



SOEN6841: Software Project Management

Winter 2025

FEASIBILITY STUDY

FOR

AI-DRIVEN HEALTH MONITORING APP

Date of Submission: March 23, 2025

Submitted to:

JOUMANA DARGHAM

Team Information

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3. Feasibility Study

Objective:

The feasibility study aims to assess the practicality of developing and implementing the AI-Driven Health Monitoring App by evaluating its technological, operational, and economic aspects. This study ensures that the proposed solution is viable, scalable, and capable of meeting user needs while adhering to industry standards and regulations. Key objectives include:

- Assessing the suitability of the technology stack, including AI models, cloud infrastructure, and wearable device integration.
- Analyzing the feasibility of implementation, considering resource availability, integration complexity, and potential risks.
- Evaluating the operational impact on users, healthcare providers, and regulatory bodies while identifying potential challenges and benefits.
- Estimating development costs, revenue potential, and ROI to determine the financial sustainability of the project.
- Ensuring compliance with HIPAA, GDPR, and security protocols to protect user data and maintain regulatory adherence.

Technical Feasibility

Evaluation of the Technology Requirements for the Software Solution

The AI-Driven Health Monitoring App requires a sophisticated technology stack that integrates real-time health monitoring, AI-driven analytics, and secure data processing. The following technologies will be used:

- **Mobile Application Development:** React Native for cross-platform (iOS & Android) compatibility.
- **Backend Infrastructure:** Node.js for scalable backend services.
- **Database Management:** PostgreSQL for structured health data and Firebase for real-time syncing.
- **AI & Machine Learning Models:**
 - Random Forest for exercise recognition.

- Support Vector Machines (SVM) for heart disease detection.
- Convolutional Neural Networks (CNN) for fatigue and stress detection.
- **Cloud Services & APIs:** Google Cloud, AWS Lambda for serverless execution, and RESTful APIs for integration with wearable devices.
- **Predictive Analytics Module:** Uses AI-driven insights to detect potential health risks based on user data trends and past records.
- **Emergency Alert Integration:** Automated alert system that notifies emergency contacts and healthcare providers in case of critical health anomalies.
- **Security Measures:** End-to-end encryption, compliance with HIPAA and GDPR regulations.
- **Wearable Device Integration:** Google Pixel Watch, Apple Watch, Fitbit SDKs.

This technology stack ensures high performance, scalability, and security while facilitating seamless data processing and AI-powered insights.

Assessment of the Feasibility of Implementing the Required Technology

Implementing the required technologies is feasible due to:

- **Availability of Open-Source Libraries:** TensorFlow and PyTorch support AI model development.
- **Cloud Infrastructure Readiness:** AWS and Google Cloud offer scalable, cost-effective storage and processing power.
- **Third-Party API Support:** Most wearable devices provide SDKs, simplifying integration.
- **Potential Technical Risks & Mitigation Strategies:**
 - **Risk:** AI model accuracy may degrade over time.
 - **Mitigation:** Regular model retraining using updated datasets.
 - **Risk:** Real-time processing delays due to large datasets.
 - **Mitigation:** Optimized database indexing and caching techniques.

Operational Feasibility

Analysis of the Operational Impact of the Proposed Solution on Existing Processes

- **For Users:** Easy-to-use mobile app for real-time health tracking.
- **For Healthcare Providers:** Integration with patient management systems to enhance preventive care.
- **For Regulatory Bodies:** Compliance with GDPR and HIPAA ensures privacy protection.
- **For Developers:** Scalable infrastructure allows for continuous improvements.

Identification of Potential Challenges and Benefits in the Operational Context

Challenges:

- **User Adoption Resistance:** Solution – Educational campaigns and intuitive UI/UX design.
- **Integration with Existing Medical Systems:** Solution – API standardization for interoperability.
- **Ensuring AI Reliability:** Solution – Continuous validation and improvements.

Benefits:

- **Early Disease Detection:** Reducing hospital visits.
- **User Engagement:** Gamification and AI-driven insights improve long-term adoption.
- **Reduced Healthcare Costs:** Preventative health measures lower long-term medical expenses.

Economic Feasibility

Estimation of the Economic Viability of the Project

Cost Category	Estimated Cost
Development	\$100,000
AI Model Training	\$40,000
Cloud & Infrastructure	\$30,000
Security & Compliance	\$20,000
Marketing & User Acquisition	\$25,000
Maintenance & Support	\$15,000/year
Total Estimated cost (first year)	\$230,000

Consideration of Resource Availability, ROI, and Cost-Benefit Analysis

- **ROI Projection:**
 - **Revenue sources:** One-time app purchase (\$30) + premium AI insights (\$5/month).
 - **Expected user base:** 100,000 users in Year 1.
 - **Potential revenue:** \$3 million.
 - **Payback period:** ~9 months.

