BILLY - Buddy Against Cyber Bullying

A PROJECT REPORT

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Under the guidance of,

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CERTIFICATE

This is to certify that the Project report **"BILLY - Buddy Against Cyber Bullying"** being submitted by "Nishad Babu Sulikeri, Ganesh V Hegde, K Vamsi Krishna, Dinesh Kumar Reddy M, Manishimha G" bearing roll numbers "20211CDV0012, 20211CDV0011, 20211CDV0030, 20211CDV0029, 20211CDV0004" in partial fulfillment of the requirement for the award of the degree of Bachelor of Technology in Computer Science and Technology (DevOps) is a bonafide work carried out under my supervision.

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DECLARATION

We hereby declare that the work, which is being presented in the project report entitled **BILLY - Buddy Against Cyber Bullying** in partial fulfillment for the award of Degree of **Bachelor of Technology** in **Computer Science and Technology (DevOps)**, is a record of our own investigations carried under the guidance of **Ms. Ashishika Singh, Assistant Professor, School of Computer Science and Engineering, Presidency University, Bengaluru.**

We have not submitted the matter presented in this report anywhere for the award of any other Degree.

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ABSTRACT

Cyberbullying, a pervasive issue in the digital age, significantly impacts mental health, particularly among adolescents. This project presents a comprehensive solution integrating an AI-powered chatbot, "Billy", that provides real-time emotional support and enables anonymous reporting to the cyber-crime department. The platform employs BotPress, Natural Language Processing (NLP) and Maptiler to ensure user privacy while analyzing cyberbullying trends to identify high-risk areas for targeted intervention. Additionally, the website offers educational resources, tips, and defense tactics to empower users with preventive strategies. By addressing cyberbullying holistically through detection, support, reporting, and awareness the system aims to foster a safer, more respectful online environment.

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CHAPTER-1
INTRODUCTION

1.1 Background

Social media platforms have become an integral part of modern life, transforming the way individuals connect, share, and communicate. With billions of users worldwide, platforms like Facebook, Instagram, and Twitter have created new opportunities for interaction while also presenting unique challenges. One of the most concerning issues to emerge from this digital era is cyberbullying, a phenomenon characterized by the use of electronic communication to harass, intimidate, or harm individuals. Unlike traditional forms of bullying, cyberbullying can occur anonymously, persist indefinitely, and reach a wide audience, making its effects particularly harmful. Research indicates that nearly 37% of internet users globally have experienced cyberbullying, with young adults and teenagers being disproportionately affected. The emotional toll on victims can include anxiety, depression, social withdrawal, and, in extreme cases, suicidal thoughts. This project aims to address this critical issue by leveraging innovative technology and fostering greater awareness to promote healthier online interactions.

1.2 Research Motivation and Problem Statement

The increasing prevalence of cyberbullying and its devastating consequences for victims highlight the urgent need for effective solutions. Many existing tools focus solely on detecting and reporting abusive behavior, but they often fail to provide immediate emotional relief or address the broader implications of such incidents. Furthermore, traditional reporting mechanisms frequently lack anonymity, discouraging victims from seeking help due to fear of retaliation or stigma. This research is motivated by the need to create a comprehensive, victim-centric approach that addresses these gaps.

This project proposes an integrated system designed to combat cyberbullying on multiple fronts. The primary goals include real-time detection and analysis of harmful interactions using advanced natural language processing algorithms, provision of immediate emotional support through an empathetic chatbot named “Billy,” and facilitation of

anonymous reporting to ensure user privacy. Additionally, the system seeks to raise awareness about cyberbullying by offering educational resources and insights into high-risk areas based on statistical analysis. By combining these elements, the project aspires to create a safer, more supportive online environment that empowers victims and promotes positive digital behavior.

1.3 Domain Introduction

This project operates at the intersection of artificial intelligence, emotional health, and social media ethics. Social platforms, while fostering global connections, have also become arenas for harmful behaviors like cyberbullying. The proposed system seeks to leverage AI technologies to address this challenge comprehensively. Central to this effort is the development of "Billy," an AI-powered chatbot that employs natural language processing to identify and respond to emotional cues in user interactions. By offering personalized, real-time support, the chatbot aims to mitigate the emotional distress caused by cyberbullying while encouraging victims to take proactive steps toward recovery.

