"UniCamp"

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CERTIFICATE

This is to certify that the project work entitled "**Uni-Camp**" is a work carried out by **M Harshavardhan** (**4NI21CS054**), **Karthik Gowda M S** (**4NI21CS045**) **Anthony Naveen J** (**4NI21CS019**) in partial fulfilment for the Minor project work (**21CS6P01**), sixth semester, Computer Science & Engineering, The National Institute of Engineering (Autonomous Institution under Visvesvaraya Technological University, Belagavi) during the academic year 2023-2024.The minor project work report has been approved in partial fulfilment as per academic regulations of The National Institute of Engineering, Mysuru.

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Brief information about the Project

UNICAMP is a comprehensive web application designed to empower students to take control of their health and well-being. With an intuitive interface and a range of powerful features, UNICAMP enables users to monitor their health, receive personalized suggestions, and access valuable insights into their well-being. Upon registration, users create personalized health profiles, inputting essential information such as medical history, allergies, medications, and more. They can then begin tracking their health regularly, recording vital signs, symptoms, exercise routines, dietary habits, and sleep patterns. One of the key features of UNICAMP is its personalized suggestions engine, which analyzes user data to provide tailored recommendations for improving health and wellness using Generative AI. Whether it's exercise tips, dietary advice, or stress management techniques, users receive actionable insights to optimize their well-being. Additionally, UNICAMP includes a symptom checker tool, allowing users to input their symptoms and receive potential causes or conditions associated with them. Data security and user privacy are paramount in UNICAMP. All health information is securely stored, complying with relevant data protection regulations to ensure user confidentiality. UNICAMP aims to revolutionize student healthcare by providing a user-friendly platform for health monitoring, personalized guidance, and disease preventive measures. By empowering students to track their health proactively, UNICAMP fosters a culture of well-being and self-care within educational institutions.

CHAPTER 1

INTRODUCTION

The UniCamp project stands as an innovative solution in the realm of student health management, aiming to revolutionize the way university students access and manage crucial information about their well-being. In a rapidly evolving world where student health and wellness are gaining prominence, the complexities of health-related data necessitate a sophisticated and user-friendly platform. Developed with React.js for the frontend, Node.js with Express.js for server communication, and MongoDB for database management, UniCamp addresses the escalating demand for a comprehensive system that enables students to monitor their health, receive personalized suggestions, and access valuable insights into their well-being.

Navigating the intricacies of personal health management has traditionally been a complex endeavor, demanding considerable time and effort. Nevertheless, the UniCamp system streamlines this process by introducing a dynamic feature akin to a virtual health portfolio. This innovative aspect empowers students to effortlessly monitor and track essential information about their health profiles, including medical history, vital signs, symptoms, exercise routines, dietary habits, and sleep patterns in real-time. By providing users with up-to-date insights into their health, UniCamp ensures that students can make informed decisions promptly. This real-time tracking capability equips users with valuable insights, enabling them to adapt their approach swiftly and make necessary adjustments to their health routines and lifestyle choices.

Similarly, UniCamp extends its functionality beyond core health tracking, introducing an intuitive health suggestions engine that redefines how students receive personalized recommendations for their well-being. Through a user-friendly interface, users can effortlessly receive tailored advice on various aspects of health, such as exercise, diet, stress management, and preventive measures, using Generative AI. This revolutionary feature provides a comprehensive overview of an individual's health needs, enabling users to pinpoint areas for improvement and make well-informed decisions about their wellness priorities. By incorporating real-time notifications and actionable insights, UniCamp ensures users maintain a proactive approach to their health, stay aligned with their wellness goals, and make responsible decisions within the context of their overall well-being.

In a parallel fashion, UniCamp strives to elevate user engagement and awareness within the student health landscape by integrating real-time data insights. The system incorporates dynamic features reminiscent of real-time updates in health management apps. Here, users can personalize their health-related tracking and recommendations, adding their preferred health metrics and goals. This customization empowers users with up-to-the-minute information, including health trends, personalized suggestions, and pertinent news. By delivering this comprehensive feature set, UniCamp equips users, whether they are seasoned health enthusiasts or newcomers, with the knowledge necessary to make informed decisions about their health. Staying abreast of the latest developments in the health domain, users can seize opportunities and optimize their strategies for navigating the evolving landscape of student health and wellness.

The UniCamp project integrates React.js, Node.js with Express.js, and MongoDB for a cohesive and user-friendly platform. This dynamic technology stack forms a robust foundation for the UniCamp application, facilitating efficient management and retrieval of health data. The system ensures a consistent and intuitive user experience across various devices, empowering students to manage their health effectively.

The UniCamp project revolutionizes student health management, integrating modern web technologies for seamless user experience and data management. Offering comprehensive insights into health profiles, personalized suggestions, and real-time tracking, UniCamp empowers informed decision-making. Its cohesive technological framework promises to transform student health and wellness, providing users with greater control and confidence in managing their well-being. This platform signifies a significant advancement in navigating the complex health landscape within educational institutions. UniCamp is set to redefine how students engage with and adopt proactive health management practices.

