SE 216 SOFTWARE PROJECT MANAGEMENT

True Posture

Software Development Plan

Section 1 Group 8

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Project GitHub Account

https://github.com/SE216-8/TruePosture

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1 INTRODUCTION

1.1 Problem Definition

Sport has a vital role in human life. It is effective in keeping people physically and mentally healthy. Many people join gyms and exercise to stay healthy. Despite this, by doing the movements in the wrong form, they harm their spine health. In addition, they cannot exercise the area they target sufficiently due to incorrect form, or they cannot do the movements because they do not know them exactly.

To prevent this, people need to work with personal trainers during the learning process, but not everyone cannot benefit from this opportunity because they are either financially insufficient or the number of trainers is not enough. Some of those who do it with the correct form reduce the effect of the movement or get injured by keeping the time interval too short or long. Due to these problems, the incentive for sports is decreasing. Also, objective measurements cannot be made in institutions such as the military and the Olympics.

An application, which can be downloaded by people on their own phone, can maximize the efficiency of movements while minimizing physical damage and loss of time by performing the movement in a correct posture.

In this document, everything needed to know about true posture project is explained.

1.2 Background Information

A correct form of exercise is important for people to develop their bodies properly and avoid injuries. In order to direct people to do the exercises in proper form, there are videos, and also apps, that show the exercise correctly and gyms where people have personal trainers. Also, in competitions such as military selection or Olympics, there is a judge who decides who should be selected or get a high score. However, there are some problems with these facilities.

Some people who are tracking their postures by watching videos or using apps may not know whether they are doing the exercise in the correct form or not. They also, generally, cannot be able to track the time interval of the exercise.

Personal trainer is the person who shows the correct form, repetition, and time interval of the exercise. However, many people, especially in poor countries, cannot afford personal trainers or go to the gym.

The judgement in competitions and selections should be very objective and focused in order to evaluate the people correctly. However, there are some cases where the competitors are evaluated wrongly due to misjudgement.

These situations show the need for other solutions to help people who want to do exercises in proper form.

2 OBJECTIVES

The aim of this project is to develop an application, which can be downloaded by people on their own phone, that maximizes the efficiency of movements while minimizing physical damage and loss of time by performing the movement in a correct posture. This algorithm will protect the health of athletes by analyzing mistakes in posture and correcting them with feedback. Additionally, more accurate results can be obtained in competitions. It will also be effective in saving the time of coaches and athletes. This project will include following features:

Target Area or Movement Request: When users open the app, they will be prompted to select the target area or specific exercise they wish to perform. Subsequently, high-quality animations prepared in advance will be displayed according to their choices, enabling users to learn the correct form visually.

Movement Accuracy Feedback: The app will facilitate users to monitor themselves using the camera, and employ image processing techniques to analyze the accuracy of the performed movement. Then it will provide detailed feedback to the user, indicating what percentage of the movement was performed correctly and offer advice on points of improvement for any inaccuracies detected.

Promote Correct Exercise Form: We will ensure that the app's feedback on the exercise form is validated by a team of professional gym trainers and achieve a concurrence rate of 90% or higher between the app's feedback and the trainers' assessments. This will serve as an indicator of the app's core functionality effectiveness, based on expert evaluation.

Movement Timing Accuracy: The app will evaluate whether the user performs movements within the correct time frame by monitoring their actions through the camera and conducting timing analysis. Subsequently, the app will provide feedback to the user, indicating whether the movement was executed within the correct timing and offering suggestions for improvement in case of timing errors.

Objective and Accurate Evaluation: The app will also provide objective evaluation for the competitions that depend on whether the movement is done correctly or not. This evaluation confirms that the results are not biased.

3 HIGH-LEVEL FUNCTIONALITY

Thanks to the True Posture application, people can do sports in the most correct and effective way without getting injured. They can correct their posture mistakes by recording them with their phone camera. Those who improve their posture health while doing sports. A document stating that the use of this application will protect personal rights will be read and signed. They will also be informed that the saved records will be deleted. However, users who are in doubt can resolve their doubts in international courts. Agreements can be made with states to resolve such doubts.

3.1 Requirements

3.1.1 Functional Requirements

- The application must access the device camera and employ image processing techniques to analyze users' movements, offering detailed feedback on the accuracy of the performed exercise. Also must give feed-back to the user percentage of correct movements.
- Provided feedback to users during exercise sessions must be in real-time, allowing them to make immediate adjustments to their form and timing based on the app's analysis.
- The application should evaluate users' movement timing through the camera and provide feedback on whether the exercise was executed within the correct time. And give some suggestions for improvement to the user in case of timing errors.
- The application should feature an algorithm designed to recognize and analyze human body postures during exercises. It must process the video feed in real-time to provide immediate feedback on exercise form and timing. The feedback will detail discrepancies and suggest corrections. The algorithm will adapt based on user progress, aiming for a high concurrence rate with experts.
- We must ensure that the app's feedback on exercise form aligns with assessments from professional gym trainers, achieving a concurrence rate of 90% or higher.
- Users should be able to choose a specific exercise or target area after opening the app, triggering the display of pre-prepared animations related to their selection target area.
- In case of where the user's device performance is not enough for image processing, the application should switch to cloud computing methods. To access this feature, users must pay via a membership system
- There should be progress tracking functionality, enabling users to view historical performance, including correctness percentages for each exercise attempted.
- Users should be able to create an account by providing data such as email, username and password, to ensure a secure registration process.
- While users perform movements, the application should analyze the exercise type (e.g., dumbbell press) and provide real-time guidance on the optimal camera position. For instance, it could suggest capturing the exercise from the front for a dumbbell press.

3.1.2 Non-Functional Requirements

- We must ensure a minimum 99% accuracy in detecting motion. And handle camera sensor errors gracefully, providing clear error messages.
- Application should detect motion within 1 second and support simultaneous detection from multiple cameras without performance degradation.
- We must implement encryption for camera-application communication and ensure secure storage of captured images in compliance with data protection regulations.
- Application should support various camera models and brands, including major manufacturers, and ensure compatibility with common video streaming protocols.