Conclusion

The feasibility study demonstrates that the AI-Driven Health Monitoring App is a practical and sustainable solution, integrating advanced AI-driven analytics, cloud infrastructure, and wearable device compatibility. The technical assessment confirms that the chosen technology stack including React Native for mobile development, Node.js for backend services, and AI models for predictive health insights is well-suited for scalability, security, and efficient real-time health monitoring. Potential technical risks, such as AI model accuracy degradation and real-time processing delays, can be mitigated through regular model updates and optimized data handling techniques.

From an operational perspective, the app is designed to provide a seamless experience for users, healthcare providers, and regulatory bodies. Its real-time health tracking, emergency alert system, and compliance with HIPAA and GDPR ensure a secure and reliable solution. While challenges such as user adoption resistance and integration with existing healthcare systems exist, strategies like educational campaigns and standardized APIs can enhance usability and interoperability. Additionally, features like gamification and AI-driven insights can improve long-term user engagement and proactive health management.

Financially, the project is economically viable, with an initial investment of \$230,000 and projected revenue of \$3 million in the first year. The estimated payback period of approximately nine months highlights the strong return on investment, making the solution both cost-effective and financially sustainable. Overall, this study confirms that the AI-Driven Health Monitoring App has significant potential to enhance preventive healthcare, reduce medical costs, and improve accessibility, making it a valuable addition to the digital health industry.



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SOLUTION PROPOSAL

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4. Solution Proposal

Objective

The increasing prevalence of chronic illnesses, mental health challenges, and lifestyle-related conditions has highlighted a critical gap in traditional healthcare systems—real-time, personalized, and continuous health monitoring. Existing wearable devices often provide fragmented data with limited interpretation, while users are left without meaningful insights or timely interventions.

The **AI-Driven Health Monitoring App** addresses this challenge by leveraging artificial intelligence to analyze health data collected from wearable devices, offering users a personalized, intelligent, and proactive healthcare experience. The app monitors both physical indicators (e.g., heart rate, body temperature, blood oxygen levels) and behavioral signals (e.g., stress, fatigue) to provide holistic health assessments.

The goal is to empower users to take control of their health by:

- Delivering **AI-generated recommendations** based on real-time and historical data.
- Providing **early warnings and alerts** for potential health risks.
- Supporting **mental and emotional wellness** through voice and facial recognition analytics.
- Ensuring **secure, scalable integration** with wearable technologies and cloud services.

The aim is to create a reliable mobile solution that meets the needs of diverse user groups—from elderly individuals requiring regular monitoring to fitness enthusiasts seeking performance optimization. By combining technological innovation with user-centric design, the app facilitates a shift from reactive treatment to **proactive, preventive healthcare**, ultimately enhancing quality of life and supporting healthier communities.

Solution Overview

The AI-Driven Health Monitoring App is designed as a comprehensive mobile solution that integrates seamlessly with wearable devices to offer users real-time, personalized health insights. It serves as a proactive healthcare companion, allowing individuals to monitor their physiological and behavioral health indicators anytime, anywhere. By leveraging advanced artificial intelligence and machine learning, the app enables users to make informed health decisions, while providing healthcare professionals and caregivers with valuable, actionable data.

This solution sits at the intersection of health, technology, and user empowerment. It combines state-of-the-art AI capabilities with user-centric mobile design to facilitate a continuous health tracking experience. The app supports early detection of health risks and offers individualized health guidance tailored to users' unique needs, health conditions, and daily routines.

To achieve its objectives, the solution employs the following core components:

1. Technical Specifications:

The AI-Driven Health Monitoring App is architected using scalable and modular technologies that support high-frequency data ingestion, secure storage, and AI-driven health analysis. It is built to ensure compatibility with a wide range of wearable devices and is adaptable for future enhancements.

Machine Learning Models:

- **Random Forest Classifier:** Used for detecting physical activity types (e.g., walking, running, sedentary behavior), enabling contextual health suggestions.
- **Support Vector Machines (SVM):** Applied for cardiovascular risk detection by analyzing heart rate variability, oxygen saturation, and other biometric indicators.
- **Convolutional Neural Networks (CNNs):** Used for emotion detection from facial expressions and stress analysis from speech signals.

Behavioral and Emotional Analysis:

- **Facial Recognition and Speech Processing:** Captures subtle cues related to mood, fatigue, and stress, using CNN and LSTM-based models for sequential data interpretation.
- **Fatigue Monitoring:** Combines motion tracking and facial feature analysis to evaluate physical exhaustion and recommend rest periods.

Real-Time Data Processing:

- **Wearable Integration:** The app communicates directly with devices like the Google Pixel Watch and other fitness wearables through secure APIs to retrieve live health metrics.
- **Stream Processing:** Health data streams are processed in real-time using Node.js backend services to generate instant alerts and insights.

