SOEN 6841 SOFTWARE PROJECT MANAGEMENT

FlexAI - Feasibility Study Report

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THE PROJECT REPORT IS PREPARED FOR
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1 Objective

This study aims to assess the technical, operational, and economic viability of FlexAI, an AI-based virtual fitness trainer that uses computer vision and motion tracking to provide real-time workout feedback, personalized plans, and injury prevention—all accessible via a mobile phone or webcam, without requiring any wearable devices.

2 Executive Summary

FlexAI is designed to address a critical gap in the fitness industry by offering affordable, personalized, and accessible fitness guidance without the need for expensive personal trainers or wearable technology. The solution offers real-time feedback, injury prevention, and social engagement features through a simple camera interface.

The study evaluates the feasibility of implementing FlexAI as a software project based on technology accessibility, operational impact, and market trends. Market research from sources such as Statista, Grand View Research, and MarketWatch supports the growing demand for AI-powered fitness apps. The global fitness app market was valued at $9.25 billion in 2023 and is expected to reach $23.98 billion by 2030, with an increasing trend toward non-invasive, hardware-free solutions.

This report concludes that FlexAI is not only viable but has strong potential for development within a software management course project and eventual expansion into a commercial product.

3 Description of Product/Service

FlexAI is an AI-driven application that provides users with real-time form correction and personalized workout plans using only their device's camera. It is designed to adapt to different fitness levels, goals, and physical needs. By eliminating the need for wearables, FlexAI lowers the barrier to entry for users while improving accessibility and convenience.

Key features include:

- Real-time posture and movement analysis
- Personalized, adaptive workout routines
- Injury prevention feedback
- Progress tracking and gamification
- Social and competitive features such as challenges and leaderboards

FlexAI is highly attractive for fitness enthusiasts, students, and professionals looking for a flexible and affordable alternative to personal training.

4 Target Market

1. **Home Fitness Enthusiasts:**
   Individuals who prefer home workouts without the need for gym memberships or expensive trainers.
2. **Busy Professionals:**
   Users who struggle to commit to strict gym schedules and seek flexible, on-demand workouts.
3. **Fitness Beginners:**
   Those intimidated by gyms or unsure about proper form and technique.

4. **Rehabilitation and Injury Recovery:**
   Users who need assistance in maintaining proper form during recovery exercises.

5. **Budget-Conscious Individuals:**
   Fitness enthusiasts looking for affordable yet effective training options.

5 Market Demand Analysis

- **Market Size and Growth:**
  The global virtual fitness market was valued at approximately $16.03 billion in 2023 and is projected to reach $151.35 billion by 2032, growing at a compound annual growth rate (CAGR) of 28.35% during the forecast period.

- **AI Integration:**
  The AI personal trainer segment is anticipated to expand from $13.3 billion in 2023 to $89 billion by 2030, reflecting a CAGR of 31.2%.

- **Target Demographics:**
  FlexAI's focus on home fitness enthusiasts, busy professionals, fitness beginners, individuals undergoing rehabilitation, and budget-conscious users aligns with current market trends favoring flexible and cost-effective fitness solutions.

6 Competitive Landscape

Alternatives

FlexAI operates in a competitive environment with various alternatives:

- **Traditional Fitness Apps:**
  Platforms like Nike Training Club and FitOn offer structured workouts but often lack real-time form correction and personalized feedback.

- **Wearable-Dependent Platforms:**
  Services such as Apple Fitness+ and Peloton rely on proprietary hardware, increasing the cost barrier for users.

- **Personal Trainers:**
  While offering personalized coaching, they can be expensive and less accessible to a broader audience.

- **Smart Mirror Devices:**
  Products like Mirror and Tempo provide interactive guidance but require significant upfront investment in equipment.

FlexAI's Advantages

- **Real-Time AI Coaching:**
  Utilizing computer vision and motion tracking via standard cameras eliminates the need for additional hardware.

- **Adaptive Workouts:**
  Personalized routines cater to various fitness levels and goals.

- **Social Engagement:**
  Incorporating community engagement and competitive elements enhances user motivation.

- **Injury Prevention:**
  AI-driven posture correction aids in reducing the risk of injuries.

7 Technical Feasibility

Technology Stack

FlexAI will be developed using a cross-platform approach, using the following technologies:

- AI and computer vision frameworks such as TensorFlow, MediaPipe, and OpenCV for motion detection and analysis.
- React Native and React.js for mobile and web application development, ensuring device flexibility.
- Node.js or Django for backend infrastructure, supporting API development, data handling, and user management.
- Firebase or MongoDB as database solutions for user data, workout history, and analytics.
- Cloud hosting platforms like AWS or Google Cloud for secure, scalable storage and processing.
- Enterprise Architect for UML diagrams.
- Figma for creating high fidelity prototypes
- Azure DevOps for Project Planning & Management, Monitoring and Control, Version control, CI/CD, Testing, Artifact Management, Security & Permissions and Collaboration.

AI/Computer Vision: TensorFlow, MediaPipe, OpenCV,
Frontend: React Native / React.js,
Backend: Node.js / Django,
Database: Firebase / MongoDB,
Hosting: AWS / Google Cloud
UI/UX: Figma
Project Management: Azure DevOps
Version Control: Azure DevOps

Implementation Feasibility

All required tools are open-source or available through academic licenses. The team has access to development environments and cloud credits through educational programs. AI motion tracking is technically feasible using well-documented APIs, and the lack of dependency on wearables simplifies implementation and broadens device compatibility.

With a development team proficient in machine learning, computer vision, and web/mobile development, FlexAI's core features can be built and tested within a single academic semester.

Conclusion

FlexAI is technically feasible with available resources and technology.

8 Operational Feasibility

FlexAI does not require users to purchase additional equipment or modify their workout spaces significantly. The application operates entirely through the device's camera, providing a streamlined setup and minimizing learning curves. This design enables easy integration into users' daily routines.

Challenges and Mitigations

- Ensuring accurate motion detection across diverse environments: This can be mitigated by guiding users to use well-lit spaces and calibrating the camera view.
- Addressing privacy concerns: Data encryption, on-device processing, and user consent will be implemented to ensure trust and compliance with regulations.
- Sustaining user motivation: Gamification features such as points, challenges, and social groups will encourage consistent usage.

Benefits

- No extra devices required
- Real-time feedback improves form
- Easy integration into routines

Conclusion

FlexAI is operationally feasible and offers minimal disruption with high potential benefit.

9 Economic Feasibility

The estimated development and operational costs for an MVP (Minimum Viable Product) version of FlexAI are as follows:

Estimated Costs (MVP)

- AI/ML Development: $5,000
- UI/UX Design: $2,000
- Backend: $3,000
- Marketing: $2,500
- Maintenance: $2,000
- **Total: $14,500 CAD**

Resource Availability

The project will utilize open-source technologies and cloud services available under student or free-tier licenses. Development will be handled in-house by a project team as part of the course.

ROI and Business Model

FlexAI will follow a freemium business model, offering core features for free and premium subscriptions for advanced features. Additional revenue may come from partnerships with wellness programs, sponsored challenges, and in-app purchases.

Considering the growing demand for accessible fitness tools and the low cost of entry due to no wearable requirements, the ROI potential is high. The application could break even within 12–18 months if commercialized post-project.

Conclusion:

FlexAI is economically feasible as a student project and scalable for market success.

10 Potential Risks and Mitigation

- **Technical Challenges:**
  Achieving high accuracy in motion tracking without wearables is complex. Investing in robust AI development and continuous testing is essential to ensure reliable performance.
- **User Privacy Concerns:**
  Camera-based tracking may raise privacy issues. Implementing strong data encryption, transparent privacy policies, and options for users to control data sharing can mitigate these concerns.
- **Market Saturation:**
  Differentiating FlexAI requires a unique value proposition and targeted marketing strategies to stand out among established fitness apps.
- **AI Bias and Accuracy:**
  Inaccurate form correction could lead to user dissatisfaction or injuries. Regular updates and machine learning improvements are necessary to enhance AI accuracy.
- **Adoption Resistance:**
  Educating potential users about the benefits and reliability of AI-powered fitness solutions can address skepticism and encourage adoption.

11 Findings

This feasibility study confirms that FlexAI is:

- Technically achievable with available open-source tools and development skills.
- Operationally efficient and integrates easily into user routines without requiring wearables.
- Economically sound with low initial investment and high potential for user acquisition and retention.
- By addressing potential risks through strategic planning and leveraging its competitive advantages, FlexAI has the potential to establish a strong presence in the evolving virtual fitness market.

12 Recommendations

- Proceed with developing a prototype focusing on core features (AI feedback, adaptive workouts, no-wearable setup).
- Conduct usability testing with student volunteers or beta users.
- Addressing technical challenges in motion tracking accuracy and ensuring robust data privacy measures are crucial for its success.
- Prepare for potential commercialization through pitch preparation, market validation, and further refinement.

13 Conclusion

FlexAI is recommended for full development as a software project management course initiative.

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1 Objective

The purpose of this document is to propose the development of FlexAI, an AI-driven virtual fitness trainer that utilizes computer vision and motion tracking technology. FlexAI aims to provide real-time feedback, create personalized fitness plans, ensure injury prevention, and enhance user engagement through gamification, all without the need for wearable devices. This solution seeks to revolutionize the fitness experience by offering accessible, smart, and interactive support for users of all fitness levels.

2 Problem Description

Over 80% of individuals abandon fitness programs within three months due to lack of guidance, motivation, and proper technique. Traditional personal training is expensive and often inaccessible, while existing digital fitness solutions lack personalization and real-time feedback. There is a pressing need for a cost-effective, intelligent, and adaptive fitness solution.