- We must maintain an uptime of at least 98% and incorporate failover and redundancy mechanisms to handle camera or server failures.
- We must implement a streamlined process for software updates and patches, providing tools for remote diagnostics and troubleshooting.
- We must optimize the application for minimal energy consumption on cameras, offering power-saving modes during idle periods.
- We must design an intuitive user interface for configuring and monitoring camera settings, and provide clear notifications for detected motion events.

4 STAKEHOLDERS

There are many stakeholders in true posture project:

1. **Ergonomic Experts:** Professionals who specialize in human factors and ergonomics can provide valuable insights into the design of the algorithm to ensure that it promotes correct posture and minimizes physical strain.
2. **Health and Safety Organizations:** Organizations responsible for workplace safety and health regulations may have an interest in promoting the use of such algorithms to reduce the risk of injuries and promote employee well-being.
3. **Manufacturers of Wearable Devices:** Companies that produce wearable devices such as smartwatches or motion sensors may see potential in incorporating the algorithm into their products to provide real-time feedback on posture and movement.
4. **Human Resources Departments:** HR departments within organizations may be interested in implementing the algorithm as part of their employee wellness programs or initiatives to improve workplace productivity and reduce absenteeism due to injuries.
5. **Academic Researchers:** Researchers in fields such as biomechanics, kinesiology, and humancomputer interaction may be interested in collaborating on the development and evaluation of the algorithm.
6. **Investors or Funders:** Individuals or organizations providing funding for the project may have a stake in its success and may provide input or guidance throughout the development process.
7. **Training and Education Providers:** Organizations that offer training programs or courses related to workplace safety and ergonomics may incorporate the algorithm into their curriculum.
8. **Development Team:** Individuals or teams responsible for coding and developing the algorithm itself.
9. **Quality Assurance and Testing Teams:** Teams responsible for ensuring the accuracy, reliability, and safety of the algorithm before deployment.
10. **Procurement Departments:** Departments responsible for purchasing equipment and tools used in the workplace. They may be involved in selecting or approving the algorithm for implementation.
11. **Legal Advisors**: Legal experts who can provide guidance on liability issues, intellectual property rights, and compliance with relevant laws and regulations.

5 SOFTWARE PROCESS

Identifying the best approach to implement this project is a vital part of the development. To decide on our software process model, necessary needs from the organizational process are inspected. Our model must be in-line with these needs:

1. **Budget and Sources:** The budget and resources for the software development process should be determined based on the organization's financial situation. These resources may include human resources, hardware, software tools, and other requirements, as well as the allocated time for the project.

2. **Clear Project Objective:** The organization must ensure that the team members understand the objectives of the project.

3. **Harmony of Process:** The product owner and other team members must divide the project objectives into meaningful sprints. The management must work on successfully completing these sprints to not hinder the work.

4. **Collaborative Team:** The organization's software development team should include an effective project management and communication plan. The project may include a correct workload division such as timeline, risk management, and task assignments.

5. **User Feedback (Understanding the Customer Type)**: The team should understand the customer's expectation from the project and their working area. Software process plans and project objectives can be changed by the customers.

6. **Team Competencies and Training:** The project team has to have sufficient knowledge. The team must be problem solvers. Also, the organizations should provide training for team members. This may include technical and social skills such as communication and leadership.

7. **Legal and Regulatory Compliance:** The organization should be reliable. Data privacy, security, and copyright have vital roles in a user's life.

8. **Quality Standards:** The entire software development process should be conducted following the organization's quality standards and procedures. Software quality and dependability can be raised by procedures like documentation, code reviews, quality control, and testing procedures.

To satisfy these needs, our team will use agile process model with Scrum framework. Biggest advantage of Scrum framework is the division of product backlog into sprints. Multiple teams can work on different sprints at once, making our project's delivery to market shorter. Each sprint is reviewed after completion, which reduces of complex tasks failing and encourages improvement. This project contains eight main sprints:

1. **Image Processing and Its Algorithm Design (4 weeks):** In this sprint, the team members will work on image processing for the user's workout video. The first task will be determining the body joints. After that, the main point is evaluating the correctness of the exercise with respect to joint angles and general posture. These outcomes must be designed to be implemented in

the app and user interface. If a team member has a lack of qualification about this topic, the member must be trained.

2. **Database Design for User Data and User's Progress (2 weeks):** In this sprint, the database will be created for the user's data and progress. The database must be created to meet the main properties.

3. **Design and Registration System (2 weeks):** Firstly, the registration screen will be designed and check the user information on the database. The other task for this sprint is creating an environment for general app structure including area selection, exercise section, and progress tracking.

4. **Cloud Computing for Premium Members (3 weeks):** There will be some users who do not have a device that has enough power to handle image processing. In this sprint, the team will create a cloud computing system for these users. The system must be created to be seen as it's working on the user's phone.

5. **Area Selection and Posture Correctness (4 weeks):** After creating the general structure of the app, in this sprint, first, the target area section part will be created. A user selects an exercise area, and then the program shows the proper form via a video, after that, the program will evaluate the user's posture correctness, both form and timing, and send feedback to the user by using the algorithms.

6. **Progress Tracking (1 week):** The team will create a progress tracking section in the app to show the users' statistical comparison. It includes posture correctness. The user must be able to see exercise recordings.

7. **Polishing the App (1 week):** In this sprint, the team will focus on polishing the app. This includes resolving any bugs, optimizing performance, and making minor improvements to enhance the user experience.

8. **Releasing (1 week):** In this final sprint, the team will complete the final preparations for the app's launch. The app will be deployed to iOS and Android marketplaces. After all tests have been successfully completed and any in-app bugs have been resolved, final checks will be conducted to ensure the app is ready for public release.