Health Recommendation Engine:

- **Personalized Feedback:** Based on the AI analysis, users receive dynamic recommendations related to sleep, hydration, physical activity, and stress management.
- **Predictive Alerts:** The system warns users of potential health anomalies (e.g., abnormal heart rates) and prompts them to take preventive action.

Cloud-Based Data Management:

- All user data is encrypted and stored securely on a compliant cloud infrastructure, supporting multi-device access and long-term data tracking.

User Interface (UI/UX):

- Developed using **React Native**, the app provides an intuitive and accessible interface with easy navigation across health dashboards, alerts, and wellness tips.

2. Security Measures:

Given the sensitivity of health data, the system implements robust security and privacy protocols to ensure user trust and regulatory compliance.

- **Data Encryption:** All health data is encrypted both at rest and in transit using industry-standard protocols.
- **Authentication & Authorization:** Role-based access ensures that only authorized users (e.g., the individual or designated caregiver) can view or share health data.
- **Compliance with Regulations:** Full compliance with global health data privacy standards such as **HIPAA** and **GDPR** is ensured.
- **Regular Security Audits:** Monthly audits and penetration tests will be conducted to identify vulnerabilities and maintain a secure app environment.

Key Features and Functionalities

The following key features distinguish the AI-Driven Health Monitoring App from existing health and wellness applications.

	Description	Feature	Functionality
Personalized Health Insights	Provides users with real-time, customized health suggestions based on their physical and emotional metrics collected via wearables. AI algorithms process this data to deliver daily personalized guidance.	AI-Driven Recommendation Engine	Utilizes machine learning algorithms to analyze user data and generate personalized recommendations for lifestyle, nutrition, sleep, and stress management.

Early Risk Detection	Identifies early signs of cardiovascular disease using machine learning to prevent emergencies. Ensures timely interventions through automated alerts.	Cardiovascular Risk Analyzer	SVM-based models assess heart rate, oxygen levels, and other biomarkers to predict heart disease risk and notify users in real-time.
Emotional and Mental Health Monitoring	Enhances emotional awareness by analyzing facial expressions and voice tone to detect stress, fatigue, and mood fluctuations, especially valuable for mental health support.	Mood and Stress Detection	Uses CNN and voice/facial analysis to detect user emotions and stress levels, enabling timely emotional well-being support.
Real-Time Health Feedback	Monitors live health data to trigger instant alerts during anomalies. Protects vulnerable users (like the elderly or those with chronic illnesses) through rapid emergency notifications.	Instant Alert System	Monitors health data continuously to send emergency alerts to users and designated caregivers if abnormal readings are detected.
Seamless Device Connectivity	Facilitates continuous and accurate health tracking by connecting to multiple smartwatches and fitness devices. Ensures smooth and secure data flow between devices and the app.	Wearable Integration Suite	Integrates with smartwatches (e.g., Google Pixel Watch) via secure APIs to collect and synchronize real-time health metrics.

Visual Health Dashboards	Simplifies health monitoring by visualizing metrics like heart rate, oxygen levels, and sleep scores through clean, intuitive dashboards.	User-Friendly Health Interface	Displays vital signs, trends, and recommendations through intuitive dashboards and interactive visualizations for easy understanding.
Proactive Health Coaching	Keeps users engaged in their health journey by offering interactive coaching tips, daily goals, and motivation nudges tailored to their habits and performance.	AI Health Companion	Delivers interactive health guidance and habit-building strategies using AI chat-style interfaces, encouraging sustained engagement.
Sleep and Recovery Analytics	Tracks and analyzes sleep cycles, disturbances, and recovery patterns to help users improve rest and avoid sleep-related health issues.	Sleep Quality Monitor	Tracks sleep stages, movement, and vitals to generate personalized reports and tips for improving rest and recovery.
Lifestyle Optimization	Offers users tools to record meals, hydration, and calorie intake. Uses this information to suggest nutritional improvements based on physical activity and health targets.	Nutrition and Hydration Tracker	Records daily food and water intake, offering personalized dietary suggestions based on physical activity and health goals.
Safety for At-Risk Users	Ensures safety by alerting a user's emergency contact or medical team in case of significant health deterioration, especially for users in high-risk groups.	Emergency Response Feature	Automatically contacts emergency services or caregivers when detecting critical health events such as abnormal heart rate or stress overload.

Multi-Device Support	Allows seamless health tracking across mobile platforms, ensuring users can access insights and updates regardless of device.	Cross-Platform Compatibility	Enables access across mobile devices (Android/iOS) and ensures continuous health tracking regardless of user location.
Secure Health Records	Ensures data protection and compliance with healthcare laws. Protects sensitive information from unauthorized access.	Encrypted Cloud Storage	Stores health data securely with end-to-end encryption and compliance with HIPAA and GDPR regulations.
Accessibility for Diverse Users	Makes the app usable for all users, including those with low tech skills or disabilities, by offering multiple modes of interaction like voice, text, and simplified UI.	Adaptive UX Interface	Designed for users of varying tech literacy levels, including seniors, with features like voice commands and large-format options.
Behavioral Trend Analysis	Identifies patterns over time from accumulated health data to predict emerging issues and help users take proactive actions.	Predictive Analytics Module	Evaluates patterns in physical and emotional health data over time to forecast potential health issues and encourage early action.
Wellness Engagement Tools	Encourages consistency and user engagement through gamified elements like daily streaks, health goals, rewards, and visual progress tracking.	Gamified Wellness Framework	Encourages user engagement through points, achievements, and progress milestones tied to health goals and daily activity.