CHAPTER 2

LITERATURE SURVEY

Paper 1: Companion: Mental Health Mobile Applications for Students

Adolescence marks a significant transition from childhood to adulthood, characterized by various challenges and new experiences. This period often sees an increase in mental health issues such as anxiety, depression, and mood swings. Studies estimate that at least one in five youths between 9 to 17 years old experience diagnosable mental disorders, with only about 30% receiving proper care. While this statistic originates from the United States, similar trends are observed globally. For instance, in Indonesia, around 20% of the population faces mental health issues, translating to approximately 55 million individuals.

The COVID-19 pandemic exacerbated these issues by limiting social interactions and altering traditional schooling methods. While digital platforms like Google Meet and Zoom facilitated remote learning, they also contributed to a decline in socialization and increased dependence on mobile social apps, impacting adolescents' mental health. Despite these challenges, mobile phone usage does not always negatively affect adolescents. Studies have shown a slight positive correlation between time spent on social networking services and happiness among middle school students in South Korea, suggesting that these platforms can relieve academic pressure.

Mobile health apps have emerged as valuable tools for addressing mental health issues, particularly among adolescents who may find formal counseling services intimidating or inaccessible. These apps offer a convenient and familiar medium for seeking help, capitalizing on the extensive time teens spend on their phones. Popular health apps like Halodoc in Indonesia provide a range of services, including mental health consultations, but they primarily target adult users. There is a distinct need for mental health apps specifically designed for students.

The Companion app aims to fill this gap by providing a mental health platform tailored for students. The app facilitates direct access to doctors through teleconsultation, a custom news feed, and a digital diary. The design focuses on simplicity, convenience, and aesthetics to encourage regular use by students. The app’s user interface (UI) was designed using Figma and transformed into a functional application using Bravo Studio, Airtable, and Firebase. This approach minimizes coding requirements, making app development accessible even to those with limited programming skills. Companion integrates Figma front-end designs with Airtable backend through Bravo Studio’s data

binding feature. The app supports basic functionalities like GET, POST, PATCH, and DELETE operations for data management. Scenario testing confirmed the app's functionality, except for the chat feature, which is not yet supported by Bravo Studio. Messaging-style communication is a temporary solution, requiring users to refresh to see new messages, which is not ideal for seamless consultations. Companion is designed to be a user-friendly and supportive platform for students to seek mental health assistance. Built with minimal coding using Figma, Bravo Studio, Airtable, and Firebase, the app offers a straightforward and accessible solution. Future developments will include dynamic news feeds, a chat feature, and engaging activities to retain user interest. The goal is to create a safe and comfortable space for adolescents to express themselves and improve their mental health.

Paper 2: An Approach for Mental Preparation for First-Year College Students: A Case Study of Engineering Students.

The transition from high school to university presents numerous challenges for first-year students. University life differs significantly from high school, primarily due to the shift from a teacher-led environment to a student-centered learning approach. Many students arrive at university with unrealistic expectations and are often unprepared for the independent learning required. This mismatch between expectations and reality can impact students' attitudes and performance, making the transition a major challenge for new students.

First-year university students face not only academic challenges but also personal ones. The pressure to adapt to new social and academic environments can lead to anxiety and depression. Studies have shown a high prevalence of mental anxiety among first-year medical students. In response, the Department of Electrical and Computer Engineering at Thammasat University (TU) has implemented programs to monitor and assist students, particularly those vulnerable to mental health issues. This includes preliminary mental health checkups and mindfulness meditation training to improve students' mental well-being and academic performance.

Mindfulness meditation has been adopted as a preliminary intervention to help first-year engineering students at TU. This practice aims to enhance self-awareness and improve students' ability to handle the stresses of university life. The university also introduced a mobile application, "Mind Mood," which helps students evaluate and manage their mental health.

The app offers evaluations in three categories: My Mind, My Emotion, and My Personality, using various response scales to measure mental health indicators.The effectiveness of mindfulness meditation was assessed through a case study involving 44 first-year electrical and computer engineering students at TU. These students participated in mindfulness training exercises and completed questionnaires afterward. The results indicated high satisfaction levels among the participants, suggesting that mindfulness meditation helped alleviate their anxiety and improved their ability to cope with university challenges.

In conclusion, the transition to university can significantly impact first-year students' mental health and academic performance. Programs like those at TU, which include mindfulness meditation and mental health monitoring, are essential in supporting students through this critical period. By addressing both academic and personal challenges, universities can help students develop resilience and achieve long-term success.

Paper 3: AI in Health Education Translation

Artificial Intelligence (AI) has significantly impacted various domains, including translation services and health education. The convergence of these fields has opened new avenues for enhancing the understanding of health-related materials among diverse populations, particularly international students. This literature survey explores the role of AI in translation and its implications for health education, emphasizing the necessity for precise and accessible translations to improve health management and educational outcomes.