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6 PROJECT RISKS

Project risks are going to be analyzed with a combined risk list.

6.1 Likelihood Risks List

LIKELIHOOD RANK	RISK DESCRIPTION
1	**Motion detection accuracy** Our project aims to identify activities performed with dumbbells or on exercise machines. The implementation of the motion and image processing algorithms required for accurate detection could be challenging. If movements are not identified correctly, exploring alternative image processing algorithms will be necessary.
2	**Algorithm Performance and Accuracy:** Algorithms that are not sufficient in terms of accuracy may not provide the desired performance instantly during the image processing stage. In addition, risks such as training time and expense arising from the use of new and complex algorithms may slow down the progress of the project and cause an increase in costs.
3	**Lifetime Estimation Errors:** Estimating wrong about how long the project will take because cannot see all the hard parts or didn't realize how much work there is can make us rush or make the project take longer. This can cost more money and make people not trust us.
4	**Communication Problems:** Project progress may be impacted by requirements misunderstandings or unfulfilled expectations brought on by a lack of communication within the team or with the client.
5	**Security Vulnerabilities:** Security flaws introduced during the project building stage might quickly expose the system to hacking and data theft. In this situation, getting the required consents from individuals could become extremely challenging and could lead to the project's termination.
6	**Requirements Volatility:** Throughout a project, a lot of needs can change, which can impact the project's goals and cause delays and financial overruns. Stakeholders may need to add additional needs during project construction, or hardware malfunctions may cause them. Time and expense rise as a result.
7	**Cloud Computing Costs:** In this project, we utilize cloud computing, and each provider(Amazon, Google, Microsoft) that we inspect in the previous document has some pros and cons. We have chosen Amazon because of the low cost and greater usability. In the future “Amazon Cloud Computing Services” may become more expensive.
8	**Inefficient backend:** An increase in the number of the users could impact various aspects of our project. The backend may become insufficient if too many people use the app. To address this issue, we plan to use docker to containerize both the app itself and environments. This approach will enable us to scale our app’s backend efficiently using container orchestration tools (e.g., Kubernetes) in the cloud.

9	**Debugging:** The project may not be completed on schedule if a successful debugging procedure is not used throughout the project construction phase. This is because fixing faults will take more time and money.
10	**Cloud Providers:** In the future, Cloud provider that we have selected may shut down their services. In that case we might face trouble “migrating” our project to other cloud providers such as Google or microsoft.
11	**Testing:** The product could be difficult to test due to the variety of the phone types and their environments. Thanks to Docker for containerizing tools, we will be able to test our app as it has been developed.

6.2 Impact Risks List

IMPACT RANK	RISK DESCRIPTION
1	**Motion Detection Accuracy:** Our project aims to identify activities performed with dumbbells or on exercise machines. The implementation of the motion and image processing algorithms required for accurate detection could be challenging. If movements are not identified correctly, exploring alternative image processing algorithms will be necessary.
2	**Algorithm Performance and Accuracy:** Algorithms that are not sufficient in terms of accuracy may not provide the desired performance instantly during the image processing stage. In addition, risks such as training time and expense arising from the use of new and complex algorithms may slow down the progress of the project and cause an increase in costs.
3	**Lifetime Estimation Errors:** Estimating wrong about how long the project will take because cannot see all the hard parts or didn't realize how much work there is can make us rush or make the project take longer. This can cost more money and make people not trust us.
4	**Cloud Providers:** In the future, Cloud provider that we have selected may shut down their services. In that case we might face trouble “migrating” our project to other cloud providers such as Google or microsoft.
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8	**Inefficient Backend:** An increase in the number of the users could impact various aspects of our project. The backend may become insufficient if too many people use the app. To address this issue, we plan to use docker to containerize both the app itself and environments. This approach will enable us to scale our app's backend efficiently using container orchestration tools (e.g., Kubernetes) in the cloud.
9	**Communication Problems:** Project progress may be impacted by requirements misunderstandings or unfulfilled expectations brought on by a lack of communication within the team or with the client.
10	**Testing:** The product could be difficult to test due to the variety of the phone types and their environments. Thanks to Docker for containerizing tools, we will be able to test our app as it has been developed.
11	**Debugging:** The project may not be completed on schedule if a successful debugging procedure is not used throughout the project construction phase. This is because fixing faults will take more time and money.

6.3 Combined Risks List

LIKELIHOOD RANK	IMPACT RANK	COMBINED RANK	RISK DESCRIPTION
1	**1**	2	**Motion Detection Accuracy:** Our project aims to identify activities performed with dumbbells or on exercise machines. The implementation of the motion and image processing algorithms required for accurate detection could be challenging. If movements are not identified correctly, exploring alternative image processing algorithms will be necessary.
2	**2**	**4**	**Algorithm Performance and Accuracy:** Algorithms that are not sufficient in terms of accuracy may not provide the desired performance instantly during the image processing stage. In addition, risks such as training time and expense arising from the use of new and complex algorithms may slow down the progress of the project and cause an increase in costs.
3	**3**	**6**	**Lifetime Estimation Errors:** Estimating wrong about how long the project will take because cannot see all the hard parts or didn't realize how much work there is can make us rush or make the project take longer. This can cost more money and make people not trust us.

