.5.4.Squat Exercise Posture Correction



9.5.5.Lunge Exercise Posture Correction

10. CONCLUSION AND FUTURE SCOPE

10.1 CONCLUSION

In conclusion, a posture correction and recommendation project can help individuals improve their physical health, reduce pain, and enhance their overall well-being. By conducting a posture assessment and creating a customized exercise program, individuals can strengthen weak muscles, improve flexibility, and correct alignment issues.
Providing ongoing monitoring, feedback, and support throughout the program can help users stay motivated and on track towards their posture goals. Once the program is complete, offering post-program recommendations for maintaining good posture can help individuals maintain their progress and prevent future problems.

To detect and correct posture, it is important to start with awareness. By paying attention to how we sit, stand, and move throughout the day, we can identify areas where we may need to make adjustments. This can include things like sitting up straight, keeping the shoulders back and down, and maintaining a neutral spine.

There are also a variety of tools and resources available to help with posture correction, such as ergonomic chairs, standing desks, and exercises designed to strengthen the core and improve alignment. In addition, it can be helpful to work with a physical therapist or other healthcare provider who can provide personalized guidance and support.

Overall, a posture correction and recommendation project can have a significant impact on the physical health and well-being of individuals, and can be a valuable resource for healthcare professionals and fitness experts who work with clients struggling with posture issues.
Posture detection and correction are important for maintaining good health and preventing injuries. Poor posture can cause a variety of problems, such as neck and back pain, headaches, and fatigue. It can also lead to more serious health issues over time, such as spinal deformities and herniated discs.

10.2 FUTURE SCOPE

The future scope of the posture detection and correction project is vast and exciting, as technology continues to advance and research on posture-related issues deepens. Here are some potential areas of growth and development in the field:

1. Wearable Technology: As wearable technology becomes more advanced, there is a growing opportunity for posture monitoring and correction tools to be incorporated into everyday wearables such as smartwatches, fitness trackers, or clothing. These devices can provide real-time feedback and alerts to users to help them maintain good posture throughout the day.
2. Virtual Reality: Virtual reality technology can be used to simulate and correct posture issues in a controlled, immersive environment. This can be particularly useful for individuals who have mobility limitations or are unable to perform certain exercises in the physical world.
3. Artificial Intelligence: As artificial intelligence becomes more advanced, it can be used to analyze and interpret posture data more effectively. This can help healthcare professionals and fitness experts tailor customized posture correction programs for individuals based on their unique needs and preferences.
4. Gamification: Gamification can be used to make posture correction exercises more engaging and enjoyable. This can encourage individuals to stick with the program and achieve better results.
5. Integration with Telehealth: With the rise of telehealth, there is an opportunity to incorporate posture detection and correction tools into remote healthcare consultations. This can allow healthcare professionals to monitor and correct posture issues in real-time, regardless of the patient's location.Overall, the future scope of the posture detection and correction project is wide-ranging and holds great promise for improving the physical health and well-being of individuals.
6. Home Exercise Program: This system can be extended to a fitness app which suggests or recommends an home exercise plan for individuals with respect to the individuals health and corrects their posture and gives them real-time feedback as an instructor like a trainer at home itself. This would be beneficial as people can look at their fitness at home itself by using this app.

11.BIBLIOGRAPHY

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- **https://youtu.be/kRvIcdLhDtU**
- **alwaysCoding- Weekly Hacky Hour | Human Pose Estimation and Posture Corrector …**
- **https://learnopencv.com/building-a-body-posture-analysis-system-using-mediapipe/**