The application of AI in translation involves leveraging advanced algorithms and machine learning models to accurately convert text from one language to another. Modern AI-driven translation tools, such as online translation websites, have made significant strides, providing more nuanced and contextually aware translations. These tools are particularly valuable for international students who often encounter language barriers when accessing health education materials. By enhancing the quality of translations, AI ensures that students can comprehend crucial health information more effectively.

International students face unique challenges in health management due to differences in healthcare systems, cultural practices, and language barriers. AI-powered translation tools can help bridge these gaps by delivering accurate translations of health education resources, thereby improving students' understanding and application of this knowledge. Research has demonstrated that enhancing the readability and accessibility of health materials through AI translation substantially boosts students' ability to manage their health and academic responsibilities.

To assess the effectiveness of AI in health education translation, a multi-step methodology was employed. An online translation website was selected, and a pre-test was conducted to evaluate its initial accuracy. Subsequently, a questionnaire survey was administered to measure the students' comprehension abilities after using the translated materials. The survey data was analyzed to determine improvements in health education knowledge and the usability of the translations. The findings revealed that AI translations significantly enhanced students' understanding of health education concepts, underscoring the importance of utilizing advanced translation tools in educational settings.

AI's integration into translation services is transforming health education for international students by making it more accessible and comprehensible. By addressing language barriers, AI-powered translations enable students to better manage their health and excel academically. These tools play a crucial role in ensuring that health education materials are not only accurate but also culturally and linguistically appropriate for diverse student populations.

In conclusion, the intersection of AI and health education translation holds tremendous potential for improving the educational experience of international students. Future research should focus on refining AI translation tools to further enhance their accuracy and user-friendliness. By continuing to develop these technologies, educational institutions can create a more inclusive and effective learning environment, ultimately supporting the well-being and academic success of all students.

Paper 4: Personal Health Monitoring System with Notification Alert Abstract

The literature survey reveals a pressing need for a personal health monitoring system, especially in the current pandemic situation. Various studies propose the use of wearable devices equipped with sensors to monitor vital signs such as body temperature, pulse rate, and oxygen saturation (SpO2) continuously or at predefined intervals. The collected data is then compared with predefined values to identify any potential health risks.

The proposed systems generally consist of two main parts: the hardware, which includes the wearable device and sensors, and the software, which includes a mobile or web application for data storage and analysis. The application also notifies the user and their contacts when significant changes in vitals are detected.

Research shows that the Internet of Things (IoT) has the potential to revolutionize health monitoring, making it remote and real-time. The use of sensors can reduce human error and provide accurate, real-time data. The integration of cloud services with hardware functionalities can further enhance the system's efficiency and cost-effectiveness.

The literature also highlights the use of various technologies and components such as MAX30102 Sensor for pulse oximetry and heart rate monitoring, GY-906-BCC MLX90614ESF IR Sensor for body temperature measurement, and Arduino Nano for data processing.

Moreover, advancements in machine learning have been explored for predicting health risks based on the collected vitals data. For instance, the Decision Tree classification model has been used to predict potential COVID-19 cases with an accuracy of nearly 94%.

In conclusion, the literature indicates that personal health monitoring systems can significantly improve healthcare delivery and outcomes, particularly in emergency situations. However, there are still challenges to be addressed, including the extension of notification facilities to offline users and the detection of other health issues related to human lifestyle.

CHAPTER 3

REQUIREMENTS

Hardware Requirements:

1. Processor:

   Minimum: Dual-core processor

   Recommended: Quad-core processor or higher

2. RAM:

   Minimum: 4GB RAM

   Recommended: 8GB RAM or higher

3. Storage:

   Minimum: 50GB of available disk space

   Recommended: 100GB or more for storing database and application files

4. Network:

   Stable internet connection for accessing online resources and deploying the application

5. Display:

   Minimum: 1280x800 resolution monitor

   Recommended: 1920x1080 resolution monitor or higher

Software Requirements:

1. Programming Languages:
   Backend: Node.js (Express.js framework)
   Frontend: React.js
   Database: MongoDB

2. Web Servers:
   Development: Node.js development server (Express)
   Production: Node.js with Express

3. Supported Browsers:
   Compatible with popular browsers: Chrome, Firefox, Safari, Edge

4. Supported Operating Systems:
   Platform-independent: Accessible on Windows, macOS, Linux

5. Development Tools:
   React.js, Node.js with Express.js, MongoDB, Git, IDE (VS Code), Browser Developer Tools

CHAPTER 4

SYSTEM ANALYSIS

EXISTING SYSTEM

Before the development of the UniCamp health management web application, students encountered significant challenges in managing their health and well-being. The existing system was characterized by fragmented processes, reliance on manual tracking methods, and the use of multiple disconnected tools. This outdated approach not only led to inefficiencies, data inconsistencies, and a lack of real-time insights but also impacted the overall effectiveness of student health management.