5	5	10	**Security Vulnerabilities:** Security flaws introduced during the project building stage might quickly expose the system to hacking and data theft. In this situation, getting the required consents from individuals could become extremely challenging and could lead to the project's termination.
7	**6**	**13**	**Cloud Computing Costs:** In this project, we utilize cloud computing, and each provider(Amazon, Google, Microsoft) that we inspect in the previous document has some pros and cons. We have chosen Amazon because of the low cost and greater usability. In the future "Amazon Cloud Computing Services" may become more expensive.
6	**7**	**13**	**Requirements Volatility:** Throughout a project, a lot of needs can change, which can impact the project's goals and cause delays and financial overruns. Stakeholders may need to add additional needs during project construction, or hardware malfunctions may cause them. Time and expense rise as a result.
4	**9**	**13**	**Communication Problems:** Project progress may be impacted by requirements misunderstandings or unfulfilled expectations brought on by a lack of communication within the team or with the client.
10	**4**	**14**	**Cloud Providers:** In the future, Cloud provider that we have selected may shut down their services. In that case we might face trouble "migrating" our project to other cloud providers such as Google or microsoft.
8	**8**	**16**	**Inefficient Backend:** An increase in the number of the users could impact various aspects of our project. The backend may become insufficient if too many people use the app. To address this issue, we plan to use docker to containerize both the app itself and environments. This approach will enable us to scale our app's backend efficiently using container orchestration tools (e.g., Kubernetes) in the cloud.
9	**11**	**20**	**Debugging:** The project may not be completed on schedule if a successful debugging procedure is not used throughout the project construction phase. This is because fixing faults will take more time and money.

11	**10**	**21**	**Testing:** The product could be difficult to test due to the variety of the phone types and their environments. Thanks to Docker for containerizing tools, we will be able to test our app as it has been developed.

7 PROJECT NEEDS

In a software project, there are hardware, software and support needs. These needs should be chosen with respect to their functionality, cost, the resources needed and quality. One of the most popular ways to select these needs is analysing with features/resources/time triangle.

There might be some changes throughout the development of the project. This may cause in change of the project needs. If that is the case, the new needs for the project will be reassessed and determined.

7.1 Software Needs

Compiler/Interpreter/Development Kits:

Python and PyTorch will be used to analyse user's progress data.

React Native will be used to develop the mobile application.

Amazon Web Services software development kit will be used to integrate cloud system and mobile application.

Java development kit will be used in the development of the mobile application.

TensorFlow will be used in the development of image processing algorithms.

IDE's / CLI's:

Android Studio and PyCharm will be used as an IDE for coding.

Amazon command line interface will be used to operate AWS.

Testing:

Jest and PyUnit will be used to test the system.

Version Control System:

Git and GitHub Desktop will be used to collaborate on the project.

Database Management System:

Oracle Database will be used for database management.

Documentation, Management and Collaboration Tools:

Google Documents will be used for the documentation of the system. Microsoft Project and Microsoft Teams will be used for management and team collaboration.

7.2 Hardware Needs

Computers:

All the team members and organization will need computers to proceed the project.

Networking Equipment:

The team members need network connection to communicate and research.

Test Devices and Cameras:

To test the mobile application and algorithm correctness, test devices and cameras are needed.

Server:

The system will need a server to store the user's data.

Back-up Storage:

The system will need back-up storage to store the important user data.

Power Units:

To keep the system always on, power units are needed.

7.3 Support Needs

Technical Support:

Throughout the project, there must be a technical support to determine and fix the technical problems.

Collaboration with Professionals:

To measure the algorithm correctness, there is a need to collaborate with gym trainers and healthcare providers.

Feedback Providers:

Getting feedback from users is a crucial need to get better throughout the process.

Oracle Support:

There can be a need from oracle support if the team cannot fix the database problems.

AWS Support:

There can be a need from AWS if the team cannot fix the cloud problems.

8 MEASUREMENTS

Various measurements will be made to answer questions about the development and track it's process.

Cost: "What was the total cost of the project?"

Quantifying the financial resources required for project tasks and overall project execution.

Effort/Productivity: "How many hours are spent for each sprint while developing this project?"

The amount of human resources, time, and work required to complete a project and measure team productivity, efficiency, and work performance.

Performance: "How long does it take for the application detect the user's posture?"

Measuring project performance against performance targets.

Defect: "What is the difference between the measured calculation and reference calculation?"

Tracks defects, errors, bugs, or issues identified during development, testing, and deployment phases.

Reuse: "How much code has been reused?"

Measuring where the code was written by reused codes and how effective the written code is.

Number of Changes: "How many times has the code been modified or deleted?"

Monitoring the number of changes and measuring how stable the development phase is.

9 SOFTWARE TOOLS

9.1 Cloud-based System

SOFTWARE TOOLS FOR TASK 1 Cloud-Based

Tool Cost/Training/Functionality Data

Tool	Amazon Web Services	IBM Cloud	Google Cloud Platform	Microsoft Azure
Cost	770$	860$	810$	790$
Training Days	12	20	15	14
Functionality	80	80	65	60

Normalized Cost/Training/Functionality Data

Tool	Amazon Web Services	IBM Cloud	Google Cloud Platform	Microsoft Azure
Cost	89.5	**100**	94.1	91.8
Training Days	60	**100**	75	70
Functionality	100	**100**	81.25	75

Reasons for chosen tool: AWS is chosen for its high functionality, low cost, and minimal training requirements, making it attractive for businesses. Its large market share and strong security features are also significant factors.

9.2 Image Processing

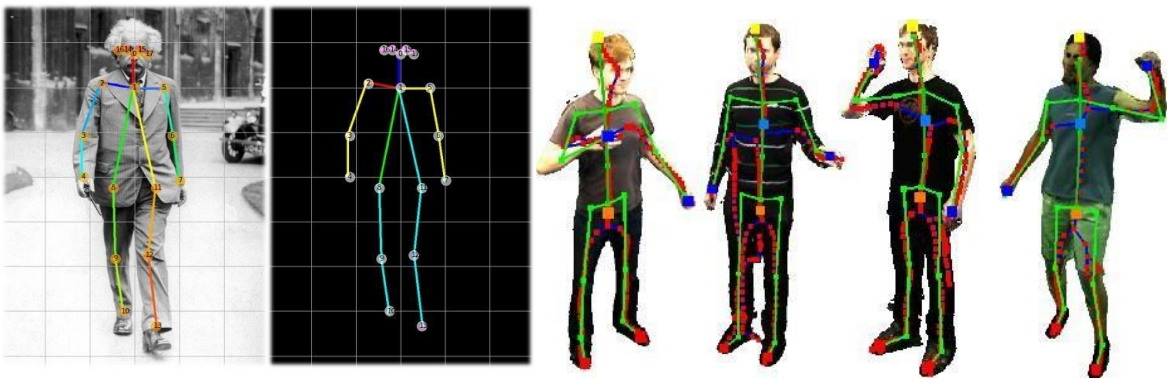
SOFTWARE TOOLS FOR TASK 2 Image Processing