3 Target Audience

- Home fitness enthusiasts
- Busy professionals with limited time
- Fitness beginners
- Rehabilitation patients
- Budget-conscious users

4 Goals

- **Deliver affordable and effective fitness coaching**: Provide a high-quality, cost-effective alternative to expensive gym memberships and personal trainers.
- **Enhance workout safety through injury prevention**: Enhance workout safety by offering real-time feedback on form and suggesting modifications to prevent injuries.
- **Increase consistency and motivation through social and gamification features**: Boost user engagement through social features and gamification, encouraging regular workouts.
- **Provide a highly accessible, hardware-free solution**: Deliver an accessible fitness experience with just a smartphone or webcam, eliminating the need for expensive equipment.

5 Solution Overview

5.1 FlexAI: A Smart Virtual Fitness Application

FlexAI is a smart fitness application that combines the power of AI-driven computer vision and image processing technology to provide a comprehensive and immersive fitness experience. By leveraging users' device cameras, FlexAI is capable of performing real-time analysis of body movements during exercise.

The key features of FlexAI include:

- **Real-time Posture Correction:** Utilizing AI, image processing and computer vision, the app provides immediate feedback on the user's posture during exercises, helping to prevent injuries and ensure correct form.

- **Personalized and Adaptive Workout Plans:** FlexAI generates customized workout plans that evolve based on user progress, fitness levels, and goals. It adapts over time, offering a dynamic fitness journey.
- **Progress Tracking:** The app tracks key metrics such as repetitions, sets, calories burned, and overall fitness progress, allowing users to visualize their improvement and stay motivated.
- **Gamification:** Users earn badges, points, and are ranked on leaderboards, turning fitness into a fun and competitive experience that encourages consistency and achievement.
- **Community and Challenge-based Engagement:** FlexAI fosters a strong community of like-minded individuals through challenges, shared goals, and social interactions, increasing motivation and accountability.
- **Mobile and Web Platform:** Accessible on both mobile and web platforms, FlexAI ensures that users can train anytime and anywhere, with no need for additional wearables or expensive gym equipment.

FlexAI is designed to seamlessly integrate with users' daily routines, offering the flexibility of training at home, in the gym, or on the go.

5.2 Addressing the Identified Problem or Opportunity

The fitness industry has long been burdened by the high cost and accessibility barriers of personal trainers, gym memberships, and specialized equipment. FlexAI offers a solution by removing the need for these expensive elements, making fitness more accessible to people from all walks of life, regardless of their financial status or location.
Key ways FlexAI addresses these challenges include:

- **Cost-effective:** FlexAI democratizes fitness by eliminating the need for costly personal trainers, gym memberships, or wearable fitness devices. Users can experience personalized, high-quality coaching directly through their smartphones or web browsers.
- **Accessibility and Convenience:** The app can be used by anyone with a smartphone or webcam, allowing users to work out from home, the office, or any other location of their choice. This increased flexibility helps to overcome geographical limitations and time constraints.
- **Enhanced Safety:** Real-time feedback on posture and movement reduces the risk of injury during workouts. This feature is especially beneficial for beginners or those unfamiliar with proper exercise techniques, ensuring that users get the most out of their workouts while preventing harm.
- **Improved Adherence and Engagement:** The gamification and community features foster a fun, social, and motivational environment that keeps users engaged. Regular updates and challenges push users to stay on track, ultimately leading to better long-term adherence to their fitness plans.
- **Personalization for Every User:** FlexAI's adaptive algorithms ensure that each user's fitness plan is tailored to their specific needs, whether they are training for weight loss, muscle building, or overall fitness. The app also adjusts as users improve, ensuring that they always face the right level of challenge and engagement.

In summary, FlexAI revolutionizes the fitness landscape by combining affordability, accessibility, safety, and engagement in a single comprehensive solution, allowing individuals to reach their fitness goals more effectively and sustainably.

5.3 Architecture Diagram

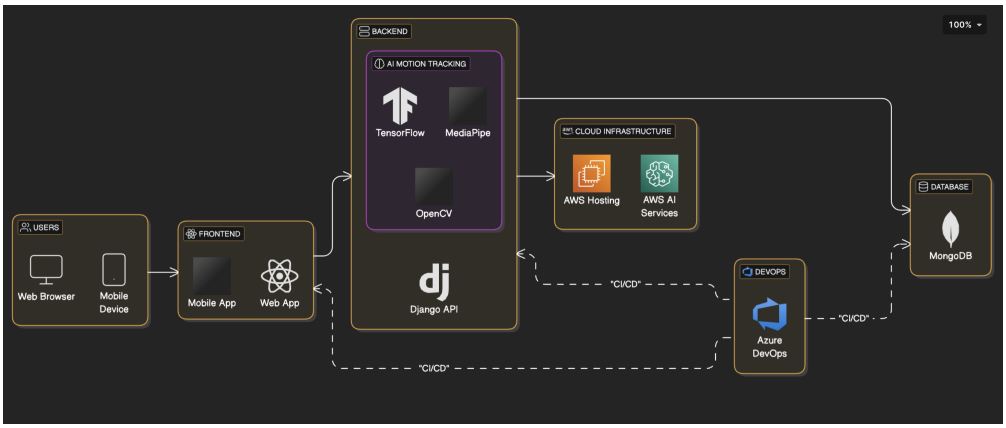

Figure 1: User Journey Flowchart

The proposed system architecture for FlexAI supports the development of a cross-platform, AI-powered virtual fitness trainer accessible via web and mobile devices, without the need for wearable technology. It features a modular design consisting of a React Native and React.js frontend, a Django-based backend, and integration with AI motion tracking frameworks such as TensorFlow, MediaPipe, and OpenCV. This setup will enable real-time analysis of body movements, posture correction, and personalized feedback.

MongoDB is proposed as the primary database for storing flexible and scalable user data, workout history, and gamification elements. The majority of the components will be hosted on AWS to leverage its scalability and AI capabilities, while Azure DevOps will be used for continuous integration and deployment, version control, testing, and collaboration. This architecture will help FlexAI's goals by enabling adaptive workouts, progress tracking, community engagement, and real-time user feedback, ensuring a seamless and scalable user experience.

5.4 Flowchart

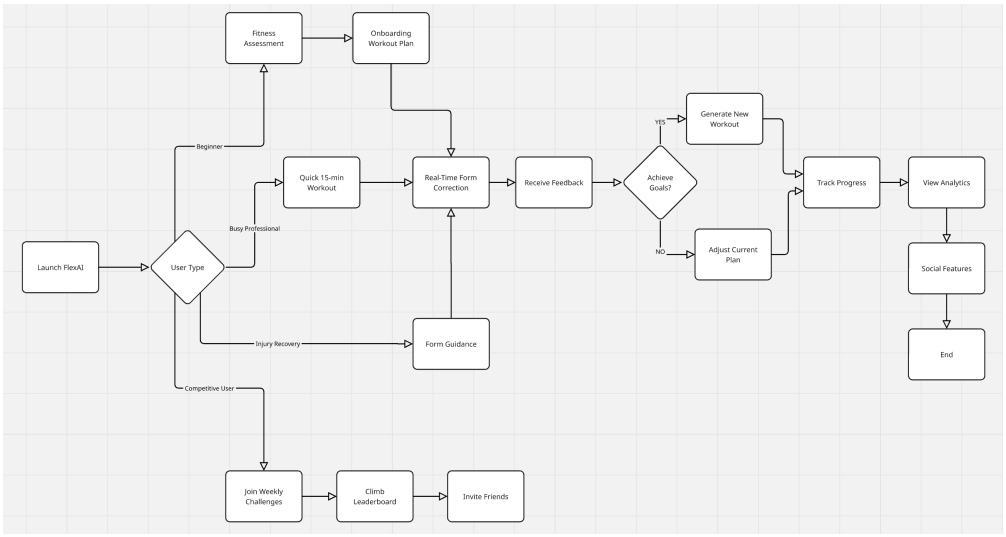

Figure 2: User Journey Flowchart

The flowchart outlines the user journey within the FlexAI smart fitness application. It will begin when the user launches FlexAI and selects their user type, which can be a beginner, busy professional, injury recovery, or competitive user. Based on the user type, the app offers a tailored experience. Beginners will undergo a fitness assessment followed by an onboarding workout plan, while busy professionals will be provided with a quick 15-minute workout. Users recovering from injuries will receive form guidance, and competitive users will have the option to join weekly challenges, climb the leaderboard, and invite friends.

All users are directed toward real-time form correction and receive feedback on their performance. Based on whether the user achieves their fitness goals, the app either generates a new workout or adjusts the current plan. The user's progress is continuously tracked, with analytics available for review, and social features enhance user engagement. The journey concludes after these interactions, completing a personalized, feedback-driven fitness experience.

