Campus Calm
Major Project I Report

Submitted in partial fulfillment of the requirements for the degree of

Bachelor of Engineering (Computer Engineering)

By:

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Under the Guidance of
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Department of Computer Engineering

TERNA ENGINEERING COLLEGE

Nerul (W), Navi Mumbai 400706

(University of Mumbai)

(2023-2024)

terna
Knowledge to Empower

TERNA ENGINEERING COLLEGE, NERUL, NAVI MUMBAI

Department of Computer Engineering

Academic Year 2023-24

CERTIFICATE

This is to certify that the major project I entitles **"Campus Calm"** is a bonafide work of

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Guide **Head of Department** **Principal**

Approval Sheet

Project Report Approval

This Major Project Report – entitled "**Campus Calm**" by following students is approved for the degree of ***B.E. in "Computer Engineering"***.

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Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will cause disciplinary action by the Institute and can also invoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Abstract

The "Campus Calm" system represents a pioneering initiative aimed at tackling the pervasive issue of academic stress among students. Designed as a comprehensive platform, it addresses the multifaceted challenges associated with stress by incorporating features such as stress level assessment, personalized recommendations, and a focus on promoting mental well-being. At the core of this endeavor is the utilization of the Perceived Stress Scale (PSS), a well-established and user-friendly questionnaire. The PSS serves as a vital tool for data collection, allowing the system to discern stress levels among students and identify those in need of support.

Through the integration of advanced machine learning techniques, the collected PSS data will be employed to train a model capable of inferring perceived stress levels of individual students. This model, once developed, holds the potential to predict stress levels, enabling timely interventions to manage and reduce stress. By harnessing the power of the PSS and machine learning, the "Campus Calm" system endeavors to empower students with personalized tools for stress management, ultimately contributing to the broader goal of mitigating the risks associated with anxiety and depression in academic settings.

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Chapter 1: Introduction

1.1 Introduction:

Stress in academia is a pervasive issue, manifesting as psychological, emotional, and physical strain for students. This strain is primarily attributed to the overwhelming weight of academic demands, compounded by the constant pressure to meet social expectations and increased responsibilities. Consequently, the prevalence of anxiety and depression among students is on the rise, necessitating comprehensive solutions.

Addressing this crisis requires a multi-faceted approach, encompassing heightened awareness, robust support systems, enhanced educational strategies, and fundamental policy reforms. Effective solutions demand diligent data collection and in-depth analysis to inform program development and implementation. Our project "Campus Calm" plays a pivotal role in supporting these efforts, facilitating the critical data analysis required to combat the growing epidemic of student stress and its adverse effects on mental well-being. It is imperative to recognize and address this issue holistically, prioritizing the health and success of our students.

1.2 Organization of Report:

The report revolves around the "Campus Calm" system, which is specifically designed to address the prevalent issue of academic stress among students. This system aims to provide a comprehensive platform that assesses stress levels, offers personalized recommendations, and promotes mental well-being. The primary objectives are to assist students in managing and reducing their stress, ultimately mitigating the risk of anxiety and depression. A pivotal tool in this endeavor is the Perceived Stress Scale (PSS), a well-established and user-friendly questionnaire known for its reliability. The PSS questionnaire will be employed to collect data from users, which will be used to train a model capable of inferring students' perceived stress levels. This predictive model will play a crucial role in helping identify students in need of support, thereby contributing to the overall success of the Campus Calm system.

Chapter 2: Literature Survey

2.1 Existing Literature Survey:

Title	Publish And Year	Authors	Summary	Research Gap
Perceived Stress Prediction among Employees using Machine Learning techniques	2022	Laavanya Mohan, Gopinadh Panuganti	This paper addresses the issue of stress in the workplace and the to measure and mitigate it. The study employs **PSS questionnaire**. Data from 251 employees is collected and analyzed using techniques like **Random Forest, Logistic Regression, and SVM.** The results reveal that only a small percentage (9.6%) of employees are stress-free.	Data is collected from surveys like PSS and DSI, alongside wearable sensors that can be unwieldy to use.; Also, it reduces the reach of the project to only those that can use the wearable system. Also, a wide range of accuracy range from 67-92 %
Machine Learning Techniques for Stress Prediction in Working Employees	2018	Srinivasulu Reddy Aditya Vivek Thota A Dharun	This paper addresses stress disorders in IT professionals using machine learning. It analyzes data from the 2017 **OSMI mental health survey** to identify key stress factors, such as gender and family history. The findings offer insights for reducing workplace stress.=	The system utilizes a questionable method of face detection using Computer Vision to determine to mood of the user, which tracks the user's facial expressions to check their mood alongside a survey. Also, no proper accuracy measure defined in the paper.