Tool Cost/Training/Functionality Data

Tool	MATLAB Image Processing Toolbox	OpenCV	ImageJ	Tensorflow
Cost	490$	0$	0$	0$
Training Days	30	25	40	45
Functionality	90	70	80	80

Normalized Cost/Training/Functionality Data

Tool	MATLAB Image Processing Toolbox	OpenCV	ImageJ	Tensorflow
Cost	**100**	0	0	0
Training Days	**100**	50	33.3	33.3
Functionality	**100**	77.7	88.8	88.8



Reasons for chosen tool: TensorFlow is chosen for its high functionality and low training requirements, making it ideal for cost-effective and efficient image processing projects. It also provides easy access and usability for various image processing algorithms.

9.3 Virtual Design

SOFTWARE TOOLS FOR TASK 3 Usability(Virtual Design)

Tool Cost/Training/Functionality Data

Tool	Adobe Photoshop	Sketch	CorelDRAW	Adobe Illustrator
Cost	250$	120$	243$	250$
Training Days	2	2	1	2
Functionality	90	30	80	85

Normalized Cost/Training/Functionality Data

Tool	Adobe Photoshop	Sketch	CorelDRAW	Adobe Illustrator
Cost	**100**	48	97.2	100
Training Days	**100**	100	50	100
Functionality	**100**	33.3	88.8	94.4

Reasons for chosen tool: Adobe Photoshop is recommended for its extensive graphic design capabilities, despite higher cost and longer learning curve. CorelDRAW offers a balanced solution with lower cost and shorter learning curve. Sketch is not compatible with our MacOS project.

Note: This tool will be used for 2D human body parts.

9.4 Database System

SOFTWARE TOOLS FOR TASK 4 Database System

Tool Cost/Training/Functionality Data

Tool	Microsoft SQL Server Management Studio (SSMS)	MySQL Workbench	Oracle SQL	Navicat
Cost	0$	0$	0$	1400$
Training Days	50	30	45	60
Functionality	70	30	85	80

Normalized Cost/Training/Functionality Data

Tool	Microsoft SQL Server Management Studio (SSMS)	MySQL Workbench	Oracle SQL	Navicat
Cost	0	0	0	**100**
Training Days	83.3	50	75	**100**
Functionality	87.5	50	93.75	**100**

Reasons for chosen tool: Oracle is the most suitable tool. While MySQL has a lower training time, it is less functional and harder to use. Microsoft SQL offers higher functionality but is also more difficult to use. Navicat is more expensive and less functional than Oracle. Therefore, Oracle SQL is the ideal choice for its low cost, ease of use, and high functionality.

9.5 Software Language

SOFTWARE TOOLS FOR TASK 5 Software Language

Tool Cost/Training/Functionality Data

Tool	ReactNative	Flutter	Kotlin	Swift
Cost	0$	0$	0$	0$
Training Days	40	70	60	60
Functionality	85	85	50	50

Normalized Cost/Training/Functionality Data

Tool	ReactNative	Flutter	Kotlin	Swift
Cost	0	**100**	0	0
Training Days	57.7	**100**	85.7	85.7
Functionality	100	**100**	58.8	58.8

Reasons for chosen tool: The chosen tool is React Native. Kotlin is only compatible with Android and Swift is only compatible with macOS, so they are eliminated. Flutter, while compatible and easy to use, lags behind React Native in terms of algorithms and other requirements. Therefore, React Native is determined to be the most suitable option.

10 PROJECT SCHEDULE

In the development of a software project, a project schedule must be created. This schedule must contain a list of project's main elements with their finish and end dates. The schedule must react changing needs.