Benefits and Impact

The AI-Driven Health Monitoring App brings transformative benefits to users, caregivers, healthcare providers, and the broader health ecosystem. By offering intelligent, real-time, and accessible health support, the app enhances individual well-being while contributing to a proactive healthcare model.

Improved Health Outcomes

The app enables users to detect early signs of health deterioration by continuously monitoring vital signs and emotional states. Timely recommendations and alerts help users take preventive measures, reducing the risk of chronic illnesses and emergency situations.

Personalized and Engaging User Experience

Each user receives customized insights based on their unique health profile, daily activity, sleep quality, and stress levels. This personalization makes the health journey more engaging, encouraging consistent use and better lifestyle choices through gamified progress tracking and health milestones.

Empowered Caregivers and Healthcare Providers

Caregivers and medical professionals gain access to accurate, AI-analyzed health data that supports faster diagnosis, better patient understanding, and improved care coordination. The emergency alert system also ensures that help is provided at the right time, especially for elderly or high-risk individuals.

Cost-Effective Health Management

By promoting proactive health practices and reducing unnecessary clinical visits, the app lowers long-term healthcare costs for users, insurance companies, and healthcare systems. Users can manage mild symptoms and monitor chronic conditions without frequent doctor appointments.

Inclusive and Accessible Health Monitoring

The app is designed for a wide range of users, including tech-savvy young adults, seniors with chronic conditions, and underserved populations in remote areas. Its accessible interface, voice

features, and cross-platform compatibility ensure inclusivity regardless of user background or ability.

Scalable and Future-Ready Solution

With its modular architecture and integration capabilities, the app can easily scale to support additional wearable devices, new health metrics, and evolving AI models. It is adaptable to future regulatory requirements and technological advancements, making it a sustainable long-term solution in digital healthcare.

Conclusion

The AI-Driven Health Monitoring App aims to revolutionize personal healthcare by combining wearable technology with advanced artificial intelligence. This innovative solution responds to the growing need for personalized, preventive, and accessible health monitoring by offering real-time insights into both physical and mental well-being.

By leveraging machine learning algorithms such as Random Forest, SVM, and CNN, the app provides a holistic approach to health management—detecting early signs of risk, supporting emotional health, and offering actionable recommendations. Seamless integration with smartwatches, an intuitive user interface, and robust privacy protocols make this solution both effective and user-friendly.

The proposed application outlines a clear vision from concept to execution, ensuring real-world relevance, scalability, and long-term sustainability. Strong data protection measures aligned with HIPAA and GDPR further reinforce trust and ethical AI use.

With the support of healthcare providers, caregivers, and forward-thinking users, this app has the potential to improve health outcomes, reduce system strain, and empower individuals to lead healthier, more informed lives in a data-driven world.



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PROJECT PLAN

FOR

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5. Project Plan (WBS)

Objective

A well-defined Project Plan is essential for ensuring the successful execution of the AI-Driven Health Monitoring App. This plan outlines the key phases, milestones, and deliverables necessary to guide the project from initiation to completion. By structuring the development lifecycle into well-defined stages, we ensure smooth execution, timely delivery, and optimal resource utilization. Each phase addresses critical aspects such as requirement gathering, system design, development, testing, deployment, and post-launch knowledge transfer. The project plan also highlights dependencies, risk mitigation strategies, and resource allocation to maximize efficiency and effectiveness.

Key Objectives:

- **Establish Clear Milestones** – Define each project phase with clear deliverables and expected outcomes.
- **Optimize Resource Utilization** – Allocate human and technological resources effectively to avoid bottlenecks.
- **Ensure Timely Delivery** – Set realistic timelines and dependencies to maintain progress and avoid delays.
- **Mitigate Risks** – Identify potential challenges and implement proactive risk management strategies.
- **Facilitate Seamless Transition** – Ensure comprehensive documentation and knowledge transfer for long-term sustainability.