Research Study and System Design for Evaluating Student Stress in Indian Academic Setting	22022	Pavan Kuma, Reddy Yannam, Vineet. Venkatesh Manik Gupta	This paper addresses the mental health challenges of Indian undergraduate students due to academics and emotions. It introduces "ARU," a privacy-focused system that **uses smartphones and wearables for real-time stress diagnosis**. It aims to fill the data gap on rising mental health issues among India's youth.	This paper uses the original PSS scale and its questions without modifying them for their particular use case. Also the final accuracy of the paper is questionable.
Detection of Stress in IT Employees using Machine Learning Technique	2022	Suresh Kumar Kanaparthi, · Surekha P, Lakshmi Priya Bellamkond,Bhavya Kadiam Beulah Mungara	This paper utilizes machine learning and visual processing to identify stressed IT employees. It introduces an advanced stress detection system with real-time monitoring and personalized counseling. The study collects survey data to assess mental stress levels and improve stress management. It also explores strategies for creating a productive and healthy work environment.	Old dataset and paper.. Uses an old third party OSMI mental health survey from 2017 for their dataset. Also relatively low accuracy score of 75% on the best algorithm.

2.2 Problem Statement:

Current stress assessment and management measures or software in educational institutions often fall short in providing personalized stress diagnosis and support. Students face limitations in accessing timely assistance, resulting in suboptimal stress management and an elevated risk of anxiety and depression. This situation highlights a pressing need for a more effective and tailored approach to addressing academic stress. Many students encounter significant challenges when it comes to planning and managing projects effectively. These issues include missing deadlines, inefficient resource utilization, poor communication within teams, and delays in project completion. To address these problems, there is a critical need for a robust project tracking system that can streamline project management tasks. Such a system would enable teams to monitor project progress, assign tasks to members, and facilitate real-time communication. By providing a dedicated space for collaboration and offering step-by-step project management guidance, this software empowers teams to work efficiently, improve their communication, and successfully achieve project goals. Considering these persistent issues and the limitations of traditional methods, it is crucial for students to embrace modern project management tools that seamlessly connect project components and automate processes. This shift can help mitigate issues like missed deadlines and overspending, leading to more efficient and successful project outcomes.

2.3 Objectives:

Objectives based on the problem statements are as follows:

- **Personalized Stress Assessment:** Implement a machine learning model that can accurately assess each student's stress levels based on their responses to the Perceived Stress Scale (PSS) questionnaire, providing a highly personalized diagnosis.
- **Timely Intervention:** Develop an alert system within the platform to identify students at high risk of stress-related issues and facilitate timely intervention through targeted support and resources.
- **Stress Level Prediction:** Enhance the predictive capabilities of the model to forecast students' stress levels over time, enabling proactive measures to prevent academic stress from escalating.
- **Recommendation Engine:** Create a recommendation engine that offers personalized stress management strategies, coping techniques, and resources tailored to each student's unique stress profile.
- **Data-Driven Insights:** Accumulate and analyze data on student stress trends to provide educational institutions with insights on stress patterns and potential areas for improvement in their academic programs.
- **User-Friendly Interface:** Design a user-friendly and accessible interface that allows students to easily complete the PSS questionnaire, view their stress assessments.
- **Mental Health Promotion**: Incorporate features within the system that promote overall mental well-being, such as stress-relief exercises, mindfulness techniques, and guidance on maintaining a healthy work-life balance.

2.4 Scope:

To develop a comprehensive stress detection system tailored to academic students, focusing on their well-being and academic performance. This system will utilize a custom PSS scale to provide accurate stress level assessments.

Target Audience:

The primary beneficiaries are academic institutions, including schools, colleges, and universities. Additionally, students, teachers, academic advisors, and administrators will benefit from this system by gaining insights into students' stress levels and well-being.

Key Features:

The project will encompass critical functionalities, including data collection from multiple sources (surveys, academic records, physiological sensors), administration of the customized PSS scale, machine learning models for stress prediction, real-time monitoring, personalized recommendations for stress management, data privacy and security measures, and the flexibility for system customization to adapt to the specific needs of different academic institutions.

Project Timeline:

The project timeline will be carefully planned, incorporating milestones and deadlines for system development, rigorous testing, and successful deployment.

Success Criteria:

The project's success will be evaluated based on the accuracy of stress level predictions, high user satisfaction, and tangible improvements in student well-being and academic performance.