5.5 Use Case Diagram

Actors: User, Admin, AI Engine
Use Cases: Register/Login, Start Workout, Get Real-Time Feedback, Track Progress, Join Challenge, View Leaderboard and Manage Content (Admin)

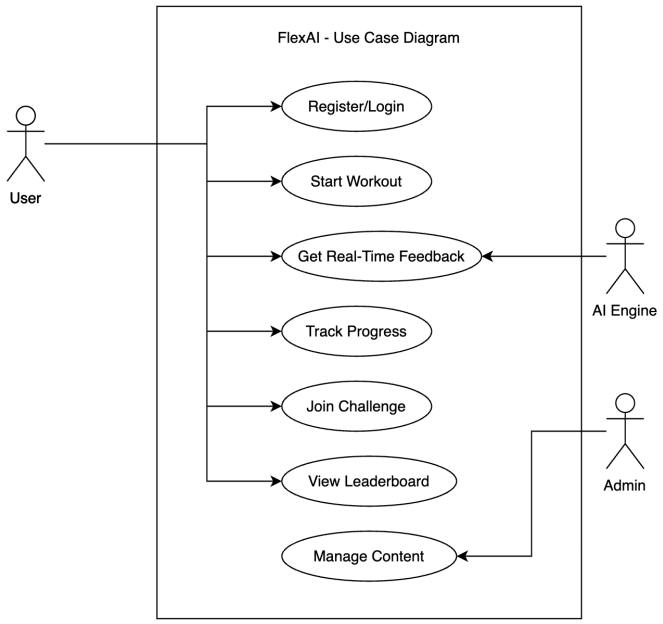

Figure 3: Use Case Diagram

The FlexAI Use Case Diagram illustrates the interactions between three primary actors—User, Admin, and AI Engine—and the core functionalities of the smart fitness application. Users can register or log in to the app, start workout sessions, receive real-time feedback powered by the AI Engine, track their fitness progress, join workout challenges, and view their position on the leaderboard. The AI Engine is responsible for providing intelligent, real-time guidance during workouts, helping users maintain proper form and exercise safely. The Admin is tasked with managing the content within the application, ensuring that workout plans, challenges, and other resources remain accurate and up to date.

5.6 Class Diagram

The FlexAI class diagram presents the structural architecture of the smart fitness application by outlining its core components and their responsibilities. At the center is the FlexAI class, which serves as the system's orchestrator and provides key functionalities such as AI-based motion tracking, real-time form correction, personalized workout generation, progress analytics, social features, and injury prevention. It collaborates with several specialized components.

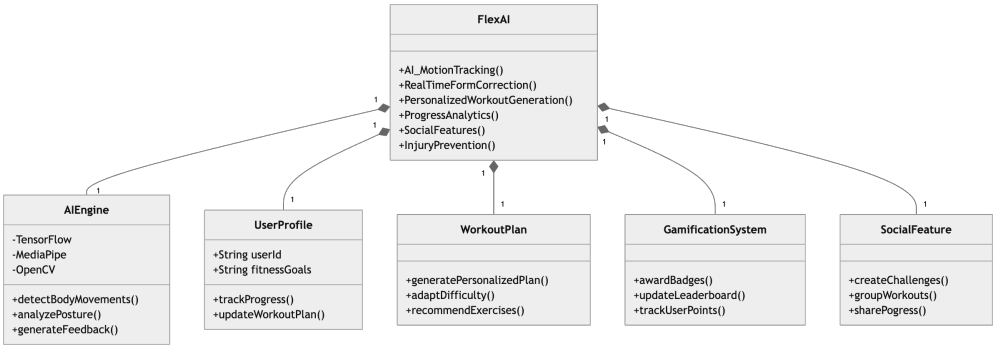

Figure 4: Class Diagram

- **AIEngine Class:** Utilizes technologies like TensorFlow, MediaPipe, and OpenCV to detect body movements, analyze posture, and generate feedback, enabling intelligent interaction.
- **UserProfile Class:** Stores user-specific data such as ID and fitness goals, and includes functions to track progress and update workout plans.
- **WorkoutPlan Class:** Responsible for generating personalized fitness routines, adapting difficulty levels, and recommending exercises tailored to each user.
- **GamificationSystem Class:** Supports user engagement through features like awarding badges, updating leaderboards, and tracking user points.
- **SocialFeature Class:** Allows users to participate in group workouts, create challenges, and share their progress with others.

This modular design highlights the integration of AI, personalization, gamification, and social connectivity within the FlexAI platform.

5.7 Database Schema (MongoDB)

1. Users

```
{
  _id: ObjectId,
  name: String,
  email: String,
  passwordHash: String,
  age: Number,
  fitnessLevel: String,
  goals: [String],
  preferences: {
    workoutTypes: [String],
    availability: String
```

```
  },
  progressLogs: [ObjectId],
  joinedChallenges: [ObjectId]
}
```

2. Workouts

```
{
  _id: ObjectId,
  name: String,
  difficulty: String,
  type: String,
  duration: Number,
  exerciseList: [ObjectId],
  aiFeedbackEnabled: Boolean
}
```

3. ExerciseData

```
{
  _id: ObjectId,
  name: String,
  description: String,
  correctFormVideoURL: String,
  musclesTargeted: [String],
  AIParameters: {
    keyPoints: [String],
    thresholds: Object
  }
}
```

4. ProgressLogs

```
{
  _id: ObjectId,
  userId: ObjectId,
  workoutId: ObjectId,
  date: Date,
  performanceMetrics: {
    caloriesBurned: Number,
    duration: Number,
    formAccuracy: Number,
    repsCompleted: Number
  },
  notes: String
}
```

5. Challenges

```
{
  _id: ObjectId,
  title: String,
  description: String,
  participants: [ObjectId],
```

```
  startDate: Date,
  endDate: Date,
  rewards: {
    points: Number,
    badge: String
  },
  leaderboard: [
    {
      userId: ObjectId,
      score: Number
    }
  ]
}
```

The MongoDB schema for FlexAI is designed to support a scalable, intelligent fitness platform that blends personalization, progress tracking, and community engagement. The `Users` collection stores essential personal details, fitness goals, and preferences, with references to logs and challenges. `Workouts` encapsulate routines with difficulty, duration, and linked exercises, with optional AI feedback. `ExerciseData` includes form guidance, muscle targeting, and AI tracking parameters. `ProgressLogs` monitor user performance across key metrics. Finally, `Challenges` foster social motivation through competition, rewards, and leaderboards. Together, these collections enable FlexAI to deliver a robust and adaptive fitness experience.

6 Key Features and Functionalities

FlexAI integrates a suite of AI-driven tools and community features designed to create a dynamic, personalized, and safe fitness experience. The following features define the core functionality of the application:

1. **AI-Powered Motion Tracking**

   - **Technology:** Utilizes TensorFlow, MediaPipe, and OpenCV to detect and analyze user movements via mobile or webcam.
   - **Functionality:** Identifies 3D keypoints of the user's body and compares them against correct form data in real time.

   Use Case Scenario: Sarah, a beginner user, follows a guided squat workout on her phone. FlexAI uses the camera to track her posture and alerts her if her knees are misaligned. A side-by-side video appears, showing her form next to the ideal form with audio prompts for correction.

2. **Real-Time Form Correction with Visual and Audio Feedback**

   - Offers immediate corrective guidance when improper form is detected.
   - Users receive both visual overlays and audio cues to adjust their posture.

   Use Case Scenario: During a plank exercise, the app detects that John's hips are too high. A red overlay highlights the problem area, and a voice prompt says, "Lower your hips slightly to engage your core."

3. **Personalized Workout Generation**

   - Adapts to user's goals, performance, fitness level, and feedback from prior sessions.
   - Includes multiple training modes: strength, cardio, HIIT, recovery, etc.
   - Automatically adjusts the plan based on user's progress, preferences, or injury reports.

   Use Case Scenario: After two weeks of consistent progress, FlexAI increases the intensity of Mary's routine by adding resistance-based movements, replacing easier exercises with intermediate ones.

4. **Gamification System**

   - Encourages motivation through:
     (a) Achievements & Badges: For milestones (e.g., 7-day streaks).
     (b) Leveling System: Users progress through fitness levels.
     (c) Points & Leaderboards: Based on consistency, performance, and challenge participation.

   Use Case Scenario: Ali completes a 30-day streak challenge. He earns a badge and moves up the leaderboard, which encourages him to challenge his roommate to beat his score.

5. **Progress Tracking & Analytics**

   - Visual graphs and statistics on:
     (a) Calories burned
     (b) Workout consistency
     (c) Improvement in posture/form
     (d) Exercise completion rates
   - Weekly and monthly summaries to help users measure growth.

   Use Case Scenario: Emily opens her dashboard and views a graph showing improvement in her squat depth and alignment over the last 3 weeks. This motivates her to set a new personal goal.

6. **Injury Prevention & Form Guidance**

   - Includes pre-workout tips and visual form guides for each exercise.
   - Detects risky postures and warns users before injury risk escalates.
   - Recommends cooldown/stretching routines post-session.

   Use Case Scenario: During lunges, FlexAI warns Max that his knee is extending past his toe. He gets a message saying, "Adjust stance to prevent knee strain," along with a form guide video.

7. **Social Features**

   - **Group Workouts:** Train virtually with friends.
   - **Challenges:** Join weekly competitions (e.g., "Complete 5 workouts this week").
   - **Community Board:** Share achievements, ask for advice, and post progress pictures.

   Use Case Scenario: Rachel joins a "Core Crusher Challenge" with her classmates. They form a virtual team and compete with another group to win rewards like premium access and merchandise.

8. **Cross-Platform Accessibility**

   - Available on Android, iOS (via React Native), and web (via React.js).
   - Data is synced across devices using secure cloud storage.

   Use Case Scenario: During her lunch break at work, Dana opens the web app to track her progress. Later that evening, she continues her workout on her mobile app from where she left off.