Project Timeline (Gantt Chart)

AI-DRIVEN HEALTH MONITORING APP																		
Description	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16	Week 17	Week 18
Scope and Objective Setup																		
Problem Identification																		
Market Analysis																		
Sprint 1																		
Requirement Analysis																		
Feasibility Analysis																		
Architecture Design																		
Development																		
Testing and UAT																		
Deployment and Integration																		
Sprint 2																		
Requirement Gathering																		
Feasibility Analysis																		
Architecture Design																		
Development																		
Testing and UAT																		
Deployment and Integration																		
Documentation and Training																		

Milestones and Deliverables

Phase	Duration	Milestone	Deliverables
Project Initiation	Week 1-3	Problem Identification, Market Analysis	Project Scope, Project charter, Stakeholder Analysis
Requirement Gathering And Feasibility Analysis	Week 4 -6	Requirement Finalization, Feasibility Report	Detailed Project Plan, Budget Plan, Communication Strategy
System Design & Development	Week 7 -12	System Architecture Model Development	System Design Document, Prototype of core features
Testing and UAT	Week 13 - 15	System Testing, UAT Completion	Test report, UAT Feedback
Deployment and Integration	Week 16 -17	System Development and Final Testing	Deployment Report, Final Testing report
Project Closure and Knowledge Transfer	Week 18	Documentation completion & Knowledge handover	Lessons Learned Document, Knowledge Transfer Report

Major Milestone Explanations

- **Project Initiation:** This phase involves defining the project's scope, securing stakeholder buy-in, and obtaining approval for the Project Charter. It includes identifying key deliverables, risks, and dependencies to ensure project success from the outset.
- **Requirement Gathering & Feasibility:** In this phase, all technical, financial, and operational constraints are identified and assessed. This ensures that the project is viable, aligns with business needs, and is achievable within the given resources and time constraints.
- **System Design & Development:** This phase includes designing the system architecture, developing AI models, and creating UI/UX components. The software engineering team implements core functionalities while ensuring scalability, security, and seamless integration with third-party systems.
- **Testing & UAT:** Rigorous testing is conducted to verify system functionality, identify bugs, and ensure performance meets specifications. User Acceptance Testing (UAT) is performed to gather feedback and validate that the system meets end-user expectations.
- **Deployment & Integration:** The application is launched and fully integrated with relevant platforms and third-party systems. This phase includes performance optimization, system monitoring, and final security checks to ensure smooth operation.
- **Project Closure:** The project is formally completed with final documentation, knowledge transfer to support teams, and a review of lessons learned. This phase ensures the long-term sustainability and maintainability of the solution.

Resource Allocation

Human Resources and Cost Estimation:

Role	Number of People	Cost per Person	Total Cost
Backend Developers	2	\$9,000	\$18,000

Frontend Developers	2	\$8,000	\$16,000
AI Engineers	2	\$10,000	\$20,000
Data Scientists	1	\$10,000	\$10,000
ML Engineers	1	\$11,000	\$11,000
QA Engineers	2	\$5,000	\$10,000
Project Manager	1	\$15,000	\$15,000
Total Human Resource Cost	-	-	\$100,000

Technology Allocation by Project Phase:

Phase	Technology Used
Project Initiation	No specified tools
Requirement Gathering & Feasibility Analysis	IDEs, Version Control System for documentation and early prototyping
Software Design & Development	IDEs, Version Control, Cloud Services, AI Libraries / Frameworks, User Interface Design Tools, Data Processing
Testing & UAT	IDEs, Version Control System
Deployment & Integration	Server and Hosting, LMS Integration, Security and Compliance
Project Closure	No specified tools

This allocation ensures an efficient and cost-effective use of resources while addressing technical, operational, and economic feasibility challenges.

Identification of Critical Dependencies

- **Phase 1: Approval of Project Scope and Stakeholder Buy-In**
 - Stakeholder alignment is essential to ensure that all parties agree on project objectives and deliverables.
 - Budget approvals and resource allocation must be finalized before moving forward.
- **Phase 2: Finalization of Requirements Before Development Starts**
 - Comprehensive requirement gathering ensures the feasibility of technical and operational aspects.
 - Clear documentation prevents scope creep and minimizes risks during implementation.
- **Phase 3: AI Model Completion Before Testing Phase**
 - AI models must be trained and validated before integration with the application.
 - Performance benchmarks and accuracy thresholds should be met before proceeding.
- **Phase 4: Successful UAT Before Deployment**
 - User feedback from testing must confirm that all system functionalities work as expected.
 - Security and compliance checks must be passed before the system is deemed production-ready.
- **Phase 5: Full Integration Before Go-Live**
 - Seamless integration with cloud services, wearable devices, and databases must be verified.
 - Load testing and scalability assessments should be completed to handle real-world usage.
- **Phase 6: Documentation Completion Before Project Closure**
 - Final project documentation should include system architecture, user guides, and maintenance plans.
 - Knowledge transfer sessions must be conducted to ensure smooth transition to support teams.

