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Faculty of Engineering and Information Technology

Patient Traker

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DEDICATION

First of all, we dedicate this graduation project to my parents, who endured
all pains to make my dreams come true, and helped me to be here.
To my supervisor Ms.Rihabb Al-Salameen who gave me all her efforts to
complete this work.
To my best friends everywhere. To my brothers and sisters.
To all my teachers in my life.
Love you all.

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Abstract

Many people suffer from diseases that can cause them additional and serious harm, for instance: Alzheimer patients with late stages may often forget their location, Hypoglycemic patients may have a sudden seizure where they immediately need suger and a piece of chocolate may save their lives, so our team is working on helping them by developing a Patient tracker (PT).

The proposed project is a mobile aplication for tracking location of patients. The purpose of the project is to improve patient care by providing real-time data on the location and health status of patients. The project will utilize GPS technology to track the location of the patient, and will also include features such as tracking vital signs and medication adherence. The project aims to reduce the workload of healthcare providers by automating the tracking and monitoring of patients. It will also provide patients with the ability to track their own health through the use of the mobile app. we will use the incremental agile methodology, which is well-suited for our system.

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Chapter One

1 INTRODUCTION

1.1 Introduction

In light of the remarkable progress of technology and the high rate of technology uses, many become dependent on technology, so much so that some of us can no longer manage or even get by without our phone, so we have decided to create a mobile app to help patients with some diseases that may cause additional harm, such as Alzheimer's and Diabetes.

Patient tracker App technology is a rapidly evolving field that has the potential to transform the way that healthcare is delivered. These devices are designed to track the location and movements of patients in real time, using GPS or other location-based technologies, and may also have the capability to collect and transmit data about the patient's health, such as vital signs or activity levels. By connecting a patient tracker app with another mobile app such as Apple Watch, patients can access their health data and track their health and well-being in real-time, while also providing healthcare providers with valuable insights into their health status. In addition to tracking the location and health of patients, the patient tracker App can store and share medical records with patients, their families, and healthcare providers. This can help to ensure that all stakeholders have access to the most up-to-date and accurate information about the patient's health, and can facilitate more informed and collaborative decision-making about the patient's care.

this project will benefit the medical and technology researchers sector, so after the project will be done and known this will help researchers to make extensive research about this. Trackers can provide real-time data on a patient's location and vital signs, which can help healthcare providers to respond more quickly to any changes in a patient's condition. also, Trackers can enable healthcare providers to communicate more effectively with patients, for example by sending reminders about appointments or medication and alerting healthcare providers if a patient has not taken their medication

as prescribed.

1.2   Literature Review

Tabel 1 provides a summary of the different studies that have been conducted on patient trackers with location-tracking technology, including the purpose of the study, the features of the device, the benefits and limitations of using it, and the accuracy and reliability of the data collected. It also includes information on the privacy and security of the patient data, the costs and resources required for the device, and the level of acceptability and feasibility among patients and healthcare providers. By organizing this information in a comprehensive table, you can provide a clear and concise overview of the current state of research on patient trackers with location- tracking technology.

Table 1: Literature Review

Study / diff	Evaluating the Effectiveness of a Mobile Health Tracking System for Chronic Disease Management [1]	The Impact of a Mobile Health Tracking App on Patient Outcomes [2]	A Systematic Review of Mobile Health Apps for Chronic Disease Management [3]
Purpose	Clinical trial	Research project	Consumer product
Features	Tracks location and vital signs	Tracks location and medication adherence	Tracks location and fitness data
Benefits	Improves patient care by providing real-time data	Reduces workload of healthcare providers by automating tracking and monitoring	Allows patients to track and improve their health on their own
Limitations	Potential for data errors	Potential for data errors	Limited clinical validation
Accuracy /Reliability	Validated by clinical trial	Data collected using validated methods	Data may not be as accurate as in clinical settings
Privacy /Security	Patient data encrypted and secure	Patient data encrypted and secure	Patient data may not be as secure as in clinical settings
Costs /Resources	Initial device cost and ongoing maintenance	Initial device cost and ongoing data management	Initial device cost and subscription fees
Acceptability /Feasibility	High level of acceptance among patients and healthcare providers	High level of acceptance among patients, moderate acceptance among healthcare providers	Moderate level of acceptance among patients, low acceptance among healthcare providers

Our project is specifically focused on the Bethlehem area, whereas the studies listed in the table have a wider geographical focus. This means that our project will be tailored to the specific needs and concerns of the Bethlehem community, which may differ from those of other communities. Additionally, our project will incorporate additional features and functionality that are not present in the studies listed in the table. For example, our project may include features such as real-time alerts for patients and caregivers, or integration with local healthcare resources and services. Overall, our project aims to provide a unique and comprehensive solution for the Bethlehem community that addresses the specific needs and concerns of patients, caregivers, and healthcare providers in the area.

1.3   Project Scope

The scope of the patient tracker project in Bethlehem is to improve the management of patients with chronic conditions, enhance the efficiency of healthcare delivery, and improve communication and collaboration between patients, doctors, and other healthcare providers. The project aims to provide real-time tracking of patients' locations and health status, as well as store and share medical records and other important information. This will benefit both doctors and patients by enabling more timely and effective care, as well as providing patients with greater control and autonomy over their health. In addition, the project will benefit the medical sector by providing valuable insights and data that can inform research and improve the quality of care for all patients.