7 Benefits and Impact

7.1 User-Centric Benefits

1. **No Wearables Required**
   - Removes the barrier of needing fitness bands or smartwatches.
   - Increases adoption among budget-conscious users and casual fitness enthusiasts.
2. **Affordable Fitness Coaching**
   - Core features available for free (Freemium Model).
   - Replaces or supplements expensive personal trainers.
3. **Personalized and Adaptive Workouts**
   - Users don't need to guess or search for workout plans.
   - Plans evolve as the user does, ensuring continued challenge and engagement.
4. **Improved Safety and Technique**
   - Real-time correction reduces the chance of injury.
   - Especially beneficial for beginners and rehabilitation patients.
5. **Motivation Through Gamification**
   - Progress is tangible and rewarding.
   - Keeps users engaged longer—addressing the issue of workout dropouts.
6. **Social Connectivity and Community**
   - Makes working out less isolating.
   - Users can connect, compete, and support each other.

7.2 Impact on Target Audience

- **Home Fitness Enthusiasts:** Get trainer-level guidance without leaving home.
- **Busy Professionals:** Access short, impactful workouts with minimal preparation.
- **Beginners:** Gain confidence with structured plans and real-time support.
- **Rehabilitation Patients:** Avoid re-injury with form-specific guidance.
- **Budget-Conscious Users:** Unlock effective workouts without expensive hardware or subscriptions.

7.3 Broader Industry Impact

- **Scalable Digital Health Solution:** Ideal for partnerships with insurers, gyms, and corporate wellness programs.
- **Reduces Healthcare Burden:** Through proactive injury prevention and improved fitness outcomes.
- **Drives Innovation in Fitness Tech:** Demonstrates the feasibility and power of AI without wearables.

8 References

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[2] 360iResearch (2024) – AI Personal Trainer Market Link

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Term:
Winter 2025

Group No: 7

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Project GitHub Repository:
https://github.com/MHUZAIFA/SOEN-6841-Software-Project-Management

THE PROJECT REPORT IS PREPARED FOR
SOEN 6841 SOFTWARE PROJECT MANAGEMENT GROUP PROJECT
WINTER 2025

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Project Overview

- ➔ **Project Name:** FlexAI
- ➔ **Development Methodology:** Agile
- ➔ **Platform:** Android & iOS
- ➔ **Planning Methodology:** Top-Down
- ➔ **Target Version For This Plan:** 1.0

FlexAI is an AI-powered virtual fitness trainer that provides real-time feedback, personalized workout plans, and motion tracking using a smartphone camera. It aims to reduce fitness dropout rates, prevent injuries, and improve workout effectiveness.

High-Level Plan

Project Timeline

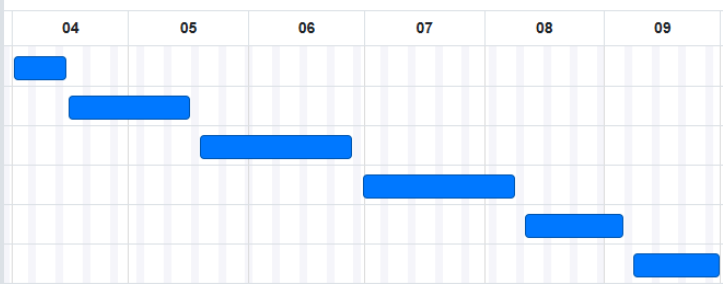
- ➔ **Start Date:** 1st April 2025
- ➔ **End Date:** 30th September 2025
- ➔ **Total Time:** 6 months

Deliverables/Iterations

- ➔ Requirements Gathering and UI/UX Prototyping
- ➔ Basic Non-Personalized Workouts System
- ➔ AI Motion Tracking and Feedback System
- ➔ Personalized Workout Plans
- ➔ Social and Gamification Features
- ➔ App Deployment and Beta Testing

Timeline Distribution

Task Name	Start	End	Duration
Requirements Gathering and UI/UX Prototyping	2025-04-01	2025-04-14	10 days
Basic Non-Personalized Workouts System	2025-04-15	2025-05-16	24 days
AI Motion Tracking & Feedback System	2025-05-19	2025-06-27	30 days
Personalized Workout Plans	2025-06-30	2025-08-08	30 days
Social and Gamification Features	2025-08-11	2025-09-05	20 days
App Deployment and Beta Testing	2025-09-08	2025-09-30	17 days



Detailed Plan

Iteration 1: Requirements Gathering and UI/UX Prototyping

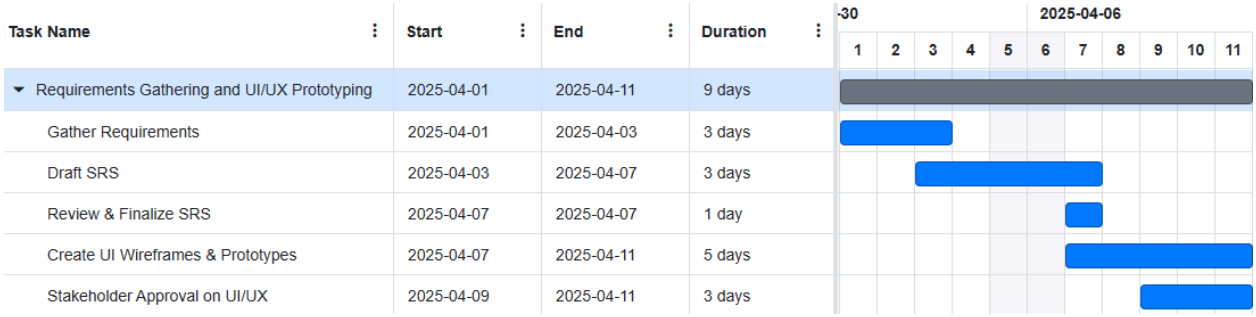
Objective

Define the core requirements and user interface of FlexAI. This phase ensures a solid foundation for development by gathering insights, designing intuitive UI wireframes, and finalizing the system requirements.

Tasks

- ➔ **Gather Requirements** – Research, user interviews, competitor analysis
- ➔ **Draft SRS** – Define app features & scope
- ➔ **Review & Finalize SRS** – Get feedback from stakeholders
- ➔ **Create UI Wireframes & Prototypes** – Design basic user flow & layout
- ➔ **Stakeholder Approval on UI/UX** – Review and revise UI designs

Tasks Timeline



Iteration 2: Basic Non-Personalized Workouts System

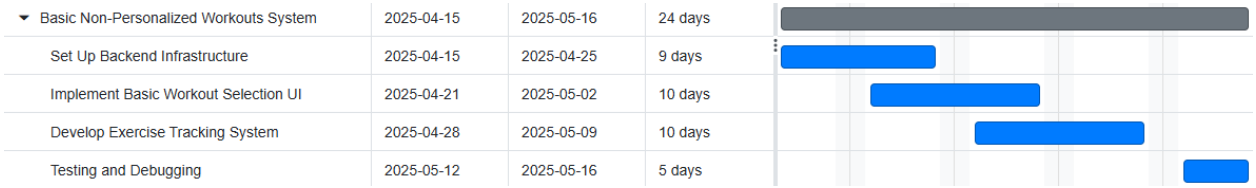
Objective

Develop a basic, non-personalized workout system that allows users to follow predefined workout routines. This iteration serves as an early version of the app, enabling exercise tracking without AI personalization.

Tasks

- ➔ **Set Up Backend Infrastructure** – Database and API design
- ➔ **Implement Basic Workout Selection UI** – User selects routines
- ➔ **Develop Exercise Tracking System** – Basic timer and rep counter
- ➔ **Testing & Debugging** – Initial testing of non-personalized workouts

Tasks Timeline



Basic Non-Personalized Workouts System	2025-04-15	2025-05-16	24 days
Set Up Backend Infrastructure	2025-04-15	2025-04-25	9 days
Implement Basic Workout Selection UI	2025-04-21	2025-05-02	10 days
Develop Exercise Tracking System	2025-04-28	2025-05-09	10 days
Testing and Debugging	2025-05-12	2025-05-16	5 days

Iteration 3: AI Motion Tracking and Feedback System

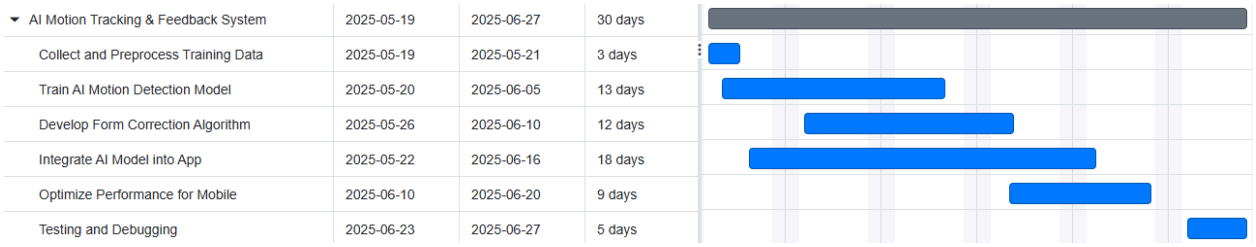
Objective

Implement AI-powered motion tracking that provides real-time feedback on workout form. This ensures users perform exercises correctly, improving effectiveness and reducing injury risk.

Tasks

- ➔ **Collect & Preprocess Training Data** – Gather motion datasets
- ➔ **Train AI Motion Detection Model** – Implement computer vision model
- ➔ **Develop Form Correction Algorithm** – AI analyzes user movement
- ➔ **Integrate AI Model into App** – Connect backend AI to frontend
- ➔ **Optimize Performance for Mobile** – Reduce latency & resource use
- ➔ **Testing & Debugging** – Ensure AI feedback is accurate

Tasks Timeline



AI Motion Tracking & Feedback System	2025-05-19	2025-06-27	30 days
Collect and Preprocess Training Data	2025-05-19	2025-05-21	3 days
Train AI Motion Detection Model	2025-05-20	2025-06-05	13 days
Develop Form Correction Algorithm	2025-05-26	2025-06-10	12 days
Integrate AI Model into App	2025-05-22	2025-06-16	18 days
Optimize Performance for Mobile	2025-06-10	2025-06-20	9 days
Testing and Debugging	2025-06-23	2025-06-27	5 days

Iteration 4: Personalized Workout Plans

Objective

Enable AI-driven personalized workout plans that adapt based on user performance and fitness goals. This phase introduces real-time progression tracking and goal-based training.