Chapter 3: Software Analysis and Design

3.1 Software Model:

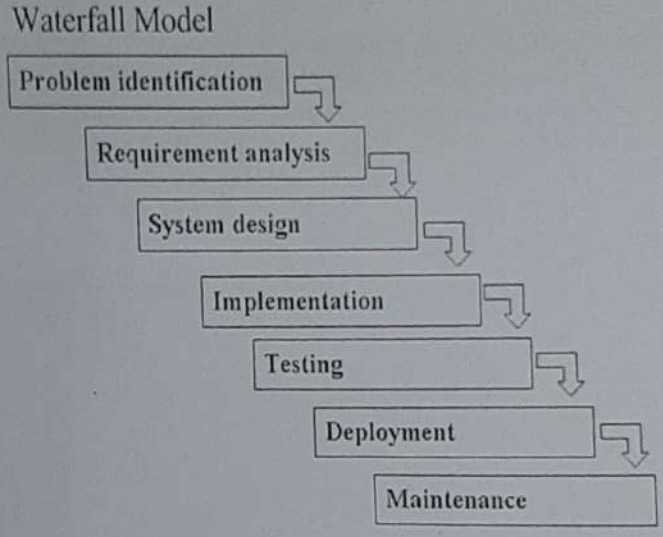

Fig 3.1 Software Model

3.1.1 Phases of Waterfall Model

1. **Stable and Well-Defined Requirements:** Waterfall is ideal when project requirements, like survey questions, are clear and stable from the outset.

2. **Step by Step Process:** In Waterfall model, each step must be fully complete before going to the next step, which fits our ML requirements property(Eg., Data Pre-processing MUST happen before model training.)

3. **Risk Mitigation in Each Step:** Waterfall helps to evaluate the risks in each stage, which is very important for Machine Learning projects where each subsequent step is dependent on the output of the previous one.

4. **Linear Development Pipeline:** As defined in our architecture, we have a linear development pipeline, without a lot of things being developed in parallel, this makes the step-by-step process of the waterfall model very suitable.

3.2 Proposed System:

Fig 3.2 depicts the proposed system of our project.

- **Participants:** Convenience sample cleaned of TERNA university students (n).
- **Data Collection:** Self-administered Perceived Stress Scale (PSS) questionnaire.
- **Data Cleaning:** The data will be standardized and of any bad responses.
- **Data Analysis:** Quantitative analysis using appropriate statistical tests.
- **Program Implementation:** Assessment of reasons due to which stress is caused, also possible collaboration with institute authorities to mitigate common stress inducing reasons.
- **Program Evaluation:** Assessing program effectiveness through pre-defined metrics.

Expected Outcome: Identification of effective interventions, and mitigation suggestions, tailored to each student.

3.3 System Requirements and Specifications (SRS):

Introduction:

a. Purpose:

The purpose of this project is to investigate and address the pressing issue of student's stress within the university workforce. The project aims to develop an accurate and accessible method for assessing stress levels among students. By utilizing the Perceived Stress Scale (PSS) technique and exploring its predictive capabilities through various data analysis methods, the project intends to provide insights into the prevalence of stress among employees and identify effective means of stress assessment. Ultimately, the project seeks to contribute to the enhancement of student's well-being, mental health, and overall workplace productivity.

b. Scope:

- This project aims to collect data from an institute wide pool of students about the perceived stress levels in their lives.
- Our questions will be specially selected to cater to our study of the stress perceived by the student due to academic reasons.
- At first the model will be trained on the collected dataset using multiple algorithms.
- The trained model will be then used to infer stress levels and reasons from the student's answers.
- Also, we aim to provide an institute wide study of students and the reasons due to which they perceive stress in their lives.

c. Intended Audience:

Researchers and Academics, Human Resources Professionals, Healthcare Practitioners Employers and Managers, etc are intended audience in this document. This project is mainly intended to college students who have stress so that they can be provided with proper guidance.

d. Benefits:

1. Accurate Stress Assessment: The project aims to develop a reliable method for assessing employee stress levels, providing organizations with accurate insights into their workforce's stress levels.

2. Workplace Productivity: Reduced stress levels can lead to increased productivity, improved focus, and better decision-making among employees.

3. Evidence-Based Practices: The project's findings can inform evidence-based stress management practices that organizations can adopt to support their workforce effectively.

4. Strategic Decision-Making: Organizations can make informed decisions regarding employee support programs, resources, and policies based on accurate stress assessment data.

5. Enhanced Mental Health Awareness: The project raises awareness about the prevalence of

stress and its impact on employees' mental health, encouraging open discussions and initiatives to tackle the issue.

6. **Research Contribution**: The project contributes to the academic understanding of stress assessment methods, providing valuable insights for researchers and practitioners in the fields of psychology, human resources, and workplace well-being.

7. **Societal Impact:** The project's outcomes may extend beyond individual organizations, positively impacting the broader societal understanding and approach to employee mental health.