The included functions of this system:

- This system depends on or works on hosting services for the medical sector, patients, and their families that suffer, such as tracking and locating the patient's current place, viewing the patient's illness record, checking his bumps and oxygen, sending notifications and alarming, etc.

- As it will allow patients with their families to access the app, So first they must register to create a personal account that will be informed by the medical ministry to insure that they are allowed to use this app and the sensitive information or not, it will be registering an ID

number, first name, last name, date of birth, gender, place of birth, email, password, personal phone number, their location or their place of residence, two of patient's relative name and contact information to keep them in touch, that information are all required to fill in their registration form, this system will allow changing or updating some information such as phone number and place of residence.

- After all, they will officially have a personal account on our app, where the citizen will log in by using their id number and password, then the user will be allowed to visit the record and check the locations and the measures of vital reactions. This app will be available 24 hours, all the time, and anywhere the user goes.

The excluded functions:

This system will not send and receive any information or services other than the patient's ones, so it will not be able to receive them such as medical staff records. For example, its task is not in the educational or commercial sector.

Clients:

This project targets specific patients throughout Bethlehem, and a number of experts, clinics, hospitals, and investors are working on it to help and support all the patients and their families to use and achieve the main goal of protecting and caring for these patients.

1.4   Problem Statement

There is a lack of effective methods for healthcare providers to monitor and track the location and health status of patients in real-time, particularly those with chronic conditions or cognitive impairments. This can lead to poor health outcomes and high healthcare costs, as well as difficulties in providing timely care in emergencies, for instance Hypoglycemic patients may have a sudden seizure where they immediately need sugar and a piece of chocolate may save their lives and Alzheimer patients with late stages may often forget

their location.

PT aims to create a mobile application that helps patients and their families physically, psychologically, and socially, as it will reduce the number of injuries, danger, and deaths that patients may be exposed to, and it will reduce psychological anxiety and phobia The social status of patients and their families, by tracking the location and vitals of patients, displaying their health conditions, what they may be exposed to, and their medical records that will be stored in the application. Finally, it is important to address the privacy and security concerns surrounding the use of patient tracker technology by implementing appropriate safeguards and measures to protect the privacy and security of patient data. This may include obtaining consent from patients before collecting or sharing their data, implementing measures to encrypt and secure patient data, and ensuring that patient data is only accessed by authorized personnel. By addressing these concerns, it is possible to build trust and confidence in the use of patient tracker technology and to encourage more widespread adoption of these devices.

1.5 Project Objectives

The specific objectives of the PT system are as follows:

1. To improve adherence to treatment plans by providing real-time monitoring and reminders for patients.

2. To improve the efficiency and effectiveness of healthcare providers by providing real-time data on patient health and location.

3. To improve the safety and security of patients, especially those with cognitive impairments, by providing location tracking and emergency alerts.

4. To improve the timeliness of care in emergency situations by providing real-time location tracking of patients.

5. To reduce healthcare costs by improving health outcomes and reducing the need for hospital visits or other costly interventions.

1.6 Project Benefits

There are several potential benefits of using patient tracker technology and connecting it with a patient's medical record in the healthcare setting:

1. Improved patient outcomes: By providing real-time monitoring of patient health data, patient tracker technology can help to identify early warning signs of deterioration and allow for timely intervention. This can help to prevent complications and hospitalizations and may result in improved patient outcomes.

2. Enhanced patient engagement: By providing patients with access to their own health data and allowing them to track their own health and well-being, patient tracker with location tracker technology can help to increase patient engagement in their own care. This can lead to better self-management of chronic conditions and may result in improved health behaviors.

3. Increased efficiency and cost-effectiveness: By providing real-time data on patient health, patient tracker with location tracker technology can help to reduce the need for unnecessary hospitalizations and emergency department visits, which can result in cost savings for the healthcare system.

4. Improved communication and collaboration: By connecting patient tracker with location tracker technology with a patient's medical record, healthcare providers can have access to more comprehensive and up-to-date information about the patient's health, which can facilitate more informed and collaborative decision-making about the patient's care.

5. Enhanced patient privacy and security: By implementing appropriate safeguards and measures to protect the privacy and security of patient data, patient tracker with location tracker technology can help to build trust and confidence in the use of these devices among patients and their families.

Overall, the use of patient tracker with location tracker technology and the connection of these devices with a patient's medical record has the potential to transform the way that healthcare is delivered and to improve the quality, efficiency, and cost-effectiveness of healthcare for patients and their families.

1.7 Project Methodology

Many software methodologies have emerged for the development of software systems, such as waterfall, agile, ... etc. For the development of our system, we will follow the agile methodology using the incremental development strategy. The following justifies the selection of agile in particular:

1. Incremental agile is a flexible and adaptable approach to project management that allows for ongoing iteration and improvement. This is particularly useful for the patient tracker project that involves researching and reviewing a complex and rapidly evolving area such as patient tracker technology.

2. Incremental agile allows for a flexible and iterative approach to the patient tracker project, with a focus on delivering small increments of value at regular intervals. This can help to ensure that the project remains on track and that the deliverables are completed promptly.

3. Incremental agile emphasizes collaboration and communication between team members, which is important for the patient tracker project that involves multiple stakeholders such as patients, healthcare providers, and researchers.

4. Incremental agile allows for a high degree of transparency and visibility into the patient tracker project, with regular check-ins and progress updates that help to keep all stakeholders informed about the status of the project.

5. Incremental agile is well-suited to the patient tracker project that involves a high level of uncertainty or complexity, as it allows for ongoing adjustment and adaptation to changing circumstances and requirements.

6. Agile helps in remaining within the boundaries of budget assigned for PT, as each feature of system are shown to the customer after it is developed and before moving forward to other major functionality. This will prevent the development of unneeded features.

Overall, we believe that incremental agile is the best project methodology for the patient tracker, as it allows for flexibility, collaboration, and transparency, and is well-suited to the complex and rapidly evolving nature of this technology.

1.8   Proposed Working Plan

Collective work is done on the project as face-to-face meetings and meetings are held on the google to present the project and meet the customers who will use the system and follow up with them in every step to obtain the functional requirements of the system.

1.9   Project Constraints

Project constraints are factors that can limit or restrict the scope, resources, ortimeframe of a project. Some potential constraints for a patient tracker projectmight include:

1. Time: The project may be constrained by a limited time frame, which could impact the scope of the project and the amount of research that can be conducted, PT must be implemented and deployed within a year, which is the year specified by the deadline assigned to graduation.

2. Budget: The project may be constrained by a limited budget, we have to work on developing the system with this limited and confined budget.

3. Data availability: One of the limitations that may face the development of the system is the availability of medical data for use in the system.

4. Access to participants: There may be challenges in recruiting and accessingpatients or healthcare providers who are willing and able to participate in theproject. This could impact the ability to gather data or to get feedback onthe use of patient trackers with location tracker technology.

5. Ethical considerations: There may be ethical considerations surrounding theuse of patient trackers with location tracker technology, such as privacy andsecurity concerns, that need to be taken into account when conducting theresearch and preparing the presentation. For example, it may be necessaryto obtain consent from patients and healthcare providers before collecting orsharing their data or to implement measures to protect the privacy andsecurity of patient data.

6. Security: Patient data collected by the tracker system is often sensitive and personal in nature, that patient data could be accessed or stolen by

unauthorized individuals, either through hacking or other types of data breaches. The data can be exposed to cyber threats such as malware or phishing attacks to ensure the security and integrity of the data being collected and transmitted.

1.10   Summary

This project aims to provide a comprehensive overview of the current state of research on patient tracker technology and its potential applications in the healthcare setting. Overall, the use of the patient tracker project and the connection of these devices with a patient's medical record has the potential to transform the way that healthcare is delivered and to improve the quality, efficiency, and cost-effectiveness of healthcare for patients and their families.

Chapter Two

2 SYSTEM ANALYSIS

2.1 Introduction

System analysis is a crucial step in the development of any project, including a patient tracker and location tracking project. It involves examining the current system, identifying its weaknesses and strengths, and determining how it can be improved, system analysis involves a detailed study of the project requirements, including the functional and non-functional requirements, as well as the business and technical constraints.

2.2 Project Implementation Options

There are several benefits to choosing mobile as the platform for your project implementation:

1. Wide reach: Mobile devices are widely used and can reach a large audience. This makes it easier for you to reach your target users and customers [8].

2. Convenience: Mobile devices are portable and can be accessed anytime, anywhere. This makes it easier for users to access your project on the go and at their own convenience [7].

3. Cost-effective: Developing a mobile app can be more cost-effective compared to other platforms, especially if you want to reach a large audience.

4. Personalization: Mobile apps can be designed to provide a personalized experience to users, which can increase user engagement and loyalty.

5. Integration with other features: Mobile apps can be integrated with various features such as push notifications, GPS, and cameras, which can enhance the functionality of your project.

6. Access to hardware: Mobile devices come with a range of hardware such as sensors and cameras, which can be leveraged to enhance the user experience and functionality of your project.

7. Offline functionality: Mobile apps can be designed to work offline, which can be useful in situations where internet connectivity is limited.

8. Fast development: Mobile apps can be developed and deployed faster compared to other platforms, which can help you bring your project to market quickly.

There could be various reasons why a website was not chosen as the platform for your project implementation. Some possible reasons could include:

1. Limited reach: Websites are accessed through a web browser and require an internet connection. This means that they may not be accessible to users in areas with limited or no internet connectivity.

2. Limited functionality: Websites are generally limited in terms of the features and functionality they can offer compared to mobile apps. For example, a website may not be able to access device hardware such as the camera or GPS.

3. Poor user experience: Websites may not provide the same level of user experience as mobile apps, which can lead to lower user engagement and satisfaction.

4. Slow development: Developing a website can take longer compared to mobile app development, especially if you want to include advanced features and functionality.

5. High costs: Developing a website can be more expensive compared to mobile app development, especially if you want to include advanced features and functionality.

6. Limited personalization: Websites may not be able to provide the same level of personalization as mobile apps, which can lead to a less engaging user experience.

7. Lack of integration with other features: Websites may not be able to integrate with other features such as push notifications, which can limit their functionality.

8. Lack of offline functionality: Websites generally require an internet connection to function, which can be a limitation in situations where internet connectivity is limited.

There could be various reasons why a desktop app was not chosen as the platform for your project implementation. Some possible reasons could include:

1. Limited reach: Desktop apps are only accessible on desktop or laptop computers, which means that they may not be accessible to users on mobile devices or tablets.

2. Limited functionality: Desktop apps are generally limited in terms of the features and functionality they can offer compared to mobile apps. For example, a desktop app may not be able to access device hardware such as the camera or GPS.

3. Poor user experience: Desktop apps may not provide the same level of user experience as mobile apps, which can lead to lower user engagement and satisfaction.

4. Slow development: Developing a desktop app can take longer compared to mobile app development, especially if you want to include advanced features and functionality.

5. High costs: Developing a desktop app can be more expensive compared to mobile app development, especially if you want to include advanced features and functionality.

6. Limited personalization: Desktop apps may not be able to provide the same level of personalization as mobile apps, which can lead to a less engaging user experience.

7. Lack of integration with other features: Desktop apps may not be able to integrate with other features such as push notifications, which can limit their functionality.

8. Lack of offline functionality: Desktop apps generally require an internet connection to function, which can be a limitation in situations where internet connectivity is limited.

Table 2: Difference Between Mobile Application FrameWorks [5]

Frame diff	Native IOS	Native Android	React Native	Flutter
Operation System	Apple Only	Android Only	IOS, Android, Web	IOS, Android, Web
Language	Swift	Kotlin	Java Script	Dart
Performance	Very High	Very High	High	High
Cost And Time	More Expensive and Slower	More Expensive and Slower	Cheaper And Faster	Cheaper And Fast
Popular Apps	Safari, iTunes, Messages	SwiftKey, Pocket Casts	Facebook, Instagram, Airbnb	Alibaba, Tencent, Google Ads
Community Support	Very Popular	Very popular	Very Popular	Popular

2.3   The Proposed System

A proposed system for a patient tracker includes the following features:

1. Patients can register and create an account on the platform, which will allow them to access their medical records and track their health status.

2. Patients can view and update their medical records, including information about their medical history, allergies, medications, and test results.

3. Patients can schedule appointments with their healthcare provider and receive reminders about upcoming appointments.

4. Patients can track and report their symptoms, which can help their healthcare provider identify any potential health issues.

5. Patients can track and manage their medications, including the dosage and frequency of their medications.

6. Patients can track their health metrics such as blood pressure, weight, and glucose levels, and view their progress over time.

7. Patients can access educational resources and tips on managing their health and preventing potential health issues.

8. Patients can communicate with their healthcare provider through a secure messaging system, which can help them get answers to their questions and concerns.

9. Location tracking, patients can opt-in to location tracking, which will allow their healthcare provider to track their location and ensure they are receiving the appropriate care.

10. Integration with wearable devices: The platform can be integrated with wearable devices such as fitness trackers, which can provide additional health data for patients and their healthcare providers.

11. The emergency alert system, patients can set up an emergency alert system that will alert their healthcare provider if they are in a potentially dangerous situation or if they need immediate medical attention.

2.4 System Requirements

2.4.1 Functional requirements

- Patient registration: Patients should be able to create an account on the platform and provide their personal and medical information.

- Medical record management: Patients should be able to view and update their medical records, including information about their medical history, allergies, medications, and test results.

- Appointment scheduling: Patients should be able to schedule appointments with their healthcare provider and receive reminders about upcoming appointments.

- Symptoms tracker: Patients should be able to track and report their symptoms, which can help their healthcare provider identify any potential health issues.

- Medication management: Patients should be able to track and manage their medications, including the dosage and frequency of their medications.

- Health tracking: Patients should be able to track their health metrics such as blood pressure, weight, and glucose levels, and view their progress over time.

- Health tips and resources: Patients should be able to access educational resources and tips on how to manage their health and prevent potential health issues.

- Secure messaging: Patients should be able to communicate with their healthcare provider through a secure messaging system, which can help them get answers to their questions and concerns.

- Location tracking: Patients should be able to opt-in to location tracking, which will allow their healthcare provider to track their location and ensure they are receiving the appropriate care.

2.4.2   Non-functional requirements

- Security: The platform should be secure and protect patient data from unauthorized access, Security is important for any project, but especially for a patient tracker with a location tracker project, because it involves the collection, storage, and dissemination of sensitive personal and health information. Ensuring the security of this information is essential to protect the privacy and confidentiality of the patient and to ensure that the data is accurate and reliable.

- Scalability: The platform should be able to handle a large number of users and handle increased traffic as needed.

- Performance: The platform should have fast load times and be able to handle multiple requests simultaneously.

- Usability: The platform should be easy to use and navigate for patients of all ages and tech-savviness.

- Compatibility: The platform should be compatible with a range of devices, including smartphones, tablets, and desktop computers.

- Maintenance: The platform should be regularly maintained and updated to ensure it is functioning properly.

2.5   Feasibility Study

2.5.1   Economic Feasibility

Economic feasibility is one of the most important factors that drive the implementation of the project or not to implement it, and in order for the work team to spread the product effectively and at the lowest costs, it is necessary to conduct a study of all economic costs related to project development and implementation.

Table 3: Economic Feasibility Study

(a) Software

service Name	Number of services	Cost per one	Total cost	links
Windows 11 pro	3	29.99$	89.97$	microsoft
VS Code	3	Free	Free	VSCode
Dart SDK	3	Free	Free	Dart
Flutter SDK	3	Free	Free	Flutter
Android Studio	3	Free	Free	Android Studio
Compiler MIKTex , Editor TeXstudio	3	Free	Free	MikTex, Texstudio
MS Office 2019	3	18.34$	55.02$	microsoft
EdrawMax	3	69$	207$	edrawsoft

(b) Hardware

Device Name	Number of devices	Cost per one	Total cost	Links
laptop (Medium specification)	3	759$	2277$	laptop
Smart-phone (Medium specification)	3	281$	843$	SmartPhone
Smart-watch (High specification)	3	223$	669$	Smartwatch

2.5.2 Technical Feasibility Study

Table 4: Technical Feasibility Study

#	Necessary Abilities and Skills
1.	Programming Language
2.	Back-End Development
3.	User Interface Design (UI)
4.	Software Engineering
5.	Problem Solving

2.5.3 Human Resources Feasibility Study

Table 5: Human Resources

#	Occupation	The number of people	Salary
1	Software engineer and interface designer	1	1300$
2	Mobile application developer	1	1000$
3	Backend developer	1	1000$

2.5.4 Scheduling Feasibility Study

Table 6: Scheduling Feasibility Study

(a) Project Plan for First Semester.

#	Task	Period
1	Searching for an idea	2 Weeks
2	Problem analysis	2 Weeks
3	Data collection and search for information	8 Weeks
4	System implementation options	4 Weeks
5	Design specifications	4 Weeks
6	Description of the functional requirements of the system	9 Weeks
7	Documentation	15 Weeks

(b) Schedule Feasibility Study for First Semester.

Task \ Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Searching for an idea	■	■														
Problem analysis			■	■												
Data collection and search for information					■	■	■	■	■	■	■	■	■			
System implementation options						■	■	■	■							
Design specifications									■	■	■	■	■			
Description of the functional requirements of the system							■	■	■	■	■	■	■	■	■	
Documentation		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

2.6   Project Added Values

The added value refers to the benefits or advantages that the project brings to an organization or group.

1. Improved patient care: The project can help healthcare providers track patients' health and location, which can lead to more timely and effective care.

2. Increased patient engagement: The project can help patients take an active role in their own healthcare by tracking their health and accessing educational resources.

3. Enhanced communication: The secure messaging feature of the project can help improve communication between patients and healthcare providers, which can lead to better understanding and treatment of patient needs.

4. Greater convenience: The project can provide patients with the convenience of accessing their medical records and scheduling appointments from their mobile devices.

5. Reduced costs: The project can help reduce costs for both patients and healthcare providers by streamlining processes and reducing the need for in- person visits.

6. Improved outcomes: The project can help improve patient outcomes by providing healthcare providers with more accurate and timely information about patients' health.

7. Increased safety: The location tracking feature of the project can help ensure patients are receiving the appropriate care and can alert healthcare providers in case of an emergency.

8. Improved patient satisfaction: The project can help improve patient satisfaction by providing a more convenient and personalized healthcare experience.

2.7   Project Management

2.7.1   Roles and responsibilities

Tasks :

Task 1:
   As a project leader, one of your key roles and responsibilities may be to write documents and identify deficiencies while leading the team. This involves creating various types of documents such as progress reports, project updates, and final reports and may involve tasks such as:

- Gathering and organizing information from team members and other stakeholders.

- Writing clear and concise documents that effectively communicate important information about the project.

- Ensuring that all documents are accurate and up-to-date.

- Identifying any deficiencies or areas for improvement within the project, and developing strategies for addressing these issues.

- Leading the team by setting clear goals and expectations, providing guidance and support, and promoting collaboration and teamwork.

   Writing documents and identifying deficiencies while leading the team is an important aspect of project management, as it helps to ensure that the project is completed efficiently and effectively and that all stakeholders are kept informed about the progress of the project. Taking on these tasks can help to improve the overall quality and effectiveness of the project and to ensure that the project is completed successfully.

   In order to effectively carry out these tasks, it will be important to have strong writing and communication skills, as well as the ability to effectively lead and motivate team members. This will also need to be able to analyze and interpret data and identify and address any deficiencies or areas for improvement within the project.

Task 2:

- draw diagrams and tables and format them with collected data. This involves using data visualization tools and techniques to create clear and visually appealing diagrams and tables that effectively communicate important information about the project.

- To draw diagrams and tables, demanded to be proficient in using data visualization software and tools, such as Microsoft word or Google Sheets. also will need to have a good understanding of how to present data in a clear and visually appealing manner and to choose the appropriate type of diagram or table for the data being presented.

- Formatting diagrams and tables involve ensuring that they are visually appealing and easy to read, and may involve tasks such as choosing an appropriate layout, adding headings and labels, and inserting images and other visual elements.

- Collecting data is a key part of this process, and it demanded to be proficient in gathering data from a variety of sources, including interviews, and existing databases. also will need to be able to analyze and interpret the data to identify trends or patterns and use this information to inform decision-making and identify any potential issues or areas for improvement.

Overall, drawing diagrams and tables and formatting them with collected data is an important aspect of project management, as it helps to ensure that important information is presented in a clear and visually appealing manner and that it is easily accessible to all stakeholders. By taking on these tasks, you can help to improve the communication and coordination within the project, and to ensure that the project is completed efficiently and effectively.

Task 3:

- format documents, arrange them in an appropriate order, and transform them into LaTeX format.

- Formatting documents involves ensuring that the document is visually appealing and easy to read, and may involve tasks such as choosing

an appropriate font and layout, adding headings and subheadings, and inserting images and other visual elements.

- Arranging documents in an appropriate order involves organizing the content of the document logically and coherently, and may involve tasks such as creating an outline or table of contents, and placing related information together.

- Transforming documents into LaTeX format involves converting the document into a format that can be easily edited and shared, and may involve tasks such as converting the document into a LaTeX template, adding citations and bibliographies, and formatting equations and other technical elements.

Overall, formatting, arranging, and transforming documents is an important aspect of project management, as it helps to ensure that the project documents are professional, clear, and well-organized and that they can be easily shared and edited by all stakeholders. By taking on these tasks, you can help to improve the overall quality and effectiveness of the project documents, and to ensure that the project is completed efficiently and effectively.

2.7.2 Communication Plan

A communication plan is an important part of project management because it helps to ensure that all members are informed and up to date on the progress and status of the project.

1. Communication channels:

    - WhatsApp.
    - Google Meet.
    - Word Online documents.
    - Face-to-face meetings.

2. Frequency of communication:

    - Almost Daily meetings at the campus.
    - Regular virtual meetings via WhatsApp or Google Meet.

3. Information to be shared:

- Project updates.

- Progress reports.

- Any issues or challenges that need to be addressed.

4. Responsibilities:

   - [Hanna] responsible for sharing project updates via email.

   - [Roaa] lead virtual meetings via Google Meet and will provide updates on progress.

   - [Mohammad] responsible for creating and updating the Word Online document with project information.

5. Decision-making:

   - All team members be invited to contribute to decision-making during meetings.

   - Feedback and suggestions be solicited via email or during virtual meetings.

   - Decisions be communicated to all stakeholders via email or during meetings.

2.7.3 A conflict resolution plan

Is a detailed strategy for addressing and resolving conflicts within a team. One effective approach to conflict resolution is to focus on listening well and understanding and appreciating the efforts and work of each team member. This may involve the following steps:

1. Identify the conflict: The first step in resolving a conflict is to identify the specific issue or issue that is causing the conflict. This may involve seeking input from all team members and asking open-ended questions to better understand their perspectives.

2. Listen actively: Once the conflict has been identified, it is important to listen actively to all team members and their perspectives. This may involve paraphrasing what they have said, asking follow-up questions, and acknowledging their feelings and concerns.

3. Appreciate the efforts and work of each team member: It is important to recognize and appreciate the efforts and work of each team member, and to express gratitude for their contributions. This can help to build trust and goodwill within the team, and can foster a sense of collaboration and mutual respect.

4. Seek a resolution: Once all perspectives have been heard, it is important to work together to identify a resolution that addresses the conflict and meets the needs of all team members. This may involve finding a compromise, delegating tasks differently, or seeking outside support or resources.

By following these steps, it is possible to effectively resolve conflicts within a team and maintain a positive and productive working environment.

2.7.4 Risk management plan

is the process of identifying, assessing, and prioritizing risks and developing strategies to mitigate or eliminate them. One effective approach to risk management is to make team decisions and find quick, simple ways to solve identified risks [6]. This may involve the following steps:

1. Identify risks: The first step in risk management is to identify potential risks that may impact the project. This may involve conducting a risk assessment, which involves analyzing the project and identifying potential threats or vulnerabilities.

2. Assess risks: Once risks have been identified, it is important to assess their likelihood and impact. This will help to prioritize risks and determine which ones need to be addressed first [4].

3. Develop strategies: After risks have been assessed, it is important to develop strategies to mitigate or eliminate them. This may involve creating contingency plans, allocating additional resources, or seeking outside support.

4. Make team decisions: It is important to involve the entire team in risk management decisions, as this can help to ensure that all perspectives are considered and that a well-informed decision is made.

5. Find quick, simple solutions: To effectively manage risks, it is important to find quick, simple solutions that can be implemented quickly and efficiently. This may involve identifying low-cost, low-impact solutions or seeking outside support or resources.

By following these steps, it is possible to effectively manage risks and ensure that the project is completed successfully.

2.8 Summary

System analysis is the process of studying a system or process to understand its components, functions, and relationships, and to identify any problems or inefficiencies. In the context of a patient tracker, system analysis would involve studying the various components of the system, such as the tracking device, the mobile app, and the database, to understand how they work together and identify any potential issues or improvements. This could include analyzing the system's requirements, analyzing the data flows and relationships between the components, and identifying any potential risks or challenges. Through this process, the project team can gain a deeper understanding of the system and develop a plan for improving its functionality and performance.

Chapter Three

3 SYSTEM FUNCTIONAL REQUIREMENTS ANALYSIS

3.1 Introduction

In this section, we will describe the functional requirements in depth and identify who the actors are for each one in a more technical approach and make the use case diagram for the system.

3.2 Context and Use-Case Diagrams

In this section, we will define the work of the annotator more clearly, especially what the user can work in the system and what it cannot and add if there are any restrictions on these tasks.
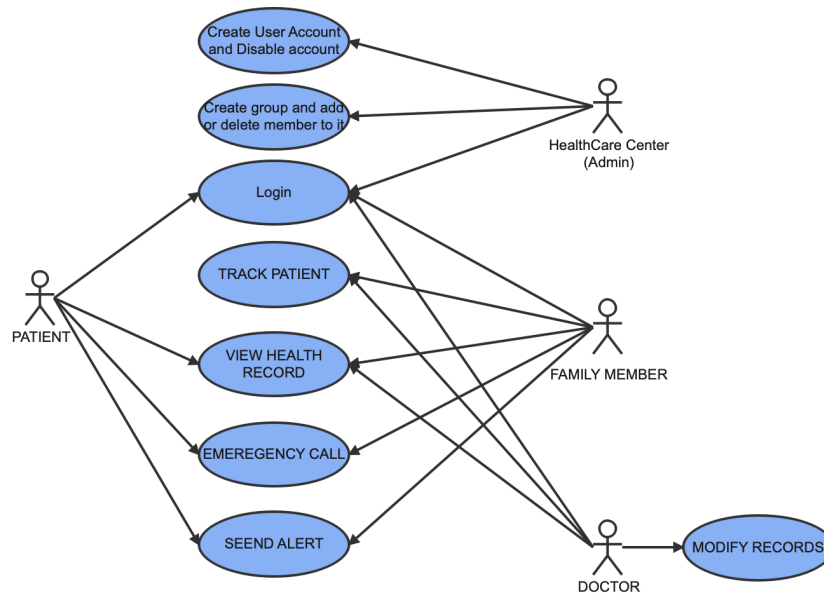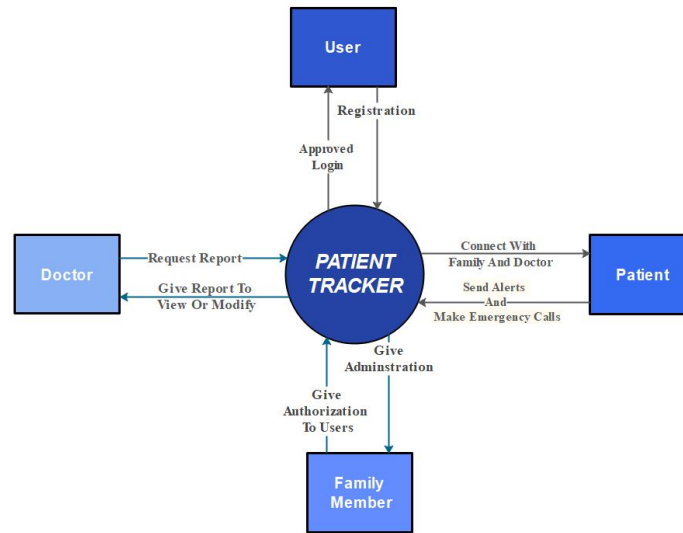

Figure 1: Use Case Diagram

Figure 2: Context Diagram

3.3 Functional Requirement Description

Depending on the previous functional requirements, the following describes the functional requirements in more detail.

Table 7: Functional Requirement Description

(a) Doctor, Family member

Actor	Doctor, Family member
Description	The family members and doctors can see the medical records of the patient
Preconditions	The family member allows the doctor to see their patient records by the patient ID number
Basic processes	The family members and doctors can follow-up of the patient's health condition and send alerts of any of them see any danger of patients life
The exceptional	If the patient is unconscious, some of information in the record is opened without the consent of the patient, and automatically send alerts to the doctor and the family members

(b) Patient

Actor	Patient
Description	Patient Can See His Health Record but He Can't Edit the Record , Only The Doctor Can (Add,Delete,Edit) His Record
Preconditions	The Family Member Allows the Doctor to See Their Patient Records by The Patient ID Number After taking the patient's opinion
Basic Processes	Patient Send Alert And Open An Emergency Call If There is Any Danger On His Life And His Health , Also His Family And Doctor Track His Location And See His Health Status
The Exceptional	If the patient is unconscious, Some of Information in the record is opened without the consent of the patient, And Automatically Send Alerts to The Doctor And the Family Members

3.4 Summary

Building the system needs the following stages, which are planning, analysis, design, implementation and maintenance, so in this chapter we analyzed and described the functional requirements, so a detailed explanation of the requirements was made, and the relationship of each requirement was determined with the elements of the system, the inputs and outputs of each of them were determined and the modeling of the system was.

Chapter Four

4 SYSTEM DESIGN

4.1 Introduction

4.1.1 Algorithms

The Advanced Encryption Standard (AES) is widely regarded as one of the best symmetric encryption algorithms currently available. Its high level of security, speed, and versatility make it a popular choice for protecting sensitive data in various industries, including healthcare. AES is frequently used to safeguard personal and medical information, among other things.

SHA (Secure Hash Algorithm) is a family of cryptographic hash functions commonly employed to create digital signatures and authenticate data integrity. Encryption is the method of transforming data so that it is unreadable without the proper decryption key. Encryption is used to maintain data confidentiality during storage or transmission, ensuring that only authorized users can access it. Hashing, on the other hand, is the process of converting data into a fixed-length value or key that represents the original data. The purpose of hashing is to confirm the data's integrity and authenticity. Hashing creates a unique digital fingerprint of the data that can be used to check if the data has been tampered with or altered. In summary, encryption protects data confidentiality, while hashing verifies data integrity and authenticity.

Both AES and SHA-256 are widely acknowledged as efficient and do not consume excessive battery power on mobile devices when appropriately implemented and optimized. However, the battery usage of any algorithm is determined by various factors such as the size of data being encrypted/hashed, the frequency of encryption/hashing, and the hardware and software specifications of the device itself. AES and SHA-256 are recognized as the best encryption and hashing algorithms, respectively, due to their strong security features and efficiency. They have been extensively used in many applications, including mobile devices, and have proven energy-efficient. Moreover, AES and SHA-256 are widely accepted and recommended by industry experts because they provide a high level of security and protection for sensitive

data such as personal and medical information, which is critical for a patient tracker app.

It's important to note that encryption and hashing algorithms are not specific to GPS, BLE, or Wi-Fi-based tracking, but rather are used to protect data in general. The choice of tracking method would depend on factors such as the required level of accuracy, the battery life of the device, and the infrastructure available for tracking.

4.1.2 PseudoCode

START

- Define the app requirements and features, including:

  - User authentication (login and registration).
  - Tracking patient location.
  - Monitoring patient health status.
  - Handling sensitive personal and medical data with security features.

- Create a new Flutter project.

- Set up the necessary dependencies and packages, including:

  - firebase_auth for user authentication.
  - cloud_firestore for accessing and storing data in Firestore.
  - location for tracking user location.
  - crypto for hashing and encrypting sensitive data.

PROCESS

- Create a user registration form for new patients to sign up with their email and password.

- Implement a function to hash the user password using SHA256 and create a new user with Firebase Authentication using the email and hashed password.

- Save the user's email and an empty location and health status field to Firestore as a new document with the user's unique ID as the document ID.

- Create a user login form for returning patients to sign in with their email and password.

- Implement a function to hash the user password using SHA256 and authenticate the user with Firebase Authentication using the email and hashed password.

- Retrieve the user's data from Firestore using their unique ID as the document ID.

- Display the user's location on a map using the location package.

- Implement a function to update the user's location or site in Firestore whenever their location changes.

- Create a form for the user to update their health status, and save the health status to Firestore as a field in their document.

- Implement security features such as access control and data validation to ensure that only authorized users can access and modify sensitive data.

- Encrypt sensitive data using the crypto package for added security.

END

- Test the app thoroughly to ensure that all features and functionality are working as intended.

- Deploy the app to the app stores for patients to download and use.

4.2   Class Diagram

4.3   Sequence Diagrams

4.4   Entity Relationship Diagram (ERD)

4.5   Functions Design and Activity Diagrams

Functions Design :

- User authentication and registration.

- Secure storage and transmission of user data.

- Collection and storage of user's health status information.

- Real-time tracking of user's location.

- Integration with external databases and APIs for medical data and services.

- Visualization of user data on a dashboard.

- Alerting users and medical professionals in case of critical changes in users' health status.

Activity Diagrams :

4.6   Input/ Output Design

Input :

- User login credentials (username, password, or fingerprint).

- User registration information (name, email, password, city, gender, etc.).

- User's health status information (symptoms, vital signs(?), test results, etc.).

- User's location information (GPS coordinates).

- User's personal information (name, date of birth, etc.).

- User's medical history (past illnesses, medications, allergies, etc.).

Outputs :

- User login status (successful or unsuccessful).

- User registration status (successful or unsuccessful).

- User's health status (symptoms, vital signs, test results, etc.).

- User's location on a map.

- Alerts or notifications for critical changes in the user's health status.

- User's personal information.

- User's medical history.

4.7 Summary

The AES and SHA-256 encryption algorithms are secure for patient tracker apps developed using Flutter with packages like firebase_auth, cloud_firestore, location, and crypto. The app inputs user login, registration, health and location data, personal information, and medical history. The app outputs the user's status, health, and location information, and its functionality includes authentication, secure storage, data tracking, visualization, and alerts for critical health changes.

Chapter Five

5 SYSTEM DEVELOPMENT

5.1 Introduction

5.2 User Interfaces

5.3 Summary

Chapter Six

Chapter Seven

6 CONCLUSION AND FUTURE WORKS

6.1 Conclusion

6.2 Future Works

References

[1] Evaluating the effectiveness of a mobile health tracking system for chronic disease management. *Clinical Trials*, 12(3):123–130, 2011.

[2] The impact of a mobile health tracking app on patient outcomes. *Medical Internet Research*, 18(12):e317, 2016.

[3] A systematic review of mobile health apps for chronic disease management. *Medical Internet Research*, 20(1):e12, 2018.

[4] Switzerland: International Organization for Standardizatio Geneva. *Risk management – Guidelines*. ISO 31000:2018(E).

[5] Piotr Nawrocki, Krzysztof Wrona, Mateusz Marczak, and Bartlomiej Sniezynski. A comparison of native and cross-platform frameworks for mobile applications. *Computer*, 54(3):18–27, 2021.

[6] PA: Project Management Institute Newtown Square. *A guide to the project management body of knowledge (PMBOK guide)*. Project Management Institute, 2017.

[7] Ted Schadler and John C McCarthy. Mobile is the new face of engagement. *Forrester Research*, 13:1–30, 2012.

[8] Alexander S Young, Amy N Cohen, Noosha Niv, Nancy Nowlin-Finch, Rebecca S Oberman, Tanya T Olmos-Ochoa, Richard W Goldberg, and Fiona Whelan. Mobile phone and smartphone use by people with serious mental illness. *Psychiatric services*, 71(3):280–283, 2020.

[9] L Zawadzki, K Mondon, N Peru, C Hommet, T Constans, Ph Gaillard, and V Camus. Attitudes towards alzheimer's disease as a risk factor for caregiver burden. *International psychogeriatrics*, 23(9):1451–1461, 2011.