Tasks

- ➔ **Develop AI-Based Workout Personalization** – Adaptive plans based on user data
- ➔ **Integrate User Progress Tracking System** – Store and analyze past workouts

➔ **Develop Feedback & Adjustment Mechanism** – Modify difficulty based on performance
➔ **User Testing & Feedback** – Validate effectiveness of AI adaptation

Tasks Timeline

Personalized Workout Plans	2025-06-30	2025-08-08	30 days
Develop AI-Based Workout Plan	2025-06-30	2025-07-11	10 days
Integrate User Progress Tracking	2025-07-07	2025-07-25	15 days
Develop Feedback & Adjustment Mechanism	2025-07-14	2025-08-01	15 days
User Testing and Adjusting	2025-07-28	2025-08-08	10 days

Iteration 5: Social and Gamification Features

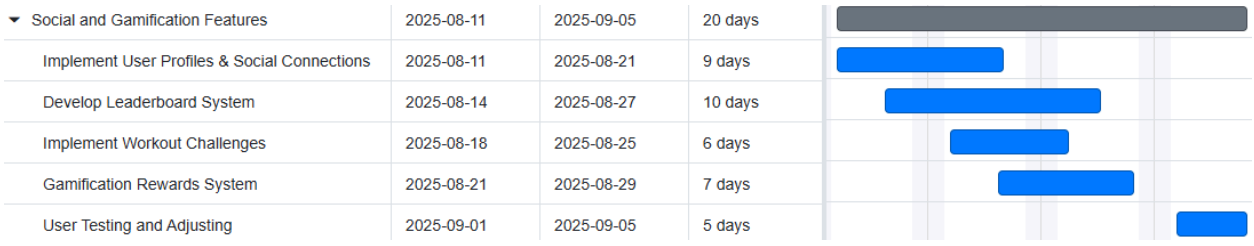
Objective

Introduce social and gamification elements to improve user engagement. Features like leaderboards, challenges, and achievement badges enhance motivation and consistency.

Tasks

➔ **Implement User Profiles & Social Connections** – Add friend & community features
➔ **Develop Leaderboard System** – Ranking based on workout performance
➔ **Implement Workout Challenges** – Daily & weekly fitness challenges
➔ **Gamification Rewards System** – Badges, points, streaks, etc.
➔ **User Testing & Adjusting** – Gather insights from test users

Tasks Timeline



Social and Gamification Features	2025-08-11	2025-09-05	20 days
Implement User Profiles & Social Connections	2025-08-11	2025-08-21	9 days
Develop Leaderboard System	2025-08-14	2025-08-27	10 days
Implement Workout Challenges	2025-08-18	2025-08-25	6 days
Gamification Rewards System	2025-08-21	2025-08-29	7 days
User Testing and Adjusting	2025-09-01	2025-09-05	5 days

Iteration 6: App Deployment and Beta Testing

Objective

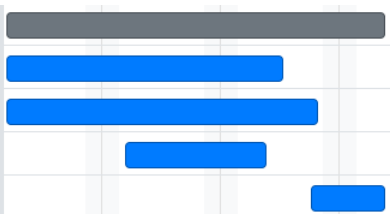
Finalize app testing, fix bugs, and deploy the app to the Play Store and App Store. This ensures a smooth launch and continuous monitoring of performance and user feedback.

Tasks

- ➔ **Beta Testing with Real Users** – Invite early adopters
- ➔ **Bug Fixes & Performance Improvements** – Optimize stability & UX
- ➔ **App Store & Play Store Listings** – Screenshots, descriptions, approvals
- ➔ **Security & Compliance Checks** – Ensure data privacy standards

Tasks Timeline

App Deployment and Beta Testing	2025-09-08	2025-09-30	17 days
Beta Testing with Real Users	2025-09-08	2025-09-24	13 days
Bug Fixing and Performance Improvements	2025-09-08	2025-09-26	15 days
Compliance Checks	2025-09-15	2025-09-23	7 days
App Store & Play Store Listings	2025-09-26	2025-09-30	3 days



System Features

- ➔ **AI Motion Tracking** - Tracks user movements using computer vision.
- ➔ **Real-time Feedback** - Provides form correction and intensity adaptation.
- ➔ **Personalized Progression** - AI tailors workouts based on performance.
- ➔ **Social & Competitive Features** - Includes leaderboards and challenges.
- ➔ **No Wearables Needed** - Uses a phone camera instead of external devices.
- ➔ **Gamification** - Rewards, levels, and challenges to boost engagement.

Resource Allocation

Human Resources

Iteration 1

- 1 UI/UX Designer
- 1 Product Manager
- 1 AI Developer

Iteration 2

- 1 Backend Developer
- 1 Mobile Developer
- 1 Fitness Consultant

Iteration 3

- 2 AI Developers
- 1 Backend Developer
- 1 Mobile Developer

Iteration 4

- 2 AI Developers
- 1 Fitness Consultant

Iteration 5

- 1 Social Features Developer
- 1 UI/UX Designer

Iteration 6

- 1 Quality Assurance Engineer
- 1 Deployment Engineer

Technological Resources & Estimated Costs

Iteration 1

- Design Software Licenses: $500
- Cloud Documentation Services: $100

Iteration 2

- Backend API Development: $2,000
- Basic Exercise Database: $1,000

Iteration 3

- AI Model Training (Cloud GPUs): $5,000
- OpenCV & ML Framework Licenses: $800
- Backend Server Setup: $1,500

Iteration 4

- AI Data Processing Services: $3,000
- Cloud Storage for User Data: $1,200

Iteration 5

- Database & API Services: $2,000
- Real-time Notifications & Chat Services: $1,500

Iteration 6

- Beta Testing Tools: $1,000
- App Store & Play Store Fees: $200
- Cloud Monitoring & Maintenance: $1,500

Critical Dependencies

Requirements Gathering
Each iteration depends on clear and well-defined requirements. Without a solid understanding of the necessary functionalities, development may face delays or require rework.

Design & Architecture
A proper design and architecture must be in place before development begins. Without this foundation, developers may encounter roadblocks or inconsistencies during implementation.

Resource Availability
The availability of developers, designers, and testers is crucial for each iteration. Limited resources can impact timelines and cause bottlenecks.

Technology Stack
Dependencies on specific technologies for development, testing, deployment, and hosting should be identified early. Any issues with these technologies can delay progress.

Feedback and Iteration Review
Iterative development relies on continuous feedback and review cycles. Managing stakeholder input efficiently is essential to avoid delays.

Integration Points
External system or service integrations should be identified early. Delays or challenges with integration points can hinder iteration progress.

Quality Assurance
Testing is critical for ensuring functionality and stability. A well-structured quality assurance process helps meet iteration deadlines.

Documentation and Knowledge Transfer
Proper documentation and knowledge-sharing ensure continuity between iterations and support project scalability.

Risk Management
Identifying and addressing potential risks proactively helps maintain iteration momentum and reduces unexpected disruptions.

Conclusion

FlexAI aims to bridge the gap between expensive personal training and ineffective home workouts using AI-driven motion tracking and personalized coaching. The agile development methodology ensures continuous improvement, user feedback integration, and high engagement levels.

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1. FlexAI Feasibility Study Report (2025) https://www.flexai.com/feasibility-study-report
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SOEN 6841 SOFTWARE PROJECT MANAGEMENT

FlexAI - Risk Assessment & Mitigation

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Objective

FlexAI is a cutting-edge fitness application leveraging AI-driven motion tracking and real-time coaching. To ensure its success, we must proactively identify, analyze, and mitigate risks associated with development, deployment, and user engagement. This plan aims to safeguard the project's reliability, security, and overall user experience.

Risk Identification

Technical Risks

1. **Compatibility Challenges**

    a. ***Description:*** Ensuring FlexAI functions seamlessly across various devices and operating systems (Android/iOS).
    b. ***Occurrence:*** During development, testing, and post-launch user adoption.
    c. ***Impact:*** Potentially limits user accessibility and adoption.

2. **Real-time AI Coaching Complexity**

    a. ***Description****:* Motion tracking accuracy may vary across different environments and devices.
    b. ***Occurrence****:* Development phase and user feedback cycles.
    c. ***Impact****:* Incorrect exercise guidance, reducing effectiveness and user trust.

3. **Data Security & Privacy Concerns**

    a. ***Description****:* Handling sensitive fitness data while complying with GDPR and other regulations.
    b. ***Occurrence****:* During data storage, processing, and transmission.
    c. ***Impact****:* Breaches could lead to legal consequences and loss of user trust.

4. **Cybersecurity Vulnerabilities**

    a. ***Description****:* Potential threats include unauthorized access, hacking, and data breaches.
    b. ***Occurrence****:* Throughout the application lifecycle.
    c. ***Impact****:* Could damage reputation and compromise user data.

5. **Scalability Issues**

    a. ***Description****:* Handling increasing user loads efficiently.
    b. ***Occurrence****:* As user adoption grows.
    c. ***Impact****:* Performance bottlenecks could affect user experience.