In summary, the project's benefits encompass improved employee mental health, increased workplace productivity, evidence-based practices, strategic decision-making, research contributions, and the overall advancement of employee well-being practices within organizations and society at large.

3.3.1 Overall Description:

a. Project Perspective:

1. **User Perspective:** Focused on meeting the needs and expectations of end-users or beneficiaries of the project's outcomes.

2. **Societal Perspective:** Considers the project's impact on society, community well-being, and broader social implications.

3. **Risk Management Perspective:** Centre's on identifying, assessing, and mitigating potential risks and uncertainties associated with the project.

4. **Regulatory Perspective**: Ensures compliance with relevant laws, regulations, and industry standards.

b. Functional Requirements:

1. **Data Collection:** Gather data from custom PSS questionnaires, academic records, and sensors.
2. **Custom PSS Scale:** Administer a tailored PSS scale focusing on academic stressors.
3. **Data Preprocessing:** Clean data, handle missing values, and outliers.
4. **Feature Extraction:** Extract relevant academic stress-related features.
5. **Machine Learning Models:** Implement prediction models using regression, classification, or clustering.
6. **Personalized Recommendations:** Offer personalized interventions based on stress profiles.
7. **User Interfaces: b**Create user-friendly interfaces for students and staff.
8. **Privacy and Security:** Ensure data encryption and access control.

c. User Characteristics:

- The user should be familiar with a web browser, android device and to have a basic idea to operate the system.
- Qualification: Anyone with basic knowledge and comfortable with English.
- Technical Experience: Elementary knowledge of computer/mobile.

d. Design Constraints:

Hardware limitation is that a 2GB RAM is required. The language requirements are HTML, CSS, JavaScript, Material Ui, React, Node JS, MongoDB and Express JS. The content will be rendered non-editable, preventing end users from editing the web page's content.

e. User Documentation:

This software is simple to use and comprehend. Users with a basic understanding of computers will be able to use this project.

f. Assumptions and Dependencies:

It is assumed that the target user base possesses basic technological literacy, allowing them to navigate and utilize the tool effectively. The availability of stable internet connectivity and compatible devices is also crucial for seamless access to the tool across various platforms.

3.3.2 System Requirements and Analysis:

The system requirements and analysis section introduce the numerous requirements of the system from the user's point of view. It also introduces a number of decisions that have been taken regarding implementation of the system.

a. User Interface:

The user interface provided by the system should be a user friendly. The web application is used by students who can create and manage their projects.

b. Hardware Interface Requirements:

- The personal computer of the registration department is used as the external hardware interface to access the website.
- Requirement of RAM is 2GB.
- The processor should be of 2.10 GHz or faster.
- Minimum memory requirement is of 400 MB.
-

c. Software Interface Requirements:

- The system can be executed on a computer system having any version of windows operating system, macOS, Ubuntu.
- The language requirements are Python, Tailwind, ReactJS, Django. Visual Studio Code (VS Code) is used with version of 1.62
- 64-bit Windows Operating System is used.

3.3.3 Supplementary Requirements:

The supplementary requirements for our college-based Stress analysis include features that cater to the unique needs of students facing stress at any level. In addition to core project functionalities, we will offer a set of questionnaires on google forms. This questionnaire will guide them to provide necessary data for gauging their stress and offering them to overcome the challenges.

3.3.4 Non-Functional Requirements:

Performance Requirements:

3.3.4.1 The system should facilitate communication and collaboration among team members along with guide.

3.3.4.2 The system should provide reports and analysis that can help students to track their project performance and make informed decisions.

Portability Requirements:

The system can be executed on a computer system having any version of windows operating system, macOS, Ubuntu.

Maintainability Requirements:

The system should be maintainable, and an authorized user should be able to reset all options to default settings.

Usability Requirements:

- A logical and user-friendly interface helps the users to access the system easily.
- Error prevention should be supported by providing proper validation mechanisms for the data before actual submission to the database.

3.3.5 Appendix:

References :

1. This SRS documentation was prepared with reference to IEEE research papers on SRS documentation standards, ensuring alignment with established best practices.
2. The internet served as a valuable resource during the creation of this SRS documentation, particularly for accessing IEEE research papers that provided valuable insights into SRS documentation practices.

3.4 Hardware and Software Requirements:

3.4.1 Hardware Interface Requirements:

- The personal computer of the registration department is used as the external hardware interface to access the website.
- Requirement of RAM is 2GB.
- The processor should be of 2.10 GHz or faster.
- Minimum memory requirement is of 400 MB.