Conclusion

The project plan for the AI-Driven Health Monitoring App provides a structured framework to ensure the successful execution of the project from initiation to completion. By clearly defining milestones, deliverables, and resource allocation, this plan facilitates a streamlined development lifecycle, minimizing risks and maximizing efficiency. The inclusion of a well-defined Work Breakdown Structure (WBS) ensures that each phase from requirement gathering to system deployment is completed in a systematic and organized manner. Additionally, the identification of critical dependencies helps mitigate potential roadblocks, ensuring smooth project execution.

Resource allocation has been carefully planned, with a balanced distribution of human and technological resources to optimize productivity while maintaining cost-effectiveness. The budget estimates, along with projected technology usage at each phase, enable efficient financial planning. The integration of AI models, cloud infrastructure, and wearable device compatibility is strategically aligned with project timelines to ensure seamless implementation and deployment. Furthermore, the inclusion of rigorous testing and user acceptance phases helps guarantee that the final product meets quality standards and user expectations.

Overall, the project plan serves as a roadmap for delivering a scalable, secure, and efficient AI-Driven Health Monitoring App. By incorporating risk mitigation strategies, structured resource management, and phase-wise deliverables, the plan ensures timely delivery while maintaining high-quality standards. With a clear transition strategy in place, including final documentation and knowledge transfer, the project is well-positioned for long-term sustainability and continuous improvement in the digital healthcare space.



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RISK ASSESSMENT AND MITIGATION

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6. Risk Assessment and Mitigation

1. Risk Identification:

Objective:

Detecting potential risks is a crucial part for the successful development and deployment of an AI-Driven Health Monitoring App. The risks are categorized into 3 different types namely Operational, Technical and Economic risks.

Technical Risks:

- **Data Privacy and Security:** Unauthorised access to private health information may violate laws such as HIPAA and result in privacy violations.
- **System Reliability:** Patient safety may be jeopardised if technical malfunctions or errors in health monitoring result in incorrect diagnoses or missed notifications.
- **Algorithm Bias:** Certain people may suffer as a result of inequitable health advice generated by AI models trained on biased data.

Operational Risks:

- **Integration with Healthcare Systems:** Workflows may be disrupted by difficulties integrating the app with current Electronic Health Records (EHR) systems.
- **User Adoption:** The efficacy of the app may be limited by patients' and healthcare professionals' reluctance to trust or utilise AI-driven health technologies.
- **Regulatory Compliance:** Navigating complex healthcare regulations may delay deployment or necessitate major software changes.

Economic Risks:

- **Development Costs:** Unexpected technical difficulties could cause development costs to exceed the allocated budgeted amount.
- **Return on Investment (ROI):** Financial sustainability may be impacted if user adoption rates are overestimated and the ROI is lower than anticipated.
- **Market Competition:** The profitability of the app may be impacted if new competitors with similar features take market share.

2. Risk Impact Analysis:

Prioritising mitigation activities is aided by evaluating the possible impact of risks that have been identified.

Technical Risks:

- **Data security and privacy:** Significant impact due to possible legal fines and eroded user confidence.
- **System Reliability:** High effect since patient health outcomes might be directly impacted by unreliable systems.
- **Algorithmic bias:** Moderate to high impact, since patients may suffer and reputational harm may result from biased suggestions.

Operational Risks:

- **Integration with Healthcare Systems:** High impact since ineffective integration can disrupt clinical workflows and reduce efficiency.
- **User Adoption:** Moderate impact, The app's efficiency and reach may be limited by low adoption rates.
- **Regulatory Compliance:** High impact because of possible legal issues and delays in operations.

Economic Risks:

- **Market Competition:** Moderate impact; competition can affect revenue and market positioning.
- **Return on Investment (ROI):** High impact if the app doesn't meet estimated financial goals.
- **Development Costs:** Moderate impact; Financial resources may be strained by budget overruns.

3. Risk Assessment Table:

Risk Category	Specific Risk	Impact Level	Likelihood of Occurrence
Technical	System Reliability and Performance Issues	High	Medium
Technical	Data Privacy and Security Breaches	High	Medium
Technical	Algorithmic Bias in Health Recommendations	High	Medium
Operational	Compliance with Evolving Healthcare Regulations	High	Medium
Operational	Integration Challenges with Healthcare Systems	High	Medium
Operational	Low User Adoption by Patients and Providers	Medium	High
Economic	Uncertain Return on Investment	High	Medium
Economic	Escalating Development and Maintenance Costs	High	Medium
Economic	Competitive Market Dynamics	Medium	Medium

Impact vs. Likelihood of Occurrence: Qualitative Assessment Table

Impact Level	Likelihood of Occurrence	Risk Exposure Points
High	High	9
High	Medium	6

High	Low	3
Medium	High	6
Medium	Medium	4
Medium	Low	2
Low	High	3
Low	Medium	2
Low	Low	1

Quantitative Model:

Total Risk Exposure Points = 6 (System Reliability Issues) + 6 (Data Privacy and Security Breaches) + 6 (Algorithmic Bias) + 6 (Regulatory Compliance) + 6 (Integration Challenges) + 6 (Low User Adoption) + 6 (Uncertain ROI) + 6 (Development Costs) + 4 (Market Competition) + = 52