The absence of a centralized platform for managing health profiles, coupled with robust analysis tools and personalized suggestions, further compounded the challenges. This deficiency made it difficult for students to assess and optimize their health comprehensively. Additionally, the limited accessibility to dedicated health management resources exacerbated the situation, hindering students from efficiently navigating their health and wellness needs.

Similarly, the existing system's lack of automated alerts or notifications posed a significant hurdle. Users had to heavily rely on personal vigilance to track health metrics, monitor symptoms, and evaluate overall wellness. This not only resulted in missed opportunities for early intervention and health optimization but also impacted the overall effectiveness of health-related decisions.

The process of tracking health metrics in the existing system involved using separate applications that merely stored input data without offering insightful suggestions. This manual approach placed a significant burden on users, with existing apps serving as data storage tools rather than providing proactive guidance. This not only affected health management but also contributed to inefficiencies in the overall dynamics of student health information. the existing system lacked integration and synchronization among different components related to health and wellness, extending beyond just physical health.

Recognizing these challenges, the UniCamp project was conceptualized to bridge these gaps comprehensively. It offers users a holistic health management tool specifically tailored for the dynamic landscape of student health, addressing not only physical health tracking but also enhancing the overall effectiveness of health management.

PROPOSED SYSTEM

The envisioned UniCamp health management web application aims to redefine the landscape of managing student health-related information. By introducing a centralized platform, UniCamp seeks to overcome the challenges posed by the existing system, offering users a seamless and efficient solution for handling diverse aspects of health and well-being.

Developed using React.js for the frontend, Node.js with Express.js for server communication, and MongoDB for database management, UniCamp promises a user-friendly interface and robust features tailored specifically for student health management. The utilization of a web app format ensures accessibility across various devices, providing a versatile and convenient experience for users.

One of the core features of UniCamp is its ability to store details about students' health profiles, including medical history, vital signs, symptoms, exercise routines, dietary habits, and sleep patterns. With a sophisticated database comprising interconnected collections, UniCamp goes beyond a conventional data repository, offering a dynamic and interconnected system for managing health-related information.

The objectives of UniCamp encompass a wide spectrum of user needs, including tracking health metrics, receiving personalized health suggestions, analyzing symptoms, and accessing preventive health measures. This comprehensive approach caters to both seasoned health enthusiasts and individuals new to proactive health management.

At the core of the UniCamp system is the efficient MongoDB database, ensuring the seamless storage and retrieval of diverse health data. This robust technology stack not only meets the dynamic requirements of health management but also signifies a substantial advancement in the field.

The proposed UniCamp health management web application stands as a pivotal stride in simplifying and enriching the handling of health-related information. Through the integration of diverse functionalities and a powerful technology stack, UniCamp envisions empowering students with a comprehensive tool. This tool enables them to make informed health decisions, track health metrics, receive personalized health suggestions, and navigate the intricacies of student health and well-being.

CHAPTER 5

SYSTEM DESIGN

User Authentication

Authentication is the pivotal process in the UniCamp Health Management System, ensuring that only authorized users and systems can access vital health resources. This safeguards sensitive health data, employing secure methods like usernames and passwords, along with session-based authentication and OAuth, to verify user identity. Robust authentication mechanisms in UniCamp contribute to the overall security and integrity of student health information.

Health Profile Management

UniCamp's database architecture is meticulously designed to handle diverse student health data efficiently. The collections such as USERS, MEDICAL_HISTORY, VITAL_SIGNS, SYMPTOMS, EXERCISE_LOGS, DIETARY_INTAKE, and SLEEP_PATTERNS collectively manage information related to students' health profiles, medical history, vital signs, symptoms, exercise routines, dietary habits, and sleep patterns. This comprehensive data management ensures seamless access, retrieval, and organization of health-related information.

Personalized Suggestions and Health Insights

Personalized suggestions and health insights form a crucial aspect of UniCamp, allowing users to receive tailored health recommendations. The AI-powered suggestion engine, using advanced algorithms and machine learning models, analyzes user data to provide personalized exercise tips, dietary advice, stress management techniques, and preventive health measures. This feature empowers users to optimize their health and well-being based on actionable insights.

Symptom Checker and Analysis

UniCamp addresses symptom-related aspects through the SYMPTOM_CHECKER tool, capturing and analyzing data inputted by users. This functionality ensures efficient tracking and management of health symptoms, allowing users to identify potential causes or conditions associated with their symptoms. The symptom checker provides users with valuable insights and helps them make informed decisions about seeking medical advice or treatment.

Health and Wellness Tracking

The VITAL_SIGNS, EXERCISE_LOGS, DIETARY_INTAKE, and SLEEP_PATTERNS collections within UniCamp are dedicated to comprehensive health and wellness tracking. These collections facilitate a holistic view of the user's health status, covering aspects like vital signs, exercise routines, dietary habits, and sleep patterns. This holistic approach aids users in maintaining a balanced lifestyle, tracking progress, and making informed health decisions.