3.4.2. Software Interface Requirements:

- The system can be executed on a computer system having any version of windows operating system, macOS, Ubuntu.
- The language requirements are HTML, CSS, JavaScript, Material Ui, React, MongoDB, NodeJs and ExpressJS. Visual Studio Code (VS Code) is used with version of 1.62
- 64-bit Windows Operating System is used.

3.5.1Gantt Chart:

Fig 3.5.1.a depicts the Gantt chart (Timeline Chart) for semester 7

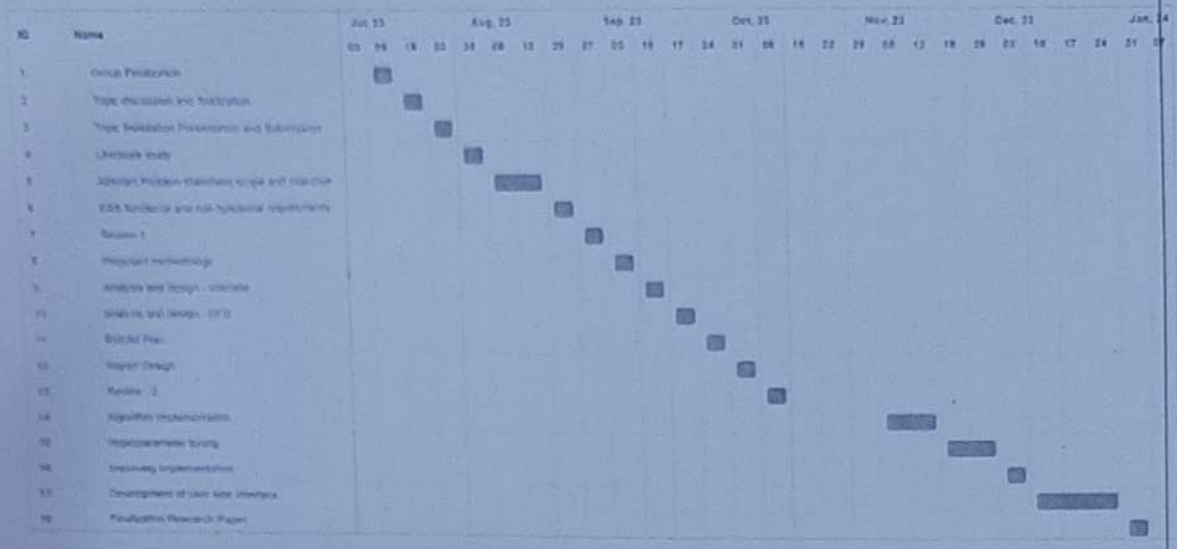

Fig 3.5.1.a: Gantt Chart

ID	Name	Start Date	End Date
1	Group Finalization	Jul 10, 2023	Jul 14, 2023
2	Topic discussion and finalization	Jul 17, 2023	Jul 21, 2023
3	Topic finalization,Presentation and Submission	Jul 24, 2023	Jul 28, 2023
4	Literature study	Jul 31, 2023	Aug 04, 2023
5	Abstract,Problem statement,scope and objective	Aug 07, 2023	Aug 18, 2023
6	SRS functional and non-functional requirements	Aug 21, 2023	Aug 25, 2023
7	Review-1	Aug 28, 2023	Sep 01, 2023
8	Proposed methodology	Sep 04, 2023	Sep 08, 2023
9	Analysis and design - usecase	Sep 11, 2023	Sep 15, 2023
10	analysis and design - DFD	Sep 18, 2023	Sep 22, 2023
11	RMMM Plan	Sep 25, 2023	Sep 29, 2023
12	Report Design	Oct 02, 2023	Oct 06, 2023
13	Review - 2	Oct 09, 2023	Oct 13, 2023
14	Algorithm Implementation	Nov 06, 2023	Nov 17, 2023
15	Hyperparameter tuning	Nov 20, 2023	Dec 01, 2023
16	Improving Implementation	Dec 04, 2023	Dec 08, 2023
17	Development of user side Interface	Dec 11, 2023	Dec 29, 2023
18	Finalization Research Paper	Jan 01, 2024	Jan 05, 2024

Fig 3.5.1.b: Gantt Chart

3.5.2 Data Flow Diagram:

Fig 3.5.2.a depicts the level 0 diagram of the 2 levels DFD.