Additionally, the system incorporates advanced encryption and secure protocols to facilitate anonymous reporting, ensuring that victims can share their experiences without fear of exposure or retaliation. Beyond addressing immediate concerns, the project emphasizes education and prevention by integrating awareness campaigns and practical resources into the platform. Through statistical analysis, the system identifies patterns of cyberbullying and high-risk areas, enabling more targeted interventions by policymakers and law enforcement. This holistic approach not only addresses the technical challenges of combating cyberbullying but also prioritizes the emotional well-being of victims, contributing to a more ethical and inclusive digital landscape.

CHAPTER-2
LITERATURE SURVEY

2.1 INTRODUCTION

The increasing prevalence of cyberbullying on digital platforms has led to extensive research on detection, reporting, and victim support mechanisms. While various methodologies have been developed, ranging from advanced machine learning algorithms to interactive chatbots, existing solutions often fall short in addressing all aspects of the problem. Most systems focus on detecting abusive content or securing anonymity during reporting but neglect the victims' emotional well-being and real-time support needs. This chapter reviews existing literature, highlighting methodologies, contributions, and limitations, identifying research gaps that the proposed system *Billy* aims to address. The survey covers studies on cyberbullying detection, anonymized reporting frameworks, chatbot-based support systems, and hybrid models for handling cyberbullying incidents.

2.2 RELATED WORK

Various methods have been proposed for detecting cyberbullying on digital platforms, with many using machine learning techniques such as support vector machines (SVM) and deep learning to identify abusive content. These methods focus primarily on analyzing text for harmful language and behavior, but they often suffer from high false-positive rates and fail to address the emotional well-being of victims. Studies also emphasize the importance of anonymity in reporting systems, using encryption and secure authentication to protect victims' identities. However, these approaches are generally reactive, providing minimal immediate emotional support or assistance during distressing situations, which limits their effectiveness in supporting victims in real time [1][2].

Additionally, AI-driven chatbots have been used to provide emotional support by analyzing users' emotional states and offering therapeutic interventions such as Cognitive Behavioral Therapy (CBT). While these chatbots, such as Woebot, are effective for general mental health support, they do not specifically address the unique challenges of cyberbullying victims. Some hybrid models combine automated content detection with human moderation to flag incidents and ensure accurate reporting, but these systems still lack real-time victim engagement and secure reporting features. This highlights the need for a solution that

integrates emotional support, victim anonymity, and secure reporting to fully address the issues surrounding cyberbullying [3][4][5].

2.3 EXISTING WORK

Table 2.1: Study of Existing Methods

No	Paper Title	Method	Advantages	Limitations
1	*Cyberbullying Detection Using Deep Learning Techniques.* [3]	Deep learning algorithms for detecting abusive language and user behavior on social media.	Automatically detects cyberbullying content.	Lacks emotional support and real-time victim assistance. No anonymity in reporting.
2	*A Framework for Anonymized Cybercrime Reporting.* [10]	Data encryption and user authentication for anonymous reporting.	Ensures privacy and encourages reporting.	Lacks real-time victim support and interaction.
3	*Chatbots in Mental Health Support: A Case Study.* [4]	AI-based chatbots for providing real-time emotional support using NLP.	Helps manage emotional distress in real-time.	Does not focus on cyberbullying; lacks integration with reporting systems.
4	*Machine Learning Algorithms for Cyberbullying Detection.* [9]	Support vector machines, decision trees, and random forests for cyberbullying content classification.	Classifies abusive content effectively.	False positives are common; no features for victim anonymity or support.