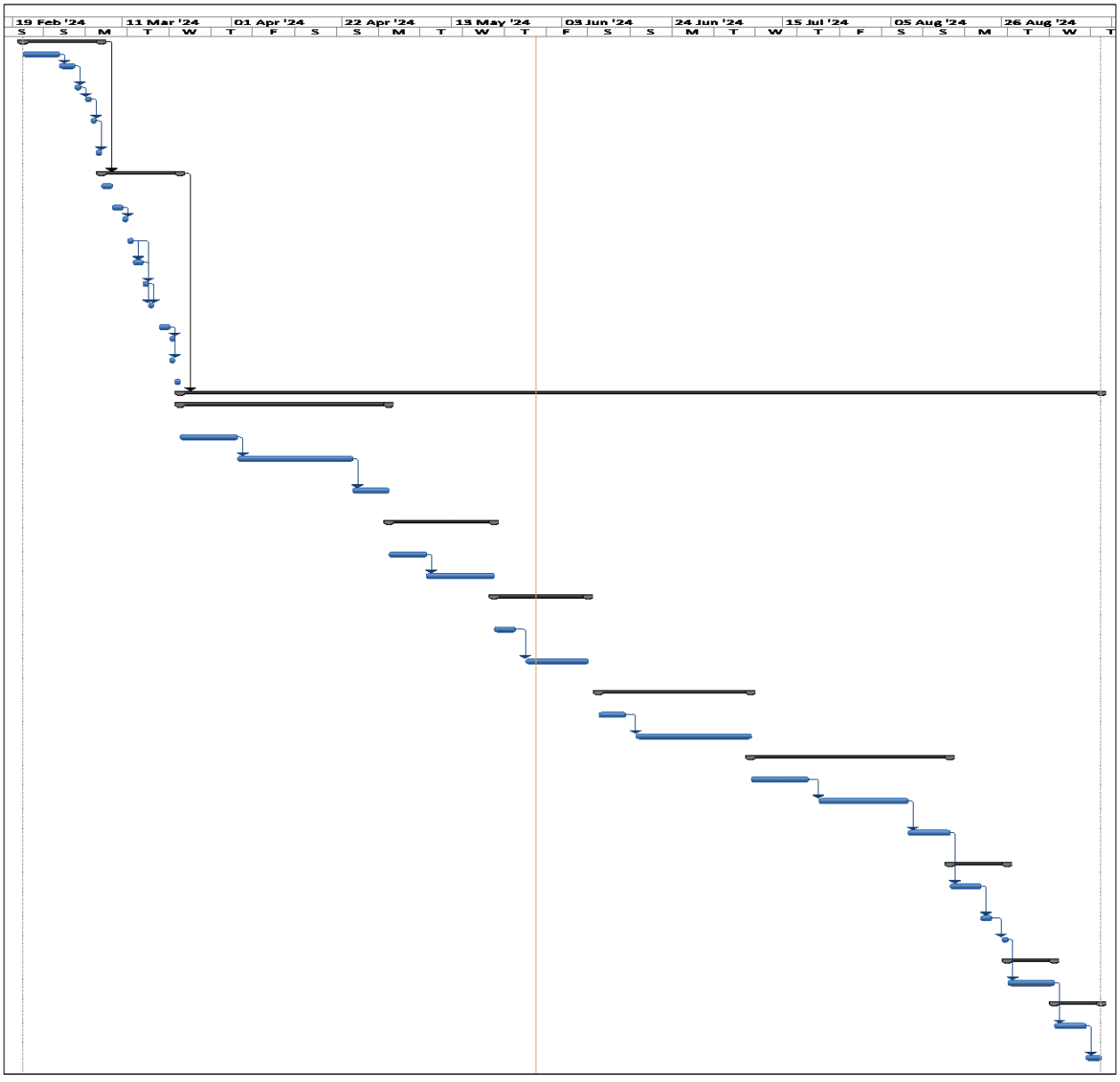
Detailed project schedule of the project is given below:

Task Name	Duration	Start	Finish	Predecessors
Product Backlog Creation	**14 days**	**Wed 21/02/24**	**Wed 06/03/24**	
Background Reading	7 days	Wed 21/02/24	Tue 27/02/24	
Prepare Question and Conduct Meeting	3 days	Wed 28/02/24	Fri 01/03/24	2
Requirements Gathering	1 day	Sat 02/03/24	Sat 02/03/24	3
Team Meeting for Requirements Analysis	1 day	Mon 04/03/24	Mon 04/03/24	4
Writing Requirements Report (Product Backlog) with Team	1 day	Tue 05/03/24	Tue 05/03/24	5
Requirements Presentation	1 day	Wed 06/03/24	Wed 06/03/24	6
Design	**14 days**	**Thu 07/03/24**	**Thu 21/03/24**	**1**
Creating Meaningful Sprints	2 days	Thu 07/03/24	Fri 08/03/24	
Choosing Tools	2 days	Sat 09/03/24	Sun 10/03/24	
Writing Software Tools Document	1 day	Mon 11/03/24	Mon 11/03/24	10
Writing Questions to Identify Measurements	1 day	Tue 12/03/24	Tue 12/03/24	
Identify Measurements from Questions	2 days	Wed 13/03/24	Thu 14/03/24	12
Measurement Storage and Collection	1 day	Fri 15/03/24	Fri 15/03/24	13
Writing Measurements Documentation	1 day	Sat 16/03/24	Sat 16/03/24	13,12,14
Listing All Risks	2 days	Mon 18/03/24	Tue 19/03/24	
Likelihood Ranking of the Risks	1 day	Wed 20/03/24	Wed 20/03/24	16
Impact Ranking of the Risks	1 day	Wed 20/03/24	Wed 20/03/24	16
Stakeholder Analysis	1 day	Thu 21/03/24	Thu 21/03/24	

Implementation / Testing	**126 days**	**Fri 22/03/24**	**Fri 13/09/24**	**8**
Sprint 1 - Image Processing and Its Algorithm Design	**28 days**	**Fri 22/03/24**	**Tue 30/04/24**	
Determining Body Joints	7 days	Fri 22/03/24	Mon 01/04/24	
Generating Statistics to Evaluate Posture Correctness	16 days	Tue 02/04/24	Tue 23/04/24	22
Controlling the Correctness of The Algorithm	5 days	Wed 24/04/24	Tue 30/04/24	23
Sprint 2 - Database Design for User Data and User's Progress	**14 days**	**Wed 01/05/24**	**Mon 20/05/24**	
Designing Database Schema	5 days	Wed 01/05/24	Tue 07/05/24	
Creating Database and Testing with Test Data	9 days	Wed 08/05/24	Mon 20/05/24	26
Sprint 3 - Application Design and Registration System	**14 days**	**Tue 21/05/24**	**Fri 07/06/24**	
Creating Registration Screen and Linking with Database	4 days	Tue 21/05/24	Fri 24/05/24	
Creating Application's Main Properties and Tabs	10 days	Mon 27/05/24	Fri 07/06/24	29
Sprint 4 - Cloud Computing	**21 days**	**Mon 10/06/24**	**Mon 08/07/24** Fri 14/06/24	
Arranging AWS for the Project	5 days	Mon 10/06/24		
Linking Image Algorithms with AWS	16 days	Mon 17/06/24	Mon 08/07/24	32
Sprint 5 - Area Selection and Posture Correctness	**28 days**	**Tue 09/07/24**	**Thu 15/08/24** Fri 19/07/24	
Sketching Body Parts and Arranging Videos	9 days	Tue 09/07/24		
Adding Target Area Selection in Application	13 days	Mon 22/07/24	Wed 07/08/24	35
Linking Image Processing with the App	6 days	Thu 08/08/24	Thu 15/08/24	36
Sprint 6 - Progress Tracking	**7 days**	**Fri 16/08/24**	**Mon 26/08/24**	
Arranging Data Analysis for the Correctness Results	4 days	Fri 16/08/24	Wed 21/08/24	37
Linking Analysis Results with Database	2 days	Thu 22/08/24	Fri 23/08/24	39
Monitoring the Results in the App	1 day	Mon 26/08/24	Mon 26/08/24	40
Sprint 7 - Debugging & Testing	**7 days**	**Tue 27/08/24**	**Wed 04/09/24**	
Testing the System and Debugging	7 days	Tue 27/08/24	Wed 04/09/24	41
Sprint 8 - Last Checks and Release Preparation	**7 days**	**Thu 05/09/24**	**Fri 13/09/24**	