Dollar Allocation for Each Risk Based on Contingency Fund:

Assuming a total contingency fund of \$15,600, the dollar allocation for each risk is calculated as below,

Dollar Value for Risk = (Risk Exposure Points for Risk / Total Risk Exposure Points) × Total Contingency Fund

Specific Risk	Risk Exposure Points	Dollar Allocation
System Reliability and Performance Issues	6	\$1,800
Data Privacy and Security Breaches	6	\$1,800

Algorithmic Bias in Health Recommendations	6	\$1,800
Compliance with Evolving Healthcare Regulations	6	\$1,800
Integration Challenges with Healthcare Systems	6	\$1,800
Low User Adoption by Patients and Providers	6	\$1,800
Uncertain Return on Investment	6	\$1,800
Escalating Development and Maintenance Costs	4	\$1,200
Competitive Market Dynamics	6	\$1,800

Note: Dollar Allocations are rounded off to the nearest hundred.

4. Risk Mitigation Strategies:

Implementing proper measures can lessen the impact and probability of identified risks.

Technical Risks:

- **System Reliability:** Establish continuous monitoring & quality assurance protocols which will help in maintaining integrity of the system.
- **Data Privacy and Security:** Implement encryption, access limitations, and frequent security audits to protect user data.
- **Algorithmic Bias:** To ensure an equitable AI performance, use a variety of training datasets and carry out bias checks.

Operational Risks:

- **Regulatory Compliance:** Keep up with changes in regulations and ensure that compliance checks are implemented at each and every stage of development.

- **Integration with Healthcare Systems:** Work together with the IT departments of healthcare facilities to ensure seamless integration & compatibility.
- **User Adoption:** Build trust and encourage adoption by educating and training stakeholders.

Economic Risks:

- **Development Costs:** Use agile project management to find problems early and fix them while keeping costs under control.
- **Return on Investment (ROI):** Conduct market research to establish realistic adoption targets and budget predictions.
- **Market Competition:** Make the software unique from other competitors by having exceptional user experience and different features.

5. Contingency Plans

Preparing for potential risk events guarantees prompt and efficient responses.

Technical Risks:

- **AI Model Failure:** To ensure uninterrupted operation, maintain backup algorithms and manual override options up to date.
- **Data Breach:** Create an incident response strategy to quickly handle and report breaches.

Operational Risks:

- **Integration Failures:** To reduce interruptions, include stand-alone features or other integration techniques.
- **Low User Adoption:** To increase engagement, create user feedback loops and customised marketing efforts.

Economic Risks:

- **Budget Overruns:** Prioritise features and set aside money for unforeseen expenses.

Conclusion:

In Conclusion, The Risk Assessment and Mitigation Plan for the AI-Driven Health Monitoring App systematically detects and addresses different types of risk namely Technical, Operational, and Economic risks. Potential problems such data privacy violations, difficulties with AI accuracy, user reluctance to adoption, and regulatory compliance issues were detected in risk identification.

The Risk Impact Analysis prioritized these risks according to their possible impact and likelihood, ensuring focus on areas prone to high risks data security and AI performance.

Risk Assessment uses a quantitative exposure & qualitative matrix model to each risk, which eases the process of proportional allocation of contingency funds.

Finally, implementing strict Risk Mitigation strategies ensures a successful implementation of the software with less risks.



SOEN6841: Software Project Management

Winter 2025

BUDGETING

FOR

AI-DRIVEN HEALTH MONITORING APP

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Submitted to:

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7. Budgeting

Objective

The budget estimation for the **AI-Driven Health Monitoring App** follows a **bottom-up approach**, ensuring accuracy and transparency in financial planning. This approach involves breaking down the project into individual components, estimating costs at a granular level, and aggregating them to determine the overall budget. This method helps capture all necessary expenses while preventing budget overruns.

Approach to Estimation

1. **Detailed Task Analysis** – Identifying all key tasks, including development, AI model training, cloud services, UI/UX design, security, and compliance.
2. **Resource Identification** – Estimating personnel costs (developers, AI engineers, testers), technology investments (software licenses, cloud hosting), and operational costs (security, maintenance, and compliance).
3. **Market Research** – Conducting research on current industry standards, vendor pricing, and cloud service rates to ensure realistic cost estimations.
4. **Historical Data Analysis** – Reviewing past AI-driven healthcare application projects to benchmark costs and predict financial risks.
5. **Expert Consultation** – Engaging with AI specialists, software developers, and project managers to refine cost projections and identify potential savings.