Mental Health and Stress Management

UniCamp efficiently manages mental health and stress-related data through the MENTAL_HEALTH collection, capturing data such as stress levels, mood logs, and mental well-being indicators. This centralized mental health management feature enables users to monitor their mental health, receive personalized stress management techniques, and enhance their overall well-being. The mental health tracking contributes to creating a seamless and user-friendly experience for students.

Data Security and Privacy

Data security and user privacy are paramount in UniCamp. All health information is securely stored in the MongoDB database, complying with relevant data protection regulations to ensure user confidentiality. The use of secure communication protocols and robust authentication mechanisms further enhances the security and privacy of user data, providing a safe and trusted environment for health management.

AI Integration for Health Predictions

The AI integration within UniCamp leverages machine learning models and advanced analytics to predict potential health issues based on user data. This predictive capability allows users to proactively address potential health concerns, receive early warnings, and take preventive measures. The AI-driven health predictions empower users with foresight into their health trajectories, enabling them to make informed decisions about their health and well-being.

CHAPTER 6

IMPLEMENTATION

IMPLEMENTATION DETAILS

1. User Authentication

- Frontend: HTML, CSS, and JavaScript are utilized to design the user interface, providing an interactive and visually appealing experience.
- Backend: Node.js with Express handles user authentication on the server-side, ensuring secure verification of user credentials.
- Database: MongoDB is employed to store user data, including usernames and securely hashed passwords.

2. Health Profile Management

- Frontend: React, HTML, CSS, and JavaScript together form the frontend, allowing users to interact with and visualize their health profile data.
- Backend: Node.js with Express executes MongoDB queries to manage diverse data aspects, ensuring efficient storage, retrieval, and organization.
- Database: MongoDB stores data in collections like USERS, MEDICAL_HISTORY, VITAL_SIGNS, SYMPTOMS, EXERCISE_LOGS, DIETARY_INTAKE, and SLEEP_PATTERNS, creating a comprehensive structure for health-related information.

3. Personalized Suggestions and Health Insights

- Frontend: React, HTML, CSS, and JavaScript contribute to the frontend, providing an intuitive interface for users to receive personalized health suggestions.
- Backend: Node.js with Express handles API requests, validate and process data, and interacts with the AI models to provide tailored health recommendations.
- AI Integration: AI models are integrated to analyze user data and generate personalized health insights, using machine learning techniques.

4. Symptom Checker and Analysis

- Frontend: React, HTML, CSS, and JavaScript are utilized for the frontend, allowing users to input symptoms and receive potential causes or conditions seamlessly.
- Backend: Node.js with Express manages API requests, process data, and interacts with the AI models to analyze symptoms and provide insights.
- Database: MongoDB's SYMPTOMS collection efficiently captures and organizes data on user-reported symptoms, aiding in symptom analysis.

5. Health and Wellness Tracking

- Frontend: React, HTML, CSS, and JavaScript contribute to the frontend, providing users with an interactive health and wellness tracking experience.
- Backend: Node.js with Express scripts manage API requests, process data, and interact with the MongoDB database to handle health tracking information.
- Database: MongoDB's VITAL_SIGNS, EXERCISE_LOGS, DIETARY_INTAKE, and SLEEP_PATTERNS collections efficiently capture data on vital signs, exercise routines, dietary habits, and sleep patterns, facilitating comprehensive health tracking.

6. Mental Health and Stress Management

- Frontend: React, HTML, CSS, and JavaScript are utilized for the frontend, allowing users to track mental health and stress levels seamlessly.
- Backend: Node.js with Express manages API requests, process data, and interacts with the MongoDB database to handle mental health information.
- Database: MongoDB's MENTAL_HEALTH collection efficiently captures data on stress levels, mood logs, and mental well-being indicators, aiding in mental health management.

Overall Architecture

The application's frontend is meticulously developed using HTML, CSS, and JavaScript, delivering a smooth and responsive web app experience. Node.js with Express takes the lead in implementing robust server-side logic, proficiently managing API requests, validating and processing data, and facilitating smooth interactions.MongoDB, a reliable NoSQL database management system, is employed for efficient and organized data storage, enhancing the overall data management structure. React plays a pivotal role in enhancing the user interface and interactivity, contributing to an engaging and dynamic user experience.HTML and CSS collaborate harmoniously, providing the foundation for structuring content and styling elements, ensuring an aesthetically pleasing and user-friendly interface.User authentication is securely handled through Node.js with Express, ensuring a streamlined process while managing user accounts and enhancing overall security.The application offers real-time data storage and retrieval capabilities using MongoDB, contributing to the dynamic and efficient management of health profiles and tracking details.

CHAPTER 7

TESTING

SYSTEM TESTING

System Testing for the UniCamp web application can involve the following scenarios and test cases for each component:

1. Authentication:

a. User Registration

Test Case 1.1: Verified successful user registration using email/password.

b. User Login

Test Case 1.2: Tested login functionality with valid credentials.

Test Case 1.3: Tested login functionality with invalid credentials.