No	Paper Title	Method	Advantages	Limitations
5	*Natural Language Processing for Emotion Detection.* [2]	NLP techniques to detect emotional states in text (e.g., sadness, anger).	Real-time emotion detection for support.	Limited real-time applications, lacks focus on cyberbullying.
6	*A Hybrid Model for Cyberbullying Reporting.* [1]	Hybrid approach combining automated detection with human moderation.	Combines automation with human intervention for accurate detection.	No real-time emotional support for victims, lacks secure reporting mechanisms.
7	*Entity Recognition for Cybercrime Reporting.* [6]	Uses NLP and machine learning for entity recognition in cybercrime reports.	Enriches reports for actionable intelligence.	Focused on evidence collection; no victim support or anonymity features.
8	*Interactive Chatbots for Social Good.* [8]	AI-driven chatbots using decision trees and NLP for user interaction.	Provides basic emotional support and connects users to services.	Does not focus on cyberbullying or include reporting and anonymity features.
9	*Real-time Detection and Reporting of Cyberbullying.* [5]	Continuous monitoring of online behaviors to detect and report cyberbullying.	Enables real-time reporting of incidents.	Lacks emotional support for victims; does not ensure anonymity in reporting.

2.4 SUMMARY

- The review highlights existing methods for cyberbullying detection, reporting, and victim support, emphasizing the gaps in current systems.
- Existing studies have focused on detecting abusive content, ensuring anonymity in reporting, or providing emotional support but rarely integrate these features comprehensively.
- The *Billy* system aims to fill these gaps by combining real-time emotional support through a chatbot, anonymous reporting mechanisms, and evidence collection for law enforcement, ensuring victim anonymity and psychological well-being.
- The need for a holistic approach that addresses all aspects of cyberbullying – detection, reporting, and victim support – is clear, and *Billy* strives to offer a unified solution to this problem.

CHAPTER-3

RESEARCH GAPS OF EXISTING METHODS

Cyberbullying is a pervasive issue that affects individuals across all age groups, especially on social media platforms. Although numerous methodologies and tools have been developed to detect, prevent, and report cyberbullying, significant gaps remain in existing approaches. Most current systems focus on technical aspects like detection and reporting while neglecting the emotional and psychological needs of victims. Additionally, challenges such as ensuring anonymity, reducing false positives, and integrating with law enforcement highlight the limitations of these solutions. This chapter identifies and discusses the major research gaps in existing methods, setting the foundation for the proposed system.

1. Lack of Emotional Support for Victims

- Current methods such as deep learning models for detecting abusive language and machine learning algorithms focus heavily on identifying abusive content but fail to provide any emotional support for the victims. The absence of real-time comfort or mechanisms to help victims cope with distress is a significant gap [3] [9].
- Research gap: There's a need for models that integrate emotional intelligence to provide timely and personalized support for victims of cyberbullying. Chatbots powered by AI can be enhanced to offer emotional care alongside detection and reporting functionalities.

2. Anonymity and Privacy Concerns

- Some systems, such as anonymous reporting frameworks, effectively protect the identity of the user but do not address other concerns like victim privacy during interactions or the preservation of anonymity in all stages of reporting [10].
- Research gap: Developing systems that ensure not only anonymity in reporting but also secure data management and protection of the victim's identity throughout the entire incident response process.

3. Limited Real-time Detection

- Existing methods such as real-time monitoring algorithms are effective in detecting incidents but often fail to provide immediate interventions that could aid victims in the moment [5]. These systems do not prioritize victim well-being or give them tools to report the incidents safely and confidently.
- Research gap: Real-time detection systems need to be paired with automated emotional support systems and actionable steps to help victims in distress, offering them immediate guidance and safe reporting channels.

4. High False Positive Rate

- Several studies that use machine learning algorithms for detection suffer from high false positive rates, which can create confusion and frustration for users. Additionally, they don't provide enough context or filtering of content to ensure meaningful and accurate intervention [9].
- Research gap: There is a need for more accurate contextual analysis using advanced NLP models that can distinguish between harmless interactions and cyberbullying with greater precision.

5. Insufficient Integration with Law Enforcement

- While some reporting frameworks focus on anonymized reporting, they don’t seamlessly integrate with law enforcement agencies to ensure that actionable steps are taken. In addition, there is a gap in systems that can track trends in cyberbullying incidents and alert authorities to high-risk areas in real time[10].
- Research gap: There is an opportunity to integrate cybercrime reporting systems more deeply with local law enforcement agencies, providing them with data-driven insights and regular reports on trends and hotspots of cyberbullying.