6. **Integration with Third-Party Services**

    a. ***Description****:* Synchronizing with health tracking APIs (Google Fit, Apple Health, etc.).
    b. ***Occurrence****:* During API updates or changes.
    c. ***Impact****:* Could disrupt functionality and data synchronization.

Operational Risks

7. **User Training and Adoption**

    a. ***Description****:* Users may struggle with AI-powered coaching and app features.
    b. ***Occurrence****:* Post-launch and onboarding phases.
    c. ***Impact****:* Could lead to lower retention rates.

8. **Regulatory Compliance**

    a. ***Description****:* Adhering to fitness, health, and data privacy regulations.
    b. ***Occurrence****:* Throughout the development and operational phases.
    c. ***Impact****:* Non-compliance could lead to penalties and legal challenges.

9. **Community Engagement & Retention**

    a. ***Description****:* Encouraging long-term user engagement through challenges and social features.
    b. ***Occurrence****:* Post-launch and beyond.
    c. ***Impact****:* Low engagement could lead to high churn rates.

Financial Risks

10. **Adapting to Users with Limited Budgets**

    a. ***Description****:* Ensuring affordability while maintaining profitability.
    b. ***Occurrence****:* Pricing model decisions.
    c. ***Impact****:* High pricing may reduce adoption, while low pricing could impact revenue.

11. **Economic Fluctuations**

    a. ***Description****:* External economic factors affecting consumer spending.
    b. ***Occurrence****:* Market downturns and inflation periods.
    c. ***Impact****:* Potential decrease in subscriptions and revenue.

12. **Cost-Benefit Balance of AI Features**

    a. ***Description****:* Developing AI-driven features incurs high costs.
    b. ***Occurrence****:* During feature prioritization and development.
    c. ***Impact****:* Costly features may not yield proportional user adoption or revenue growth.

Risk Impact Analysis

The likelihood and severity values for each risk were determined based on industry best practices and expert judgments, based on an evaluation of past occurrences in similar AI-powered applications.

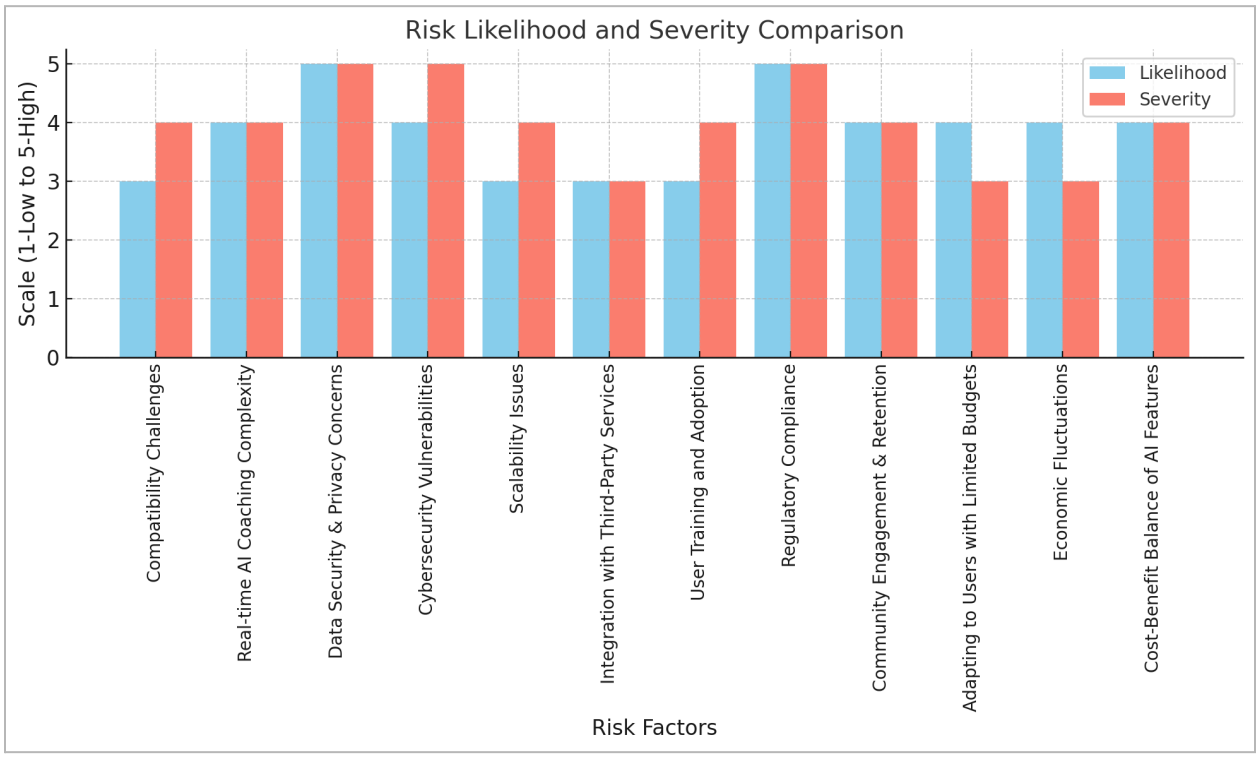
- ➔ **Likelihood** measures how probable a given risk is to occur, rated on a scale from 1 (Low) to 5 (Very High). It considers:
  - ◆ Complexity of the technology and integrations involved.
  - ◆ Potential for external factors (e.g., regulatory changes, market trends).
- ➔ **Severity** assesses the impact a risk would have if it were to materialize, also rated from 1 (Low) to 5 (Critical). It accounts for:
  - ◆ The extent of disruption to users and business operations.
  - ◆ Financial and reputational damage.
  - ◆ Legal and compliance consequences.

These assessments help prioritize risks so that mitigation strategies can be effectively designed and implemented.

No.	Risk	Likelihood	Severity
1	Compatibility Challenges	Moderate	High
2	Real-time AI Coaching Complexity	High	Major
3	Data Security & Privacy Concerns	Very High	Critical
4	Cybersecurity Vulnerabilities	High	Critical
5	Scalability Issues	Moderate	Major
6	Integration with Third-Party Services	Moderate	Moderate
7	User Training and Adoption	Moderate	Major
8	Regulatory Compliance	Very High	Critical
9	Community Engagement & Retention	High	Major
10	Adapting to Users with Limited Budgets	High	Moderate
11	Economic Fluctuations	High	Moderate
12	Cost-Benefit Balance of AI Features	High	Major

Risk Assessment (Prioritizing)

The analysis of the impact of the Risks provided us with the Likelihood and Severity of the Risk Factors. However, we need a better way to visualize the values such that a decision could be made on which risks to prioritize.
Therefore, a bar graph that shows Likelihood and Severity values for each risk factor is plotted. The factors with the highest Likelihood and Severity values can be targeted first as they are the most dangerous ones.



Mitigation Strategies and Contingency Plans

Technical Risks

1. **Compatibility Challenges**

    a. **Strategy**
        i. Comprehensive device testing on various hardware/software setups.
        ii. Continuous app updates to ensure smooth operation.
    b. **Contingency Plan**
        i. If major compatibility issues arise post-launch, release emergency patches.

ii. Provide users with troubleshooting guides and customer support assistance.
iii. Implement device-specific optimizations if necessary.

2. **Real-time AI Coaching Complexity**

    a. **Strategy**
        i. Use extensive training data for motion detection improvements.
        ii. Implement a feedback loop for continuous AI enhancement.
    b. **Contingency Plan**
        i. If AI misinterpretations occur, introduce a manual feedback system allowing users to report incorrect form corrections.
        ii. Offer alternative exercise recommendations if motion tracking fails.
        iii. Provide gradual AI updates instead of major overhauls to ensure user adaptation.

3. **Data Security & Privacy Concerns**

    a. **Strategy**
        i. Implement end-to-end encryption and strict access controls.
        ii. Regular compliance audits for GDPR, HIPAA, etc.
    b. **Contingency Plan**
        i. In case of a data breach, immediately isolate affected systems and notify impacted users.
        ii. Provide users with enhanced security options such as additional authentication layers.
        iii. Establish rapid-response protocols for legal and regulatory compliance.

4. **Cybersecurity Vulnerabilities**

    a. **Strategy**
        i. Conduct regular security assessments and penetration testing.
        ii. Implement multi-factor authentication for user accounts.
    b. **Contingency Plan**
        i. If a security breach occurs, deploy emergency security patches and enforce password resets for affected users.
        ii. Set up dedicated 24/7 monitoring for unusual activity spikes.
        iii. Collaborate with cybersecurity experts for crisis management and future-proofing.

5. **Scalability Issues**

    a. **Strategy**
        i. Utilize cloud-based infrastructure to handle dynamic loads.

   ii. Implement efficient load balancing strategies.
b. **Contingency Plan**
   i. If the app experiences server overloads, implement temporary access restrictions to stabilize performance.
   ii. Deploy backup servers and cloud-based auto-scaling mechanisms.
   iii. Provide real-time updates to users on performance issues and expected resolution times.

6. **Integration with Third-Party Services**

   a. **Strategy**
      i. Maintain API compatibility testing procedures.
      ii. Implement backup synchronization methods.
   b. **Contingency Plan**
      i. If an external service (e.g., Google Fit, Apple Health) updates its API and breaks compatibility, deploy an emergency fix or provide an alternative data import/export solution.
      ii. Offer manual data entry as a fallback option for critical integrations.
      iii. Maintain partnerships with multiple service providers to reduce reliance on a single platform.

Operational Risks

7. **User Training and Adoption**

   a. **Strategy**
      i. Develop interactive onboarding tutorials and in-app guides.
      ii. Provide AI-driven adaptive assistance for new users.
   b. **Contingency Plan**
      i. If users struggle with onboarding, introduce a "Beginner Mode" with step-by-step coaching.
      ii. Offer live customer support or AI chatbots to answer onboarding queries.
      iii. Create a user feedback forum to address common challenges.