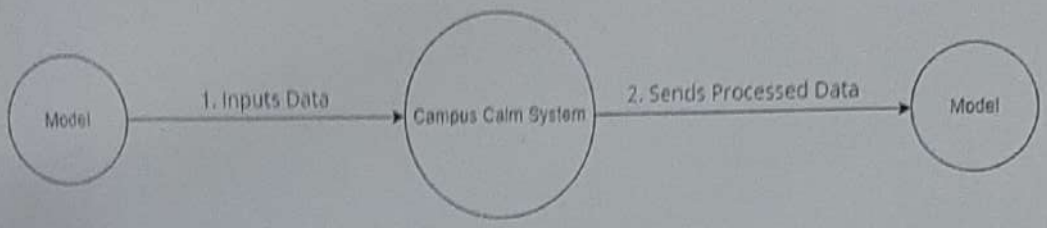

Fig 3.5.2.a: Level 0 DFD

Fig 3.5.2.b depicts the level 1 diagram of the 2 levels DFD.

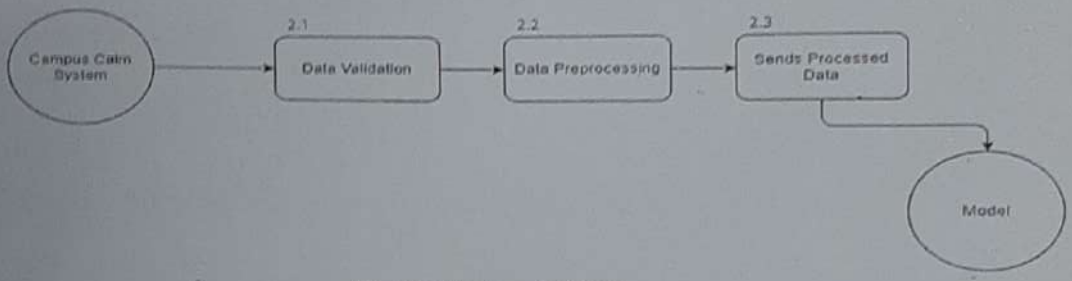

Fig 3.5.2.b: Level 1 DFD

Fig 3.5.2.c depicts the level 2 – task processing diagram of the 2 levels DFD.

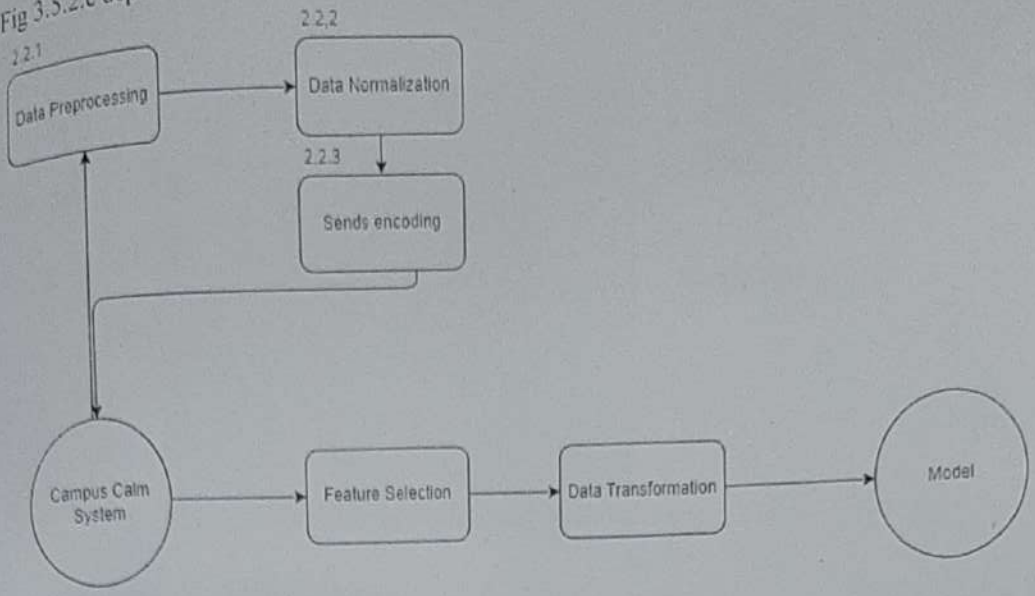

Fig 3.5.2.c: Level 2 – Task Processing DFD

Fig 3.5.2.d depicts the level 2 – group processing diagram of the 2 levels DFD.

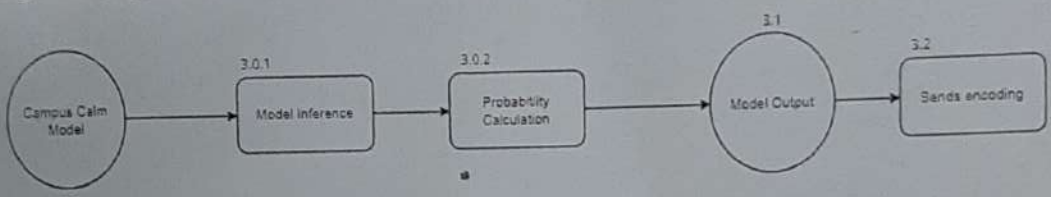

Fig 3.5.2.d: Level 2 – Group Processing DFD

3.5.3 Use Case Diagram:

Fig 3.5.3 depicts the use case diagram.

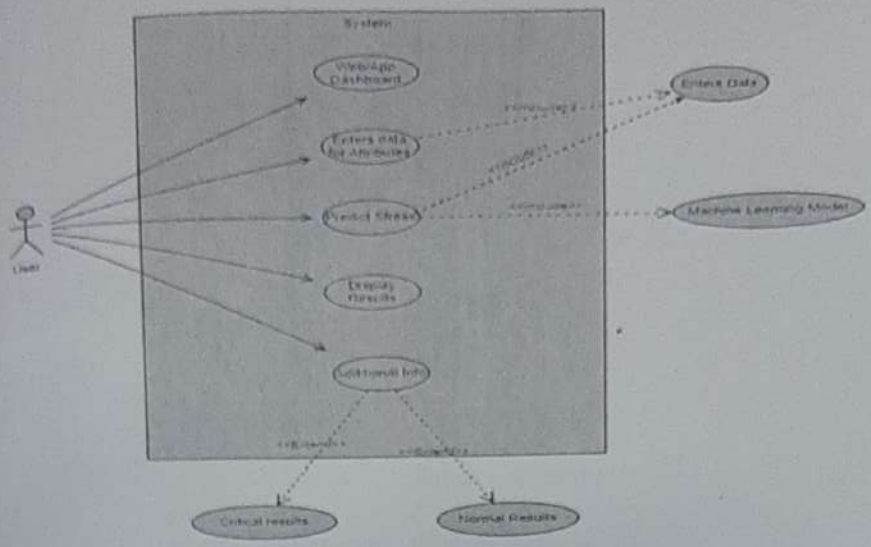

Fig 3.5.3: Use Case Diagram

3.5.3 Flow Chart Diagram:

Fig 3.5.4.a depicts the user flowchart for our system.

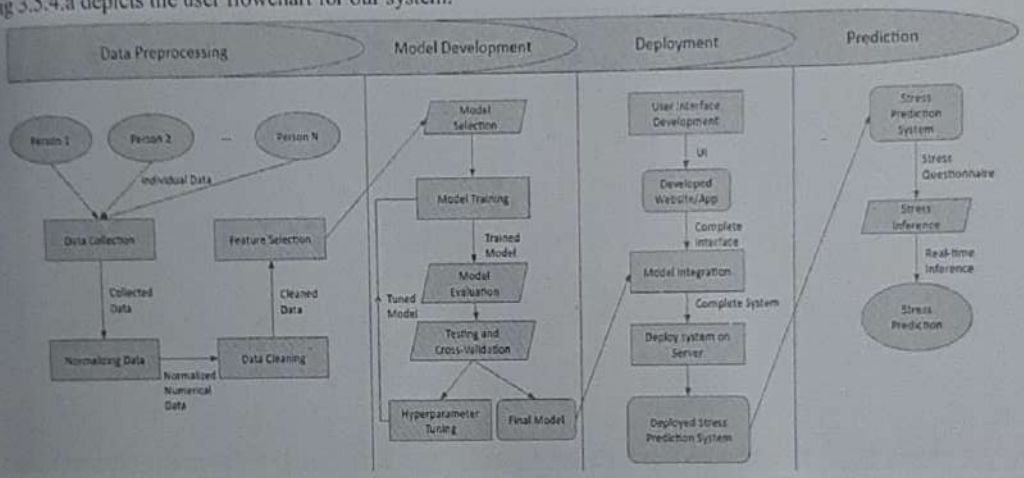

Fig 3.5.4.a: Flowchart

3.5.5 Sequence Diagram:

Fig 3.5.5 depicts the sequence diagram.