Detailed Budget Breakdown

Budget Category	Subcategories	Estimated Cost
Development	Frontend, Backend, Database, API Development	\$50,000
AI Model Training	Data Collection, Model Development, Testing	\$30,000
Cloud & Infrastructure	AWS, Google Cloud, Storage, Load Balancing	\$15,000

Security & Compliance	GDPR/HIPAA Compliance, Encryption, Audits	\$10,000
Marketing & Outreach	Advertisements, Social Media, User Acquisition	\$6,000
Maintenance & Support	Server Costs, Bug Fixes, Feature Updates	\$10,000/year
Total Estimated Budget		\$121,000

Human Resource Cost Estimation

The human resource costs cover salaries for essential team members responsible for developing, testing, and maintaining the application. The costs are estimated based on industry standards and reflect competitive wages for experienced professionals in AI, software development, and project management.

Role	Number of People	Cost per Person	Estimated Cost
Backend Developers	2	\$9,000	\$18,000
Frontend Developers	2	\$8,000	\$16,000
AI Engineers	2	\$10,000	\$20,000
Data Scientists	1	\$10,000	\$10,000
ML Engineers	1	\$11,000	\$11,000
QA Engineers	2	\$5,000	\$10,000
Project Manager	1	\$15,000	\$15,000
Total Human Resource Cost	-	-	\$100,000

Technology Costs

Technology costs cover the essential software, hardware, and cloud infrastructure required to develop and maintain the application.

Category	Description	Estimated Cost
Software Development Tools	IDEs, version control	\$4,000
AI Frameworks	TensorFlow, PyTorch, model training libraries	\$5,000
Cloud Hosting	AWS, Google Cloud for app hosting	\$3,000
Data Processing	Large dataset processing, model computation	\$3,000
Total Technology Cost	-	\$15,000

Development and Operational Costs

These costs cover essential aspects of system integration, security measures, and accessibility features.

Category	Description	Estimated Cost
UI/UX Design	Prototyping and design tools	\$2,000
LMS Integration	Integration with learning management systems	\$3,000
Security & Compliance	Data privacy measures, legal audits	\$3,000
User Accessibility Tools	Assistive technology integration	\$2,000
Total Operational Cost	-	\$10,000

Marketing and Stakeholder Engagement

This section includes costs for product promotion, outreach campaigns, and pilot testing to ensure user adoption and stakeholder engagement.

Category	Description	Estimated Cost
Workshops & Presentations	Engagement activities	\$3,000
Pilot Program Implementation	Beta testing with real users	\$3,000
Total Marketing Cost	-	\$6,000

Contingency Budget

The contingency budget accounts for unexpected financial requirements, ensuring the project remains on track despite unforeseen challenges. The contingency rate is set at **10% of the total estimated budget**, based on project complexity, potential technological challenges, and historical cost variations in AI projects.

Risk Factor	Estimated Cost Allocation
AI Model Retraining	\$5,000
Unexpected Compliance Costs	\$3,000
Infrastructure Scaling	\$5,000
Additional Security Enhancements	\$3,000
Total Contingency Budget	\$16,000

Justification of Contingency Budget

- **AI Model Retraining:** Periodic model updates may be necessary to maintain accuracy.
- **Unexpected Compliance Costs:** Regulatory changes may require software adjustments.
- **Infrastructure Scaling:** Increased user adoption may necessitate additional cloud resources.
- **Additional Security Enhancements:** Strengthening data protection measures ensures compliance and user trust.

Cost Management and Tracking

To maintain financial control and accountability, the project will implement a structured cost-tracking system, ensuring that actual expenditures remain within budget.

Periodic Review Cycles

- **Monthly budget reviews** to track progress and adjust allocations as needed.
- **Quarterly financial audits** to identify cost overruns and implement corrective actions.
- **Stakeholder reporting** to ensure transparency and financial accountability.

Stakeholder Reporting

- **Financial transparency** through detailed reports for investors and key stakeholders.
- **Real-time tracking** of expenses via financial management software.
- **Adjustment strategies** for reallocation of funds when necessary.

Total Estimated Budget

Category	Total Cost
Personnel Costs	\$100,000
Technology Costs	\$15,000
Development & Operational Costs	\$10,000
Marketing & Stakeholder Engagement	\$6,000
Contingency Budget	\$16,000
Total Estimated Project Cost	\$147,000

Conclusion

The budgeting plan for the AI-Driven Health Monitoring App ensures financial feasibility through a **bottom-up estimation approach**, capturing all necessary costs while maintaining transparency. With a total estimated budget of **\$147,000**, the plan allocates funds efficiently across key areas such as development, AI model training, cloud infrastructure, security, and marketing. A **contingency budget of \$16,000** is included to address unforeseen challenges like AI model retraining, compliance updates, and infrastructure scaling, ensuring project stability.

To maintain cost control, the project will implement **periodic budget reviews, financial audits, and real-time expense tracking**, ensuring timely adjustments if needed. This structured approach minimizes financial risks while optimizing resource allocation, supporting the project's long-term success and sustainability.