2. Health Profile Management:

a. Creating a Health Profile

Test Case 2.1: Verified users can create a health profile with essential information like medical history, allergies, and medications.

b. Updating Health Profile Details

Test Case 2.2: Verified users can update their health profile details.

c. Viewing Health Profile Details

Test Case 2.3: Verified users can view detailed information about their health profile.

3. Personalized Suggestions and Health Insights:

a. Generating Personalized Suggestions

Test Case 3.1: Verified the AI engine generates personalized health suggestions based on user data.

b. Viewing Health Insights

Test Case 3.2: Verified users can view health insights and recommendations provided by the AI engine.

5. Mental Health and Stress Management:

a. Tracking Mental Health

Test Case 5.1: Verified users can track their mental health and stress levels.

b. Viewing Mental Health Insights

Test Case 5.2: Verified users can view insights related to their mental health and stress management.

6. Data Synchronization:

a. Testing Data Synchronization

Test Case 6.1: Tested data synchronization between frontend and MongoDB database.

Test Case 6.2: Simulated concurrent user actions for data consistency.

Test Case 6.3: Intentionally disconnect and reconnect to test synchronization recovery.

Test Case 6.4: Verified handling of conflicts in data synchronization.

Test Case 6.5: Tested scalability by increasing data transaction volume.

7. Security and Privacy:

a. Testing Password Hashing and Encryption

Test Case 7.1: Verified effectiveness of password hashing.

Test Case 7.3: Conducted penetration testing for security vulnerabilities.

Test Case 7.4: Validated data encryption methods.

8. Compatibility Testing:

a. Device and Browser Compatibility

Test Case 8.1: Tested on various mobile devices and operating systems.

Test Case 8.2: Verified browser compatibility across different platforms.

Test Case 8.3: Tested responsiveness and layout consistency across screen resolutions.

Test Case.