8. **Regulatory Compliance**

   a. **Strategy**
      i. Hire compliance specialists to ensure adherence to legal standards.
      ii. Keep up with evolving regulations and update policies accordingly.
   b. **Contingency Plan**
      i. If the app fails to meet a new regulation, work with legal teams to implement necessary changes before penalties are enforced.

ii. In case of non-compliance penalties, establish a crisis communication strategy to maintain user trust.
iii. Maintain flexibility in data storage and user agreements to quickly adapt to regulatory changes.

9. **Community Engagement & Retention**

    a. **Strategy**
        i. Introduce rewards and gamification elements.
        ii. Foster community interaction through social features.
    b. **Contingency Plan**
        i. If user engagement declines, conduct surveys to understand the cause and pivot strategies accordingly.
        ii. Increase social media engagement and launch marketing campaigns to reignite interest.
        iii. Offer limited-time challenges and incentives to boost participation.

Financial Risks

10. **Adapting to Users with Limited Budgets**

    a. **Strategy**
        i. Offer tiered pricing models (freemium, premium subscriptions).
        ii. Provide discounts or bundled offers to improve affordability.
    b. **Contingency Plan**
        i. If users hesitate to purchase premium features, introduce referral discounts or loyalty rewards.
        ii. Temporarily lower pricing or offer free trials during economic downturns.
        iii. Introduce sponsored content or ads to subsidize free-tier users without disrupting experience.

11. **Economic Fluctuations**
    a. **Strategy**
        i. Diversify revenue streams (ads, partnerships, premium features).
        ii. Maintain flexible pricing strategies to adjust to market conditions.
    b. **Contingency Plan**
        i. If a recession impacts subscriptions, pivot towards B2B partnerships with gyms or health services.
        ii. Offer long-term subscription plans at discounted rates to lock in revenue stability.

iii. Reduce non-essential development costs during financial downturns to maintain profitability.

12. **Cost-Benefit Balance of AI Features**
    a. **Strategy**
        i. Prioritize AI features that add tangible value to users.
        ii. Conduct A/B testing to evaluate feature adoption and impact.
    b. **Contingency Plan**
        i. If an AI feature fails to gain traction, analyze user feedback and repurpose or phase it out gradually.
        ii. Introduce a modular AI approach where users can enable/disable features based on their needs.
        iii. Focus on cost-effective improvements rather than over-engineering features with minimal ROI.

Conclusion

This Risk Assessment and Mitigation Plan ensures that FlexAI is prepared for potential challenges by implementing proactive strategies. By prioritizing security, compliance, and user experience, we aim to deliver a sustainable and successful AI-powered fitness platform.

The identified risks span technical, operational, and financial aspects, each carrying different levels of likelihood and severity. Technical risks, such as compatibility challenges, AI coaching accuracy, and cybersecurity concerns, require rigorous testing and continuous improvements to ensure a seamless user experience. Operational risks, including regulatory compliance and user adoption, emphasize the importance of structured onboarding and engagement strategies. Financial risks highlight the need for a balanced pricing model, adaptability to economic fluctuations, and cost-effective feature development.

Mitigation strategies have been tailored to address each risk, incorporating robust security protocols, scalability solutions, and user-centric design improvements. The prioritization of risks based on their impact ensures that the most critical issues are addressed first, reducing potential disruptions and enhancing FlexAI's reliability.

By continuously monitoring these risks and updating strategies accordingly, FlexAI will maintain a competitive edge in the fitness technology space, providing users with a cutting-edge and safe AI-driven workout experience. This Risk Assessment and Mitigation Plan ensures that FlexAI is prepared for potential challenges by implementing proactive strategies. By prioritizing security, compliance, and user experience, we aim to deliver a sustainable and successful AI-powered fitness platform.

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SOEN 6841 SOFTWARE PROJECT MANAGEMENT

FlexAI - Software Development Budget

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23 Mar 2025

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THE PROJECT REPORT IS PREPARED FOR
SOEN 6841 SOFTWARE PROJECT MANAGEMENT GROUP PROJECT
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1 Objective

To estimate the budget required for the development of FlexAI, an AI-driven smart fitness application, across all phases of the software development lifecycle. This includes a detailed breakdown of expenses in key categories such as development, testing, marketing, and maintenance, as well as resource costing and a contingency budget. The aim is to ensure the project remains feasible, efficient, and adaptive to changing needs throughout development.

2 Cost Categories (Total Estimated Budget: $15,500 CAD)

A well-structured budget ensures that each critical aspect of the project receives appropriate funding. The categories are based on standard industry practices, and the values reflect a balanced distribution suited for an academic MVP project with commercialization potential.

2.1 Development – $7,000 CAD (45.2%)

Development is the most resource-intensive phase, encompassing coding, integration, and architecture design.

FlexAI incorporates cutting-edge AI technologies requiring skilled labor and time.

- **Frontend Development (React Native/React.js)** – $2,500: For cross-platform UI development, ensuring accessibility via mobile and web.
- **Backend Development (Django/Node.js)** – $2,000: For robust API design, data handling, and managing workout plans, user authentication, and storage.
- **Database Setup (MongoDB, Firebase)** – $500: Setup and integration of cloud-based, scalable databases to store user data and analytics.
- **AI & Computer Vision Integration** – $2,000: Implementing real-time motion tracking and form correction using TensorFlow, MediaPipe, and OpenCV, essential to FlexAI's USP.

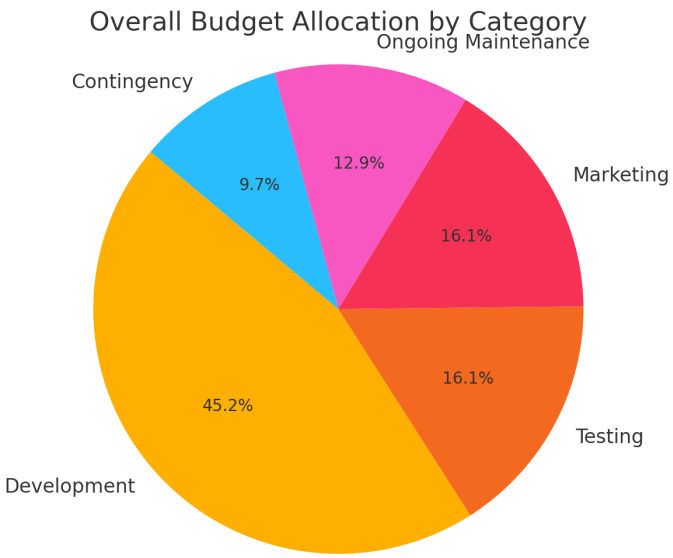

Figure 1: Overall Budget Allocation by Category

This pie chart illustrates how the total budget of $15,500 CAD is distributed across five main categories:

- **Development (45.2%):** Takes the largest share, reflecting the complexity and technical depth of implementing AI-driven features.
- **Testing (16.1%) and Marketing (16.1%):** Are equally important for delivering a reliable product and ensuring user adoption.
- **Ongoing Maintenance (12.9%):** Supports platform stability post-launch.
- **Contingency (9.7%):** Allows flexibility for risks or unforeseen needs.

This visualization emphasizes the priority given to technical delivery and product readiness.

2.2 Testing – $2,500 CAD (16.1%)

Testing ensures the application functions reliably across platforms, minimizes bugs, and delivers user satisfaction.

- **Manual Testing** – $1,000: Hands-on testing by QA team for UI flow and edge cases.
- **Automated Testing Tools** – $500: Setup of scripts and test cases using frameworks like Jest, Mocha.
- **Usability and Beta Testing** – $1,000: Collecting feedback from initial users to improve experience and performance.

2.3 Marketing – $2,500 CAD (16.1%)

Marketing is crucial for user acquisition, especially for consumer-facing platforms. This portion supports outreach and visibility during launch.

- **Social Media Campaigns** – $1,000: Paid advertising and influencer engagement.
- **App Store Optimization** – $500: Ensuring visibility on Google Play and Apple App Store.
- **Promotional Content** – $500: Videos, banners, and interactive demos to explain app features.
- **Partnerships** – $500: Sponsorships and wellness program integrations.

2.4 Ongoing Maintenance – $2,000 CAD (12.9%)

Maintenance is required post-launch to ensure system stability and user satisfaction.

- **Server Costs** – $800: Monthly AWS/Google Cloud hosting and data storage.
- **Bug Fixes and Feature Updates** – $800: Ongoing development to refine features and address technical debt.
- **Customer Support** – $400: Support tickets, help desk software, and user assistance.

2.5 Contingency – $1,500 CAD (9.7%)

A safety net for unplanned costs based on risk assessment and industry norms (approx. 10% of total budget).

3 Resource Costing

Resource estimation includes labor (human resources), technology stack, and third-party services.

3.1 Human Resources

A development team is essential for technical execution. Rates reflect entry to mid-level contract/freelance roles within Canadian academic and startup settings.