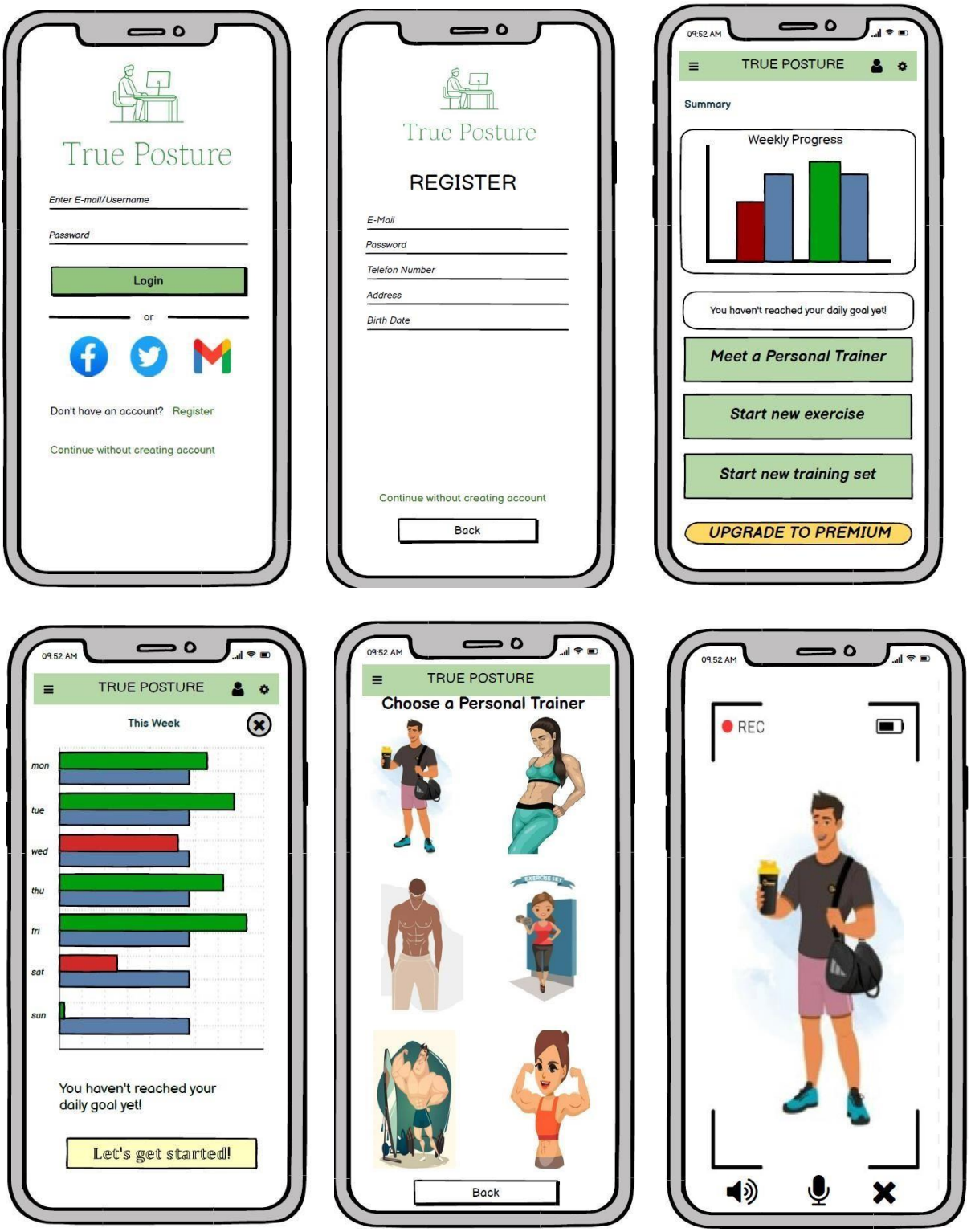
Arranging First Release Versions both Android and IOS	4 days	Thu 05/09/24	Tue 10/09/24	43
Meeting and Discussions with Team	3 days	Wed 11/09/24	Fri 13/09/24	45

(Schedule of the Project)

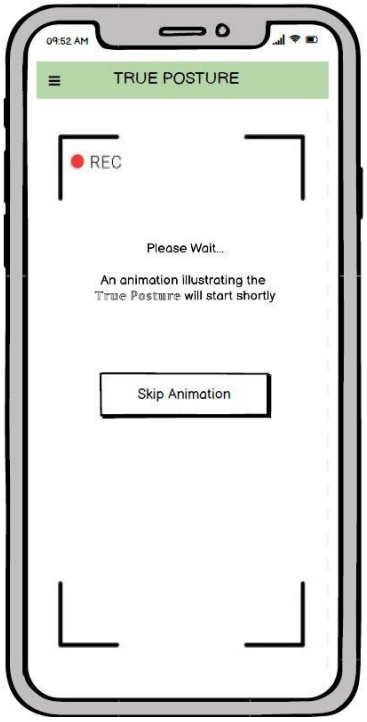


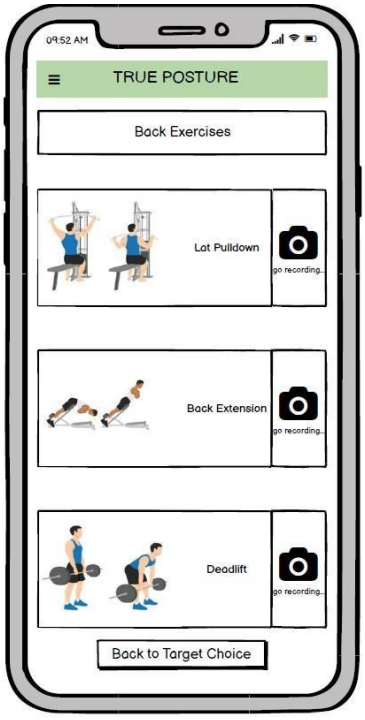
(Gantt Chart of the Schedule)