6. Lack of Victim-Centered Approaches

- Research like chatbots for mental health support highlights the value of AI-driven support, but these systems are often generic, not tailored specifically to cyberbullying victims. They do not address the specific emotional states associated with being bullied, such as feelings of helplessness or anxiety [4].
- Research gap: Developing chatbots and systems with a cyberbullying-specific focus, designed to handle the sensitive nature of these incidents and offer personalized, empathetic responses for victims in distress.

7. Inadequate Educational Support

- Cyberbullying prevention tools in schools primarily focus on monitoring and intervening after bullying has occurred. However, there is a lack of proactive education and prevention tools for both victims and perpetrators [7].
- Research gap: A shift towards educational programs that prevent cyberbullying before it starts, alongside detection, reporting, and support systems, would create a more holistic solution. This could include integrating preventative measures and educating users about safe online behavior.

CHAPTER-4
PROPOSED METHODOLOGY

The increasing prevalence of cyberbullying has created a critical need for effective systems that can detect, prevent, and provide support to victims. While existing solutions have focused on detecting offensive content and reporting incidents, there remains a significant gap in providing real-time emotional support and ensuring the victim's privacy. This chapter outlines the proposed methodology for an integrated system aimed at addressing these gaps. The system combines advanced machine learning techniques for real-time cyberbullying detection, an AI-powered chatbot for victim support, and a seamless anonymized reporting process. Additionally, it incorporates integration with law enforcement agencies and educational content to prevent cyberbullying before it starts.

4.1 Proposed System Components and Features

1. Real-Time Cyberbullying Detection

- **Data Collection:** User data (e.g., social media posts, online interactions) will be collected for analysis. The data will be pre-processed to remove irrelevant information (e.g., non-verbal content, advertisements).
- **Emotion Detection:** Implement NLP techniques to identify emotional states (anger, sadness, fear) through sentiment analysis. Emotion-aware models can help the chatbot understand the victim’s emotional distress and respond empathetically [2].
- **Real-Time Feedback:** As the content is flagged for potential abuse, the victim will be informed in real-time, offering support and a clear path for anonymous reporting.

2. Victim Support via AI Chatbot ("Billy")

- **AI Chatbot Design:** An AI-driven chatbot (named Billy) will engage with victims immediately upon interaction. Using a decision-tree algorithm, it will provide emotionally supportive messages, comfort, and guide victims through the process of reporting the incident to authorities.

- **Emotional Intelligence:** Contextual AI responses will be generated based on the victim's emotional state (detected through text analysis). For example, if the victim shows signs of distress, the chatbot will provide encouraging messages and offer resources such as mental health helplines or counseling services.
- **Privacy and Anonymity:** The chatbot will never collect personal identifying information unless the victim explicitly consents. It will guide users through a secure reporting process, maintaining anonymity throughout. Secure encryption will ensure that any data collected remains confidential [10].
- **Supportive Resources:** It will provide links to support groups, educational content, and self-help resources to help victims cope with the emotional aftermath of cyberbullying.

3. Anonymized Reporting System

- **Anonymous Reporting:** Once the victim interacts with the chatbot, they will be provided with an option to report the incident to law enforcement anonymously. This process will be seamless, enabling victims to report the perpetrator's details (e.g., usernames, timestamps, abusive content) without revealing their identity.
- **Real-Time Data Submission:** The reporting system will automatically generate reports containing relevant evidence (e.g., screenshots, message logs) and forward them to the appropriate authorities (e.g., cyber-crime departments).
- **Cybercrime Intelligence:** The system will analyze reported data to calculate cyberbullying statistics, identifying trends, high-risk areas, and potential perpetrators. These insights will help law enforcement prioritize cases in red alert areas.

4. Integration with Law Enforcement

- **Automated Incident Reporting:** The system will have API integrations with local and national cybercrime units. When a report is filed, the relevant law enforcement bodies will be notified automatically, and follow-up actions can be initiated.
- **Data Tracking:** Law enforcement will have access to cyberbullying trends and hotspot maps, helping them allocate resources more effectively and respond faster.
- **Regular Reporting:** The system will periodically send detailed reports on regional cyberbullying statistics, enabling authorