Med Vantage

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Abstract

Mental health is an essential part of our overall well-being, affecting how we think, feel, and act. It influences how we handle stress, relate to others, and make choices. Good mental health is not just the absence of mental illness but also the presence of positive characteristics such as the ability to manage stress, adapt to change, and maintain fulfilling relationships. This paper explores the importance of mental health, common mental health issues, and strategies to promote mental wellness.Mental health problems are common and can affect anyone regardless of age, gender, or background. Some of the most prevalent mental health issues include depression, anxiety, and stress-related disorders. Depression is characterized by persistent sadness and a lack of interest or pleasure in activities. Anxiety involves excessive worry and fear, which can interfere with daily life. Support from friends, family, and the community is crucial. Building strong, positive relationships can provide emotional support and help us feel connected. Community programs and activities can offer opportunities for social interaction and support.Schools and workplaces also play an important role in supporting mental health. Creating a positive and inclusive environment can help reduce stress and promote well-being. Providing resources and support for mental health can make a big difference.

Acknowledgements

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Publication List

[Optional] The main contributions of this research are either published or accepted or in preparation in journals and conferences as mentioned in the following list:

Journal Articles

1.

Conference Papers

1.

Additional Publications

Following is the list of relevant publications published in the course of the research that is not included in the thesis:

1.

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Chapter 1

Introduction

[*Must be present in FYDP-1 Report and also in Final Report*]

Every chapter should start with 1-2 sentences on the outline of the chapter.

1.1 Project Overview

Our project is creating a website for people in Bangladesh to get mental health help online. This website will let people schedule appointments, pay online, and talk to qualified doctors. We're making sure the website is safe and follows all the rules. Our goal is to help everyone in Bangladesh, no matter where they live or how much money they have, to get the mental health support they need. We're working hard to make the website easy to use and understand, so anyone can use it. By using technology, we want to make it easier for people to talk about mental health and get help without feeling ashamed. We're also teaming up with experts to make sure the website works well and is trustworthy. Our project is all about making mental health care accessible to everyone in Bangladesh, so they can live happier and healthier lives.

1.2 Motivation

The motivation behind the online mental health platform stems from the urgent need to address the mental health crisis in Bangladesh. Limited access to mental healthcare, coupled with stigma and cultural barriers, has left many individuals without adequate support. By leveraging technology to overcome geographical and social barriers, the platform aims to democratize mental healthcare, providing accessible, affordable, and stigma-free services to all Bangladeshis regardless of their location or socioeconomic status.

1.3 Objectives

The objectives of the online mental health platform for Bangladesh are to develop an intuitive and accessible platform for users of all technical abilities, ensuring ease of use

and broad accessibility. By verifying healthcare providers and adhering to data protection regulations, the platform builds trust and maintains high credibility. Community engagement and educational campaigns aim to reduce stigma and increase mental health awareness, encouraging individuals to seek help without fear of judgment. The platform also strives to make mental health services accessible and affordable for people in remote or under served areas, regardless of their financial status. Continuous improvement is ensured by regularly collecting user feedback and analyzing data, keeping the platform effective, relevant, and user-friendly.

1.4 Methodology

The methodology for developing the online mental health platform involves comprehensive market research and stakeholder consultations to understand user needs and existing gaps in Bangladesh's mental health landscape. Collaborative design and development with healthcare experts and technologists ensure the platform is user-friendly and culturally appropriate. Rigorous verification processes for healthcare providers and strict compliance with data protection regulations build trust and maintain ethical standards. An iterative development process, including regular testing and user feedback, ensures the platform meets user needs effectively. Community engagement and educational campaigns are launched to reduce mental health stigma and promote platform use. Continuous improvement is maintained through ongoing analysis of user feedback and data to refine and enhance the platform's features and services.

1.5 Project Outcome

The project outcome is the establishment of a scalable and sustainable online mental health platform that significantly enhances access to mental health services in Bangladesh. The platform will provide a user-friendly interface for patients to schedule appointments, make online payments, and receive counseling, either online or offline. By verifying healthcare providers and ensuring data privacy, it will build trust and credibility among users. The platform aims to reduce mental health stigma through community engagement and educational initiatives, encouraging more individuals to seek help. Ultimately, the project will improve mental health outcomes and accessibility, fostering a supportive environment for mental health care across diverse populations in Bangladesh.

1.6 Organization of the Report

The Report consist of chapters as follow Background Research, Project Design, Implementation and Results, Standard and Design Constraints. Finally the Conclusion ends the report with reference at the end.

Chapter 2

Background

[*Must be present in FYDP-1 Report and also in Final Report*]

Every chapter should start with 1-2 sentences on the outline of the chapter.

2.1 Preliminaries

In this section, you have to provide the necessary background knowledge to understand the rest of the report [1].

2.2 Literature Review

This section will contain you literature review.

2.2.1 Similar Applications

Put a summary of similar web applications, mobile apps similar to your work.

2.2.2 Related Research

Here report the summary of the investigation of the research literature.

2.3 Gap Analysis

Here summarise the gap where you intend to work.

2.4 Summary

Chapter 3

Project Design

The project's initial phase, known as project design, is when the project's concepts, features, structure, and deliverables are structured.

3.1 Requirement Analysis

3.1.1 Functional and Nonfunctional Requirements

Functional and Nonfunctional Requirements Functional Requirements Specific tasks or behaviors that a system must be able to carry out are known as functional requirements. The following competencies are functional requirements for med vantage:

1. User Registration and Authentication:

- Users can create accounts and log in securely.
- Password recovery options are available.

2. Profile Management:

- Users can create and update personal profiles.
- Profiles include personal information, preferences, and mental health history.

3. Appointment Scheduling:

- Users can book, reschedule, and cancel appointments with mental health professionals.
- Confirmation and reminder notifications are sent via email or SMS.

4. Communication Tools:

- Secure messaging system for users to communicate with mental health professionals.
- Video conferencing capabilities for virtual therapy sessions.

5. Resource Library:

- Access to articles, videos, and other educational materials on mental health topics.
- Search functionality to find specific resources easily.

6. Mental Health Assessments:

- Interactive questionnaires and assessments to evaluate mental health status.
- Immediate feedback and recommendations based on assessment results.

7. Progress Tracking:

- Users can log and track their mental health progress over time.

- Visual tools like charts and graphs to monitor improvements or changes.

8. Support Community:

- Forums or discussion boards for users to connect with peers and share experiences.
- Moderation features to ensure a safe and supportive environment.

9. Emergency Support:

- Quick access to crisis helplines and emergency contacts.
- Information on how to get immediate help in a crisis situation.

10. Content Management System:

- Administrators can add, update, and manage content on the website.
- Control over user-generated content to ensure quality and appropriateness.

Nonfunctional Requirements:

Nonfunctional requirements describe the qualities a system should have, even though they are not related to specific actions or behaviors. For Med Vantage, nonfunctional requirements include:

1. Security:
• Sensitive information is protected with data encryption.
• User activities are tracked in audit log.
2. Performance:
• The system provides fast response times for data entry, updates, and queries.
• Changes in data, such as new entries or updates, are shown immediately.
3. Usability:
• The system is user-friendly and easy to navigate.
• The interface is intuitive, allowing users to quickly find and access features.
• The design accommodates users with different levels of technical skill.
4. Maintainability:
• The system is designed for easy updates and maintenance.
• The code is well-documented to facilitate troubleshooting and modifications.
• Regular maintenance can be performed without significant downtime.
5. Documentation:
• Comprehensive user guides and manuals are provided for all features.
• Technical documentation is available for developers and IT staff.
• Documentation is regularly updated to reflect system changes and new features.

3.1.2 T

his context diagram (Figure 3.1) shows the system entities and their primary functions within the system.

3.1.3 Data Flow Diagram Level 1

These essential actions will be examined in the DFD Level 1 in terms of user response and the flow of each procedure. Figure 3.2

3.1.4 UI Design

Any software or system must have a user interface (UI), which provides users with a visible and interactive platform for interaction. The UI is crucial in creating user-friendly interfaces, intuitive navigation, and effective controls, all of which are designed to enhance usability, overall satisfaction, and the user experience.

This is our Home page (Fig. 3.3) design for our project. In this landing page patient(user) can login or sign up easily. After logging in , patient (user) can check available doctor list, book their appointment and took counselling.

In this interface (Fig. 3.6), patient(user) can see available doctor list. Patient can book appointment and continue counselling.

This is the interface (Fig. 3.7) for Doctor. Doctor can see patient list and continue their counselling one by one. Then doctor can check payment and see analysis of their mental health report.

3.2 Detailed Methodology and Design

From the patient interface, if any patient successfully logging in then he/she can see available doctor list. After selection doctor they can easily book their counselling hour and they need to pay through online system. Then Doctor accept their request and provide counselling link and for offline counselling doctor provide schedule. Then Doctor store their mental health related data.

Fig. 3.8 (Detailed Methodology Design)

3.3 Project Plan

Figure 3.10: Project Plan

3.4 Task Allocation

Figure 3.11: Task Allocation

3.5 Summary

This section outlines the overall project procedure, covering both functional and nonfunctional requirements. By including an image of the user interface, users can get a general

idea of the system's design and what to expect during interactions. Tasks have been distributed equally among all project members.

Chapter 4

Implementation and Results

[Must be present in Final Report. Incomplete version might be included in FYDP-1 Report, however it is optional.]

Every chapter should start with 1-2 sentences on the outline of the chapter.

4.1 Environment Setup

4.2 Testing and Evaluation

4.3 Results and Discussion

4.4 Summary

Chapter 5

Standards and Design Constraints

In this 5th chapter, we will talk about different standards, design constraints, cost analysis, design thinking and complex engineering problems.

5.1 Compliance with the Standards

For doing this project, we have followed some standards. There are:
• UI design standards for better user experience.
• Project Management tools for managing the project.
• Washington Accord Guidelines

5.1.1 Software Standards

Ensuring compliance with software standards is crucial for consistent development, meeting quality benchmarks, and facilitating effective maintenance and integration. Our approach involves encapsulating all system features within modular units that can be seamlessly integrated into existing systems via an Application Programming Interface (API). This design choice ensures that the programming language does not limit the system's usability. As part of a micro-services architecture, the software is designed for broad use across various fields. We adhere to CMMI guidelines for documenting, developing, and maintaining the software, and we proactively mitigate risks with a detailed risk planner for future projects.

5.1.2 Hardware Standards

Our system is designed to be lightweight, minimizing the need for extensive hardware to manage speed and space complexity. It can operate efficiently on a basic private or shared server. A processor with a 1GHz clock speed and 4GB of RAM is sufficient for optimal performance. If user load or portal participation exceeds a certain threshold, clients will

be notified to upgrade their hardware capacities. However, even with lower RAM, the system remains functional, albeit with longer feedback times.

5.1.3 Communication Standards

Understanding and working within design constraints is essential for creating effective and practical solutions. Addressing these constraints enables designers to make informed decisions, prioritize requirements, balance competing factors, and deliver successful products. Guided by Donald Norman's 10 principles for user-friendly design, we have implemented a system that aligns with existing client systems. We have standardized headers, footers, and major interface elements with primary color nodes that adapt to the integrated system. To simplify the design, we have ensured that all design decisions require only one or two steps, enabling users to complete tasks quickly and reducing short-term memory load.

5.2 Design Constraints

The design constraints for the online mental health platform include ensuring user-friendliness to accommodate varying levels of digital literacy, especially in rural areas. It must support multilingual functionality to cater to Bangladesh's diverse population. Data privacy and security are critical, requiring robust encryption and compliance with healthcare regulations. The platform needs to be scalable to handle increasing user loads and accessible on low-bandwidth internet connections prevalent in remote areas. Additionally, integrating secure online payment systems and ensuring seamless communication for both online and offline counseling sessions are essential. These constraints ensure the platform is inclusive, secure, and reliable for all users.

5.2.1 Economic Constraint

When developing an online mental health platform for Bangladesh, several economic constraints can impact both the development and implementation phases. Here are some potential factors to consider:

Development Costs:

• Costs of research , programming and testing
• Costs of project management, quality assurance, and UI/UX design.
* Cost of integrating voter ID and phone number verification services.
*Developing a robust system for verifying doctor degrees and IDs.
• Use of third-party libraries, API and tools.

Infrastructure :

• Server costs, including cloud services (e.g., AWS, Google Cloud).
• Database management systems.

• Security measures to protect sensitive health data (encryption, firewalls).

Training and Marketing :

* Training doctors, assistants, and patients on how to use the platform effectively.

* Promoting the platform to potential users, including digital marketing, social media campaigns, and possibly traditional media.

Affordability, Market Readiness and Pricing:

* Setting a pricing model that is affordable for a broad spectrum of users in Bangladesh.

* Balancing between covering costs and making mental health services accessible.

* Potential resistance from traditional healthcare providers and users unfamiliar with digital health solutions.

5.2.2 Environmental Constraint

When developing an online mental health platform for Bangladesh, several environmental constraints should also be considered. These constraints can affect the development, deployment, and sustainability of the platform. Here are some potential environmental factors:

Infrastructure and Connectivity:

* Variability in internet connectivity across urban and rural areas.

* Reliance on stable and high-speed internet for online consultations and data transfers.

* Frequent power outages in certain regions can disrupt access to the platform

Technological Infrastructure :

* Ensuring the platform is optimized for various devices with different processing powers and screen sizes.

* Prevalence of older or lower-end devices among users.

* Environmental impact of data centers (e.g., energy consumption, cooling requirements).

5.2.3 Ethical Constraint

Developing a Mental Health Counselling system involves several ethical considerations to ensure the well-being and privacy of individuals. Here are some ethical constraints that should be taken into account:

Privacy and Confidentiality:

*Ensuring that patient data is securely stored and protected from unauthorized access

* Implementing robust encryption methods for data transmission and storage.

* Ensuring that only authorized personnel (doctors, assistants) have access to sensitive data

Informed Consent:

* Ensuring patients give informed consent before using the platform or sharing personal information.

* Allowing patients to withdraw consent and delete their data from the platform if they choose.

Equity:

*Providing equal access to services for all users, regardless of their socioeconomic status, gender, ethnicity, or location.

* Ensuring that no group is unfairly disadvantaged or excluded from using the platform.

Ethical Use of Technology:

* Using AI and machine learning responsibly to analyze patient data and provide insights

* Ensuring that algorithms are free from bias and do not perpetuate discrimination.

Patient Empowerment:

* Empowering patients to make informed decisions about their mental health care.

* Providing options for patients to choose between online and offline counseling.

* Establishing mechanisms for addressing complaints and resolving issues fairly and promptly

5.2.4 Health and Safety Constraint

When developing an online mental health platform for Bangladesh, it's crucial to consider health and safety constraints to protect users and ensure the platform provides reliable and effective care. Here are some key health and safety considerations:

Ensuring Quality of Care:// * Implementing a rigorous verification process for doctors and their assistants to ensure they are qualified and licensed to provide mental health services.

* Regularly updating and re-verifying credentials to maintain high standards.

* Ensuring providers are up-to-date with the latest mental health practices and health protocols.

Patient Safety:

* Establishing clear protocols for handling mental health emergencies or crises, including guidelines for referrals to in-person care or emergency services.

* Implementing systems to monitor patient progress and ensure follow-up appointments.

* Using reminders and notifications to encourage adherence to treatment plans.

5.2.5 Social Constraint

When developing an online mental health platform for Bangladesh, it's essential to consider social constraints that could impact the platform's adoption and effectiveness. Here are some key social constraints to be mindful of:

Socioeconomic Factors :

* Affordability of online mental health services for lower-income individuals.

* Variations in education and literacy levels, affecting the ability to use digital platforms.

* Need for clear, simple instructions and user interfaces to accommodate users with different educational backgrounds.

Social Norms:

* Sensitivity to gender-specific needs and preferences in mental health care.

* Influence of family and community opinions on individuals' decisions to seek mental health care.

Cultural Attitudes and Stigma:

* High levels of stigma associated with mental health issues can discourage individuals from seeking help.

* Cultural beliefs that mental health problems are a sign of weakness or failure can prevent open discussion and treatment.

* Preference for traditional, in-person consultations over virtual ones.

Licensing and Data Protections :

* Obtaining necessary licenses and permits to operate as a healthcare service provider.

* Adherence to data protection and privacy laws, such as the Digital Security Act, to ensure the confidentiality and security of patient information.

* Compliance with government regulations regarding the provision of healthcare services, including mental health.

* Flexibility to adapt to new policies or regulations as they arise.

5.2.6 Political Constraint

Political constraints can significantly impact the development and operation of an online mental health platform in Bangladesh. Here are some key political considerations to keep in mind:

Political Interference and Influence:

* Safeguarding against undue influence from political actors on decision-making processes or service delivery.

* Maintaining transparency in operations and decision-making processes to build trust with users and stakeholders.

* Mitigating the risk of political interference or pressure that could compromise the independence or integrity of the platform.

Political Stability:

* Consideration of the impact of political instability or unrest on the operation of the platform.

* Monitoring political developments for potential changes in healthcare policies or regulations that could affect the platform.

5.2.7 Sustainability

The sustainability of the proposed online mental health platform in Bangladesh hinges on several key factors. Financial viability is paramount, requiring a robust revenue model, efficient cost management, and diversification of funding sources to ensure long-term stability. Scalability is essential to accommodate growth and expand access to underserved populations. Social acceptance relies on community engagement, cultural sensitivity, and user feedback to foster trust and reduce stigma. Environmental impact considerations, such as green practices and energy efficiency, are crucial to minimize ecological footprint. Regulatory compliance is non-negotiable, necessitating adherence to laws, regulations, and ethical standards. Long-term impact assessment is vital to demonstrate the platform's value and drive ongoing improvement. By addressing these facets comprehensively, the platform can establish itself as a sustainable solution, contributing to improved mental health outcomes and societal well-being across Bangladesh.

5.3 Cost Analysis

Cost analysis of the online mental health platform project involves identifying and estimating all expenses associated with its development, implementation, and operation. Here's a step-by-step guide to conducting a cost analysis for launching this system:

Budget Categories - Cost

Google cloud platform - 500
$SoftwareandHardwareCosts-300$
Integrating payment gateways - 100
$Cloudcomputingservices-250$
Development,testing tools and software - 50

$Documentation and Reporting - 40$
Domain cost - 30
$Copyrights licensing - 50$
Marketing Cost - 300
$Training Cost - 200$

Total Costs : 1820

5.4 Complex Engineering Problem

5.4.1 Complex Problem Solving

The Washington Accord emphasizes that a key trait of the engineering profession is the capacity to handle complexity and uncertainty, as no two real-world engineering projects are alike. Consequently, complex engineering problems demand a high level of technical expertise and knowledge. These challenges are typically marked by their intricate nature, uncertainty, and the necessity for interdisciplinary collaboration. The Washington Accord Graduate Attribute Profile consists of 12 components, supported by a Knowledge Profile (K1–K8) and a Level of Problem Solving Definition (WP1–WP7).

Table 5.1: The Washington Accord Knowledge Profile has eight elements.

K1	K2	K3	K4	K5	K6	K7	K8
Natural Sciences	Mathematics	Engineering Fundamentals	Specialist Knowledge	Engineering Design	Engineering Practice	Comprehension	Research Literature

Complex engineering problems possess a range of attributes. Some or all of the following may be addressed in a professional engineering school program:

P1: For our project, we need to examine existing models with similar objectives (K8), gather data for machine learning predictions (K3, K4), understand the design of machine learning models (K3, K4), develop a web-based front end (K6), and integrate various components (K5, K6) P2: Conflicting technical requirements: Building a machine learning model with low variance in the absence of primary data presents a challenge.

P3: The limited availability and variability of mental health patient data pose challenges in formulating a clear machine-learning problem. Additionally, the complexity of the analysis required makes it difficult to choose a specific algorithm from many alternatives.

P4: Computer science and engineering graduates usually lack exposure to mental health or depression issues, resulting in limited familiarity with such problems.

P5: We must need a permission from our patients to use their problems and solutions . We have to follow the ethical standards and government rules of our country.

P6: Stakeholders often harbor diverse thoughts and needs, which may occasionally conflict with one another. It's essential to navigate these differences and address conflicting requirements to ensure a balanced and satisfactory outcome for all involved parties P7:Project involves a number of interdependent sub- systems (components), such as, appointment booking, payment system, organize counseling ,patient data collection, training module, doctor and assistant authentication, front-end application development, etc

Table 5.2: Mapping with complex problem solving.

P1 Dept of Knowledge	P2 Range of Conflicting Requirements	P3 Depth of Analysis	P4 Familiarity of Issues	P5 Extent of Applicable Codes	P6 Extent of Stakeholder Involvement	P7 Interdependence
√	×	×	√	×	√	√

5.4.2 Engineering Activities

The features of complex engineering tasks, some of which a skilled engineering student might be able to handle:

A1 (Range of Resources): The project needs to engage diverse resources including people, money,equipment,materials, information and technologies.

A2 (Level of interaction): Resolution of significant problems arises from addressing interactions between various technical, engineering, and other conflicting issues. Through iterative discussions among stakeholders, mental health professionals, and our team, effective solutions are achieved.

A3 (Innovation):A degree of innovation is needed to develop the machine-learning based Mental health prediction model using the Available patient data.

A4 (Consequences for society and the environment): The project helps the mental health people for getting a better platform . And our society aware about the mental health problems cause and solutions.

A5 (Familiarity): The project deals with a very crucial area of our society .For this project, people are more familiar with the mental health problems and can find the easy solution of that problems.

Table 5.3: Mapping with complex engineering activities.

A1 Range of resources	A2 Level of Interaction	A3 Innovation	A4 Consequences for society and environment	A5 Familiarity
×	×	√	√	√

5.5 Summary

In this chapter, we viewed various aspects of standards and design constraints in the context of developing a mental health problems and solutions system. We highlighted the importance of compliance with software, hardware, and communication standards to ensure the system's effectiveness and compatibility with existing systems. We also aimed design constraints, including economic, environmental, ethical, health and safety, social, political, and sustainability constraints, emphasizing the need to consider these factors during development.

Furthermore, we analyzed the costs to figure out how much it would take to build and run the system. We looked at different budget areas to see if it's financially possible and sustainable. Also, we talked about complex engineering problems and activities. We looked at things like how deeply we need to think about them, how well we know the issues, and how different parts depend on each other. We also considered new ideas and how they affect society and the environment. In summary, this chapter covered everything from standards and design limitations to analyzing costs and tackling complex engineering challenges in creating our Online mental health solutions platform.

Chapter 6

Conclusion

6.1 Summary

The online mental health platform for Bangladesh aims to provide accessible and effective mental health services to individuals across the country. With features catering to various user roles such as admin, doctors, assistants, and patients. The platform facilitates secure appointment scheduling, online payments, and counseling sessions. Verification processes ensure the qualifications and credibility of healthcare providers, while compliance with regulations ensures data privacy and ethical standards. By addressing economic, environmental, social, and political constraints, the platform strives for sustainability. Through continuous improvement, community engagement, and regulatory compliance, it aims to enhance mental health outcomes and promote well-being in Bangladesh.

6.2 Limitation

Limitations of the online mental health platform for Bangladesh include the cultural stigma, language diversity, regulatory complexity, healthcare infrastructure challenges, and technological constraints. Limited internet access and digital literacy in rural areas may hinder platform accessibility. Deep-seated societal stigma surrounding mental health could deter user engagement, while language barriers may exclude non-Bengali speakers. Compliance with complex healthcare regulations and data privacy laws poses ongoing challenges. Additionally, shortages of mental health professionals and technological constraints may limit the platform's effectiveness. Addressing these limitations requires comprehensive strategies to promote inclusively, education, regulatory compliance, and technological adaptation.

6.3 Future Work

Future work for the online mental health platform in Bangladesh includes optimizing accessibility with mobile applications for low-bandwidth areas, expanding multilingual support,

and conducting community outreach to reduce stigma. Integration with tel-medicine services, research on mental health trends, and partnerships with healthcare organizations will enhance services and reach. Technological innovations like AI diagnostics and virtual reality therapy offer potential for advanced treatment options. Continuous improvement through user feedback ensures the platform remains responsive to evolving needs, promoting mental health awareness and accessibility across diverse communities in Bangladesh.

References

[1] Jon Kleinberg and Eva Tardos. *Algorithm design*. Pearson Education India, 2006.