TESTING RESULTS

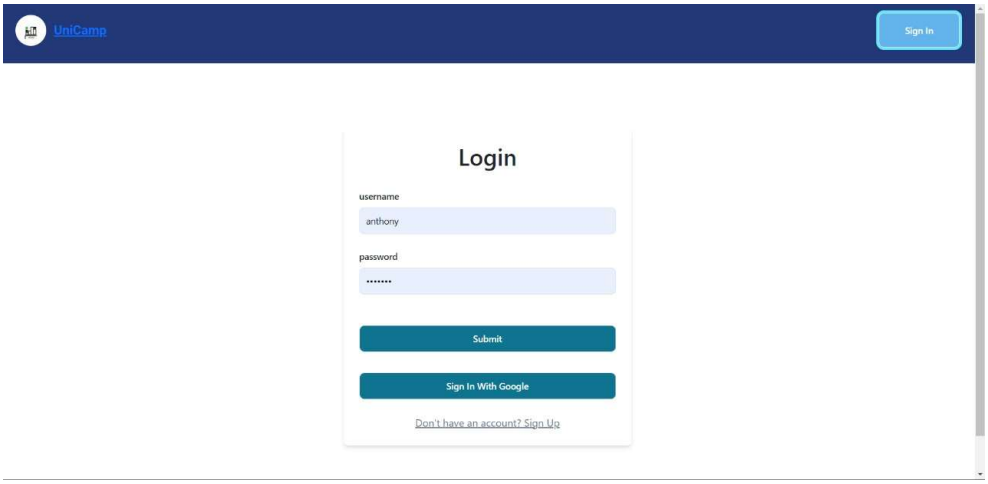

Fig:7.1 Login Page

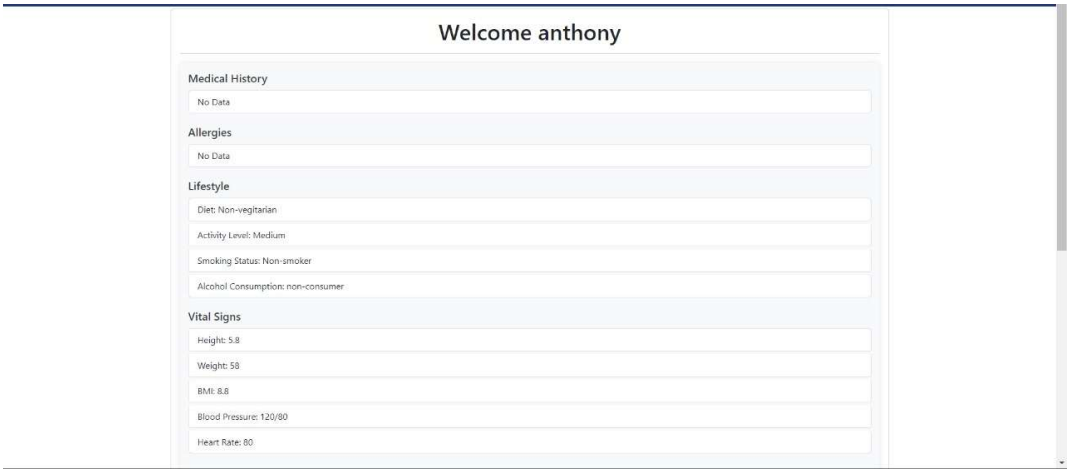

Fig:7.2 User Health Profile

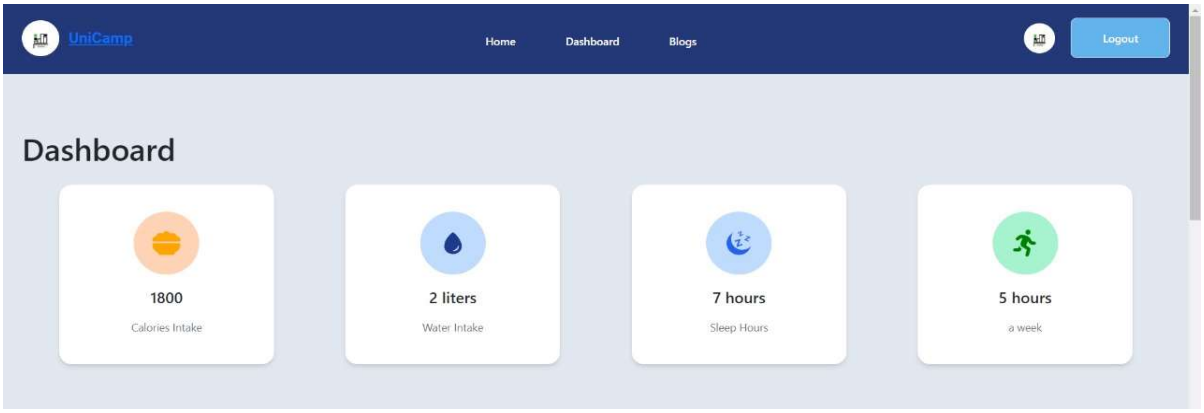

Fig:7.3 User Dashboard

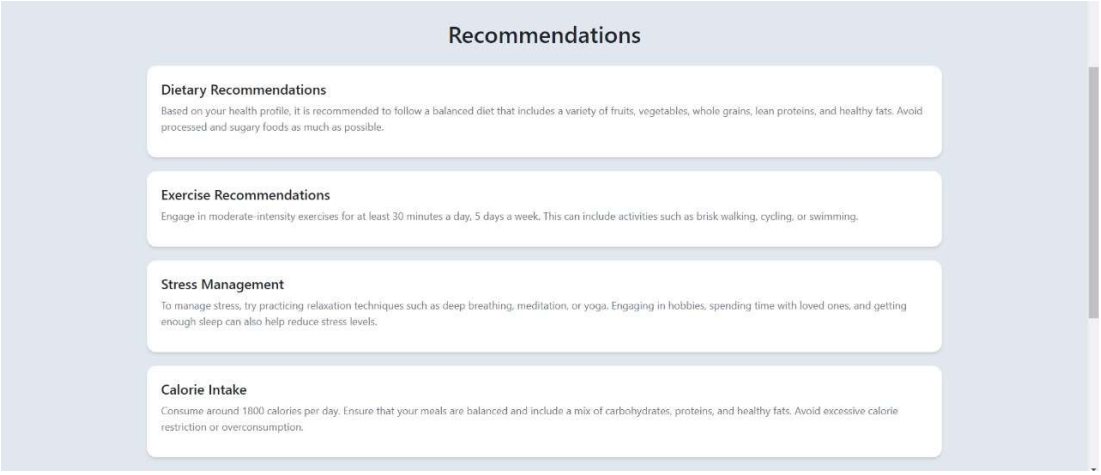

Fig:7.4 AI generated Recommendations

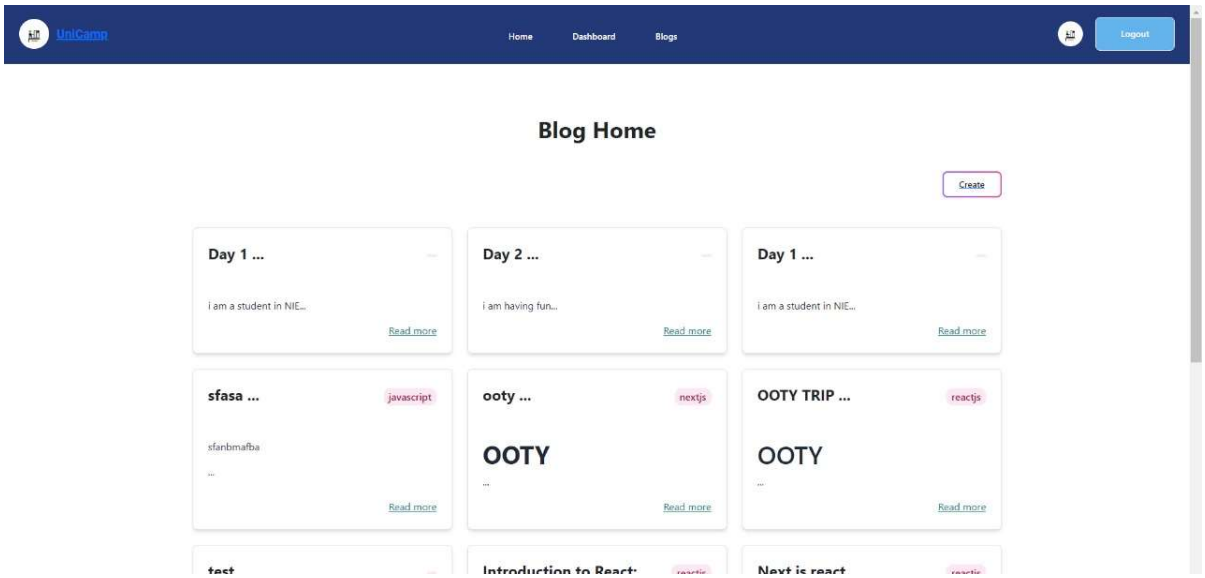

Fig:7.5 User Blog Interface

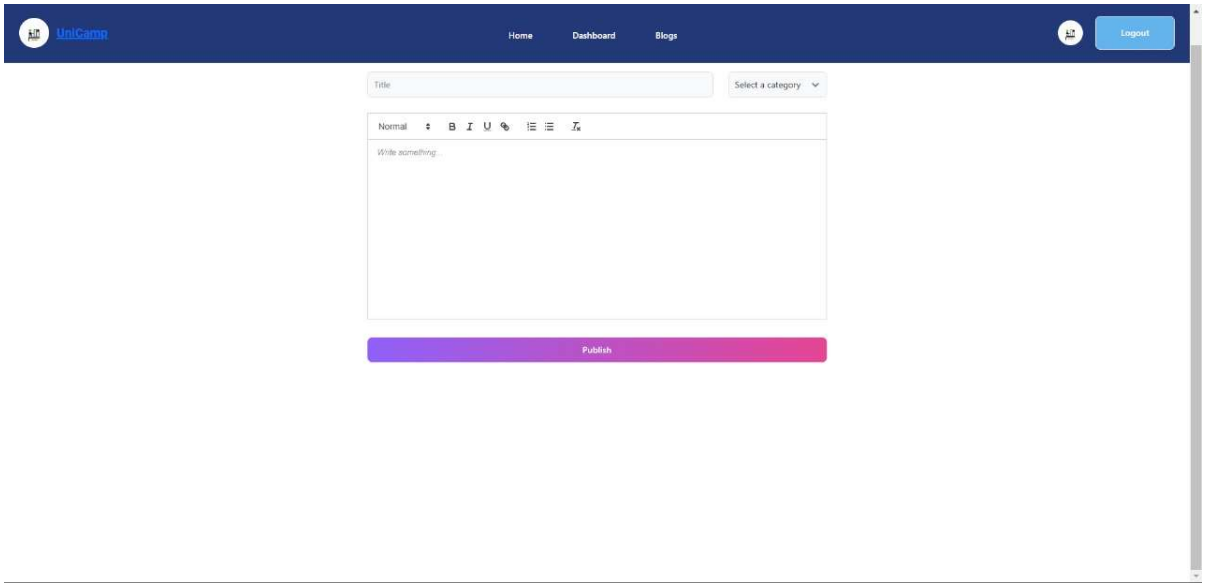

Fig:7.6 User Blog Create

Fig:7.7 Encrypted Password

CHAPTER 8

CONCLUSION

In conclusion, the E-Way Electric Vehicle (EV) Management System successfully implemented a diverse array of features aimed at providing users with effective tools for managing electric vehicle related information. Leveraging HTML, CSS, JS, PHYTHON FLASK, and MySQL, we crafted a cohesive and user-friendly system.

The comprehensive vehicle data management feature ensures efficient handling of electric vehicle data. With structured tables like COMPANY, VEHICLES, STATION, COST, and SERVICE, the system offers seamless access, retrieval, and organization of information related to electric vehicle companies, vehicle details, charging stations, financial aspects, costs, and services.

Expense tracking and management, a vital aspect of E-Way, is facilitated by the COST table. This functionality empowers users to gain insights into their electric vehicle-related expenses, categorize spending, and make informed financial decisions.

Service and complaint management are efficiently addressed through the SERVICE table, providing insights into the performance of electric vehicle companies and enabling users to make informed decisions based on user ratings and resolved complaints.

Station management, facilitated by the STATION table, ensures users can locate charging stations, assess their availability, and plan electric vehicle journeys strategically. The STATION table contributes to creating a seamless and user-friendly experience for electric vehicle users.

Overall, the architecture of the E-Way system, driven by HTML, CSS, JS, PHP, and MySQL, offers a comprehensive solution for managing electric vehicle-related data, ensuring efficient data processing, expense tracking, service management, financial analytics, and station management. The system not only demonstrates technical proficiency but also provides a foundation for future enhancements, making it even more comprehensive and user-centric.

CHAPTER 9

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