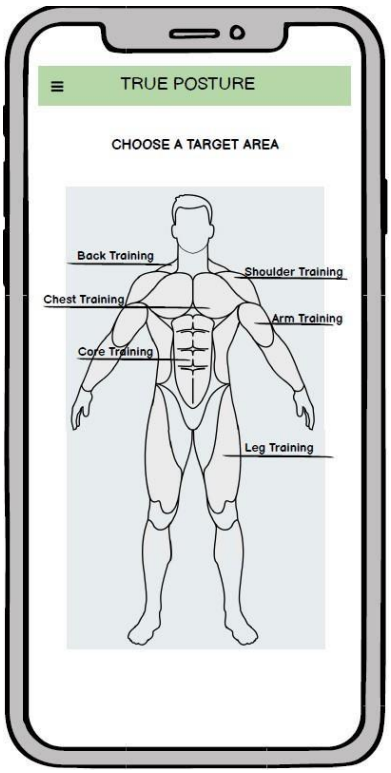
11 USER INTERFACE

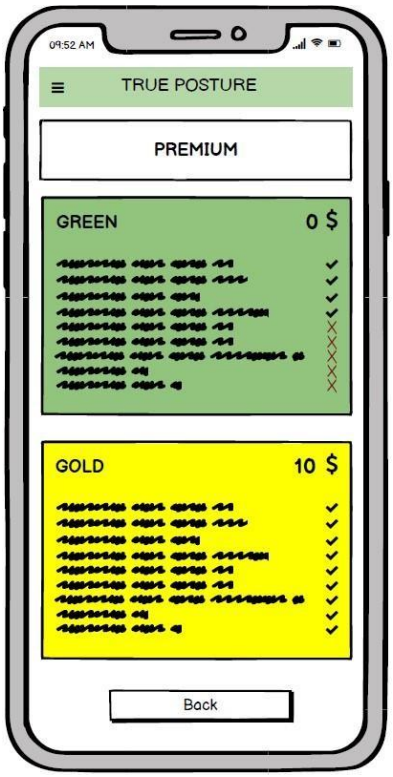


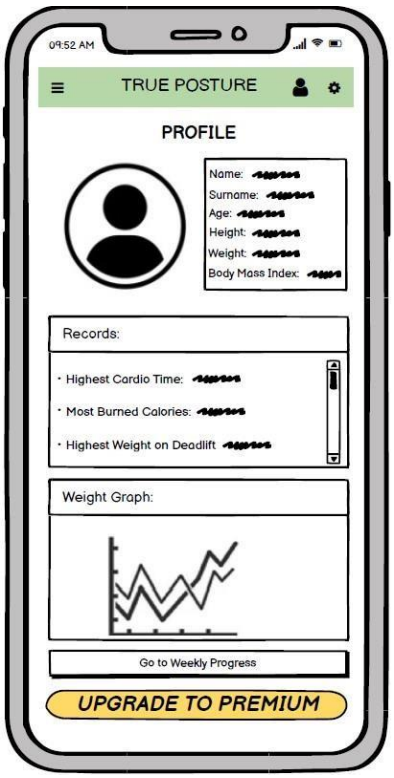

09:52 AM
TRUE POSTURE
Choose an Exercise
Squat-Jumps
Pushups
Deadlift
Lunges
Plank
Pull-Ups


09:52 AM
TRUE POSTURE
REC
Please Wait...
An animation illustrating the
True Posture will start shortly
Skip Animation


09:52 AM
TRUE POSTURE
Back Exercises
Lat Pulldown
go recording..
Back Extension
go recording..
Deadlift
go recording..
Back to Target Choice


TRUE POSTURE
CHOOSE A TARGET AREA
Back Training
Shoulder Training
Chest Training
Arm Training
Core Training
Leg Training


09:52 AM
TRUE POSTURE
PREMIUM
GREEN
0 $
GOLD
10 $
Back


09:52 AM
TRUE POSTURE
PROFILE
Name:
Surname:
Age:
Height:
Weight:
Body Mass Index:
Records:
· Highest Cardio Time:
· Most Burned Calories:
· Highest Weight on Deadlift
Weight Graph:
Go to Weekly Progress
UPGRADE TO PREMIUM

12 CONCLUSION

True Posture project aims to change the way starters approach fitness by ensuring the correctness of exercise postures through a technologically advanced mobile application. This application, designed for personal smartphones, employs image processing algorithms and real-time feedback systems to guide users towards a better exercise execution, preventing injuries and enhancing the effectiveness of workout.

As the project continues to improve, it holds the promise not only for individual users but also for professional environments like olympics and school education. By integrating professional insights and feedback within the app, it ensures that exercises are performed with precision, catering to the needs of both beginners and professional athletes. The use of cloud computing enhances accessibility, making it a versatile tool adaptable to various user needs and technological capabilities.

In conclusion, the True Posture application represents a significant step forward in the use of technology to enhance human health and physical performance. Its development is a good example of using advanced technology to create solutions that are both innovative and highly beneficial. As this project progresses, it is expected to set new standards in the field of fitness technology, contributing to safer, more effective workout routines and fostering a healthier society.