- **Frontend Developer:** \$30/hour × 80 hours = \$2,400
- **Backend Developer:** \$30/hour × 60 hours = \$1,800
- **AI Engineer:** \$40/hour × 50 hours = \$2,000 (AI features are complex and need experienced handling)
- **UI/UX Designer:** \$25/hour × 40 hours = \$1,000 (Prototypes via Figma, user flows)
- **QA Tester:** \$20/hour × 40 hours = \$800 (Manual testing and reporting)

Total Human Resource Cost: \$8,000 CAD

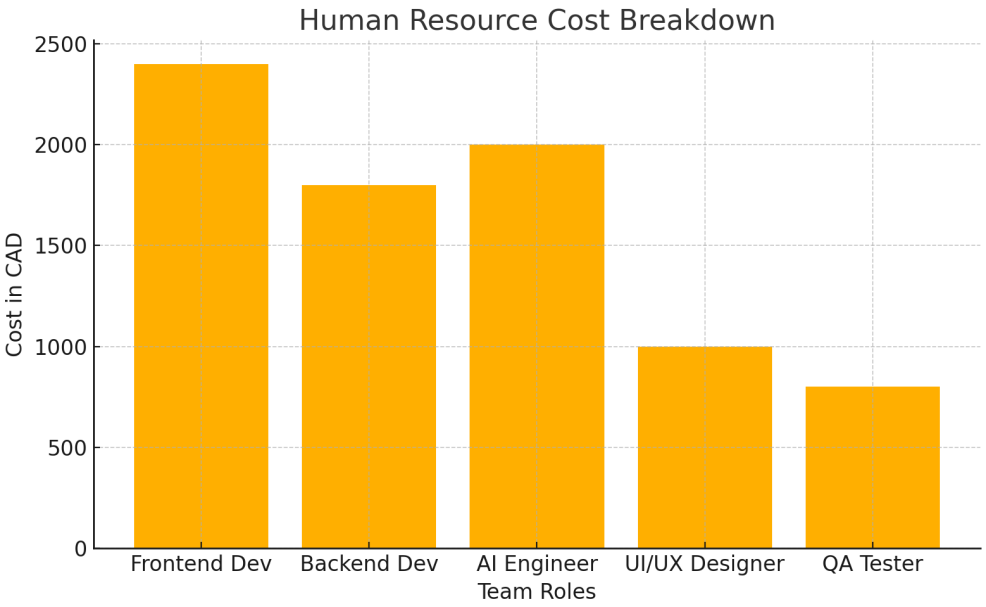

Figure 2: Human Resource Cost Breakdown

This bar chart shows the estimated costs for each role contributing to FlexAI:

- **Frontend Developer** (\$2,400) has the highest cost due to the demand for responsive, cross-platform interfaces.
- **AI Engineer** (\$2,000) comes next, highlighting the investment in motion tracking and posture correction capabilities.
- Other critical roles like **Backend Developer**, **UI/UX Designer**, and **QA Tester** are proportionally budgeted based on expected work hours and impact.

This graph justifies the human resource investment by reflecting the balance of technical, design, and quality assurance efforts required.

3.2 Technology Costs

These are minimized due to reliance on open-source software and educational programs.

- **Cloud Infrastructure (AWS, Firebase):** $300 (based on free-tier credits and minimal scaling needs)
- **Testing Tools:** $200 (basic licenses or academic access)
- **AI Libraries:** Free (TensorFlow, OpenCV, MediaPipe)

3.3 External Services

Certain services require outsourcing.

- **Graphics & Promotional Videos:** $500 (for marketing and app previews)
- **Legal Consultation:** $200 (Terms of Use, Privacy Policy)

Total Technology + Services Cost: $1,200 CAD

3.4 Total Resource Cost Estimate

Total Estimated Cost: $9,200 CAD

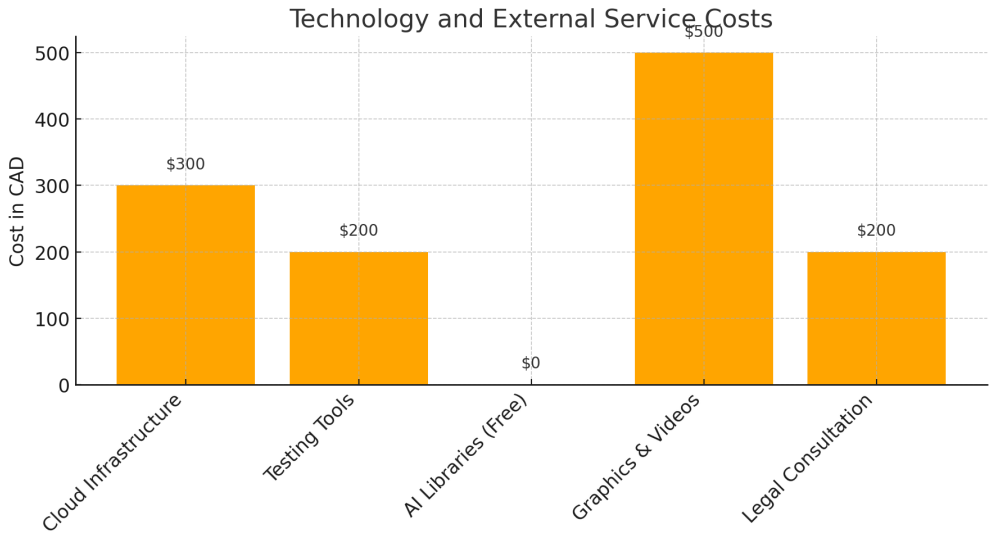

Figure 3: Human Resource Cost Breakdown

This bar chart presents the distribution of costs across technology infrastructure and outsourced services:

- **Graphics & Videos** ($500): This is the highest among these, essential for creating promotional content and app previews.
- **Cloud Infrastructure** ($300): Supports data storage and hosting, using cost-efficient educational credits.
- **Testing Tools** ($200): Needed for automation and quality assurance.
- **Legal Consultation** ($200): Ensures compliance with data privacy laws.
- **AI Libraries** ($0): Free and open-source (e.g., TensorFlow, MediaPipe), saving significant costs.

This visualization showcases how FlexAI smartly balances external expenses while leveraging free technologies.

4 Contingency Budget

Allocation: $1,500 CAD (9.7% of total budget)

Rationale:
The software development lifecycle is prone to unpredictable changes—scope creep, technology shifts, and compliance issues. Based on academic software project standards, a 10% contingency is justified.

Potential Risk Scenarios Covered:

- **Technical Risks:** Unforeseen issues in AI tracking or real-time processing may require additional tools or paid APIs.
- **Compliance:** If data privacy regulations evolve, legal and technical modifications may be necessary.
- **Performance Bottlenecks:** May require server upgrades, especially if traffic exceeds expectations.
- **Human Resource Gaps:** Delays or reallocation of team members may necessitate freelance hires.

The contingency buffer ensures the team can adapt without derailing the timeline or compromising on deliverables.

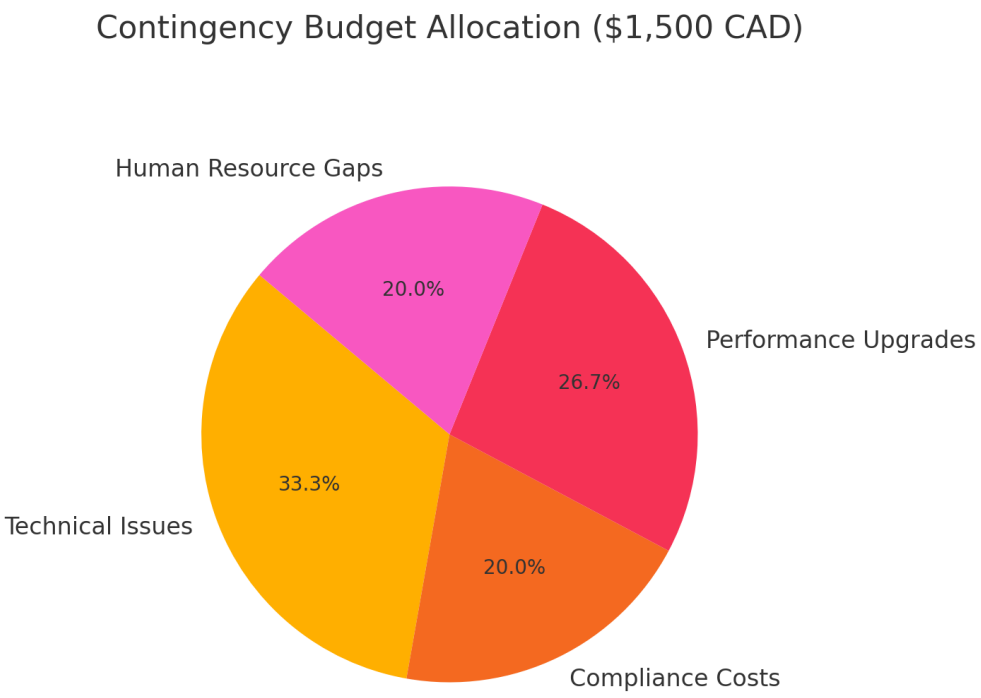

Figure 4: Contingency Budget Allocation

This pie chart breaks down how the $1,500 CAD contingency budget is reserved for handling project uncertainties:

- **Technical Issues (33.3%):** Highest allocation, anticipating challenges in AI motion tracking or system bugs.
- **Performance Upgrades (26.7%):** Server scaling or optimization costs.
- **Compliance Costs (20%):** Potential legal or regulatory adjustments.
- **Human Resource Gaps (20%):** Freelance support or extended team time due to delays.

This visual proves that the contingency fund isn't arbitrary—it's strategically planned across the most likely risk areas.

5 Conclusion

The FlexAI budget is realistic and well-justified. Prioritization of development and testing reflects the technical complexity and innovative AI backbone of the product. Resource allocations are grounded in real-world cost benchmarks and student-accessible tools. With a clear financial plan and a contingency safety net, the project is positioned for success—both within the academic scope and in future commercial scaling.

6 References

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