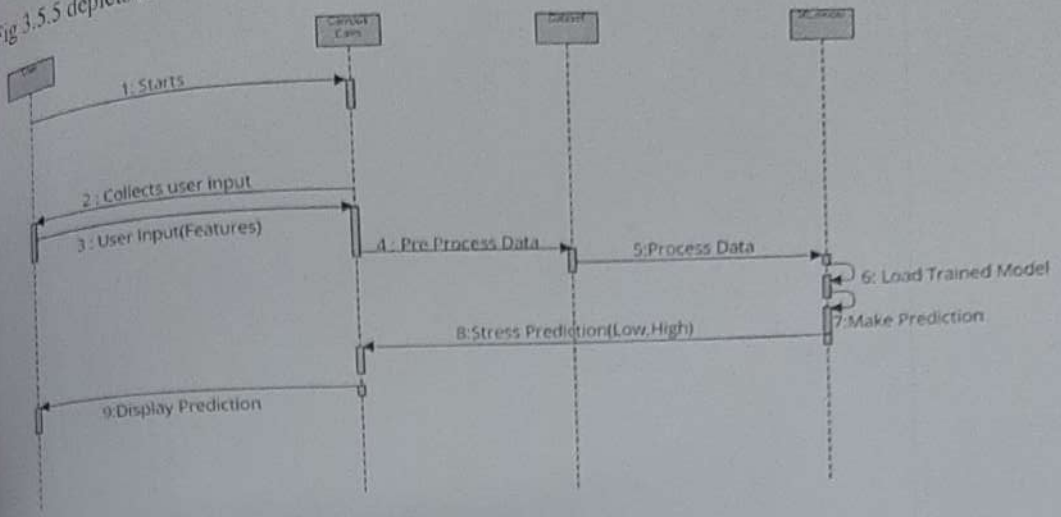

Fig 3.5.5: Sequence Diagram

3.6 Risk Mitigation Monitoring and Management Plan:

Risk	Category	Probability	Impact	RMMM
Data Quality	Data	10%	1 [Low]	RMMM1
Model Performance	System	15%	2 [Medium]	RMMM2
User Adoption	Implementation	25%	3 [High]	RMMM3

Table 3.6.a: RMMM Plan

IMM ID	Description	Mitigation Strategy	Monitoring	Response Plan
MM1	Inaccurate or Incomplete user responses to the PSS form	Preprocessing Implement data cleaning and validation procedures	Continuous data monitoring: regularly check data quality and integrity	If data issues arise, correct them promptly, and reprocess data if necessary
MMM2	The machine learning model may not provide accurate stress predictions.	Hyperparameter Tuning: Fine-tune model parameters and architecture.	Model Metrics: Continuously monitor model performance using metrics like accuracy and F1-score.	If model performance deteriorates, retrain the model with updated data or features.
RMMM3	Limited user engagement with the platform.	User Feedback: Collect feedback from users and use it to improve the system.	User Engagement Metrics: Monitor user engagement metrics such as active users and form completion rates.	If user adoption remains low, implement marketing strategies and user education efforts.

Table 3.6.b: RMMM Management

Chapter 4: Results and Discussions

present and interpret the outcomes of our stress analysis, providing a comprehensive view of our research. We in by summarizing our project's objectives and the specific questions we aimed to answer. Our results are displayed ng tables, charts, and graphs, with an explanation of our data collection methods.

then interpret the data, discussing trends, variations, and any anomalies. We connect our findings to the theoretical mework or models guiding our analysis and discuss their significance. Comparisons with existing literature are made highlight novel insights, and we acknowledge any limitations or uncertainties in our study, including assumptions d potential sources of error.

e also consider the practical implications of our findings, particularly in engineering or structural contexts. We nclude by summarizing key takeaways, emphasizing their importance in the research context, and suggesting future search directions. Throughout, we aim for a logical flow, offering a holistic understanding of the stress analysis results nd their implications.

Chapter 5: Conclusion

In conclusion, this ambitious project seeks to establish the Perceived Stress Scale (PSS) as a gold standard for assessing stress levels among students, aiming to provide a reliable and validated tool that can significantly impact stress management in educational settings. Through meticulous data collection, we aspire to not only validate the effectiveness of the PSS but also harness the collected data to train a sophisticated stress detection model.

The envisioned system represents a leap forward in stress monitoring and intervention. It goes beyond merely quantifying stress levels by offering personalized suggestions for stress mitigation based on the inferred stress values. This personalized approach holds the potential to revolutionize how we address and alleviate stress among students, tailoring interventions to individual needs.

Furthermore, the incorporation of campus-wide data analysis into our project design is a strategic move towards understanding broader patterns of stress factors. By identifying common causes of stress across the campus community, we aim to implement targeted strategies that can effectively mitigate these stressors. This holistic approach recognizes that stress is multi-faceted and can be influenced by various factors, including academic, social, and environmental elements.

In essence, this project not only aims to validate a stress assessment tool but also endeavors to pioneer a comprehensive and data-driven approach to stress management in educational institutions. Through the integration of technology and a campus-wide perspective, we envision creating a system that not only detects and quantifies stress but actively contributes to the well-being of students by offering personalized and effective strategies for stress reduction. As we progress, we anticipate that the outcomes of this project will not only inform academic research but will also have practical implications for creating healthier and more supportive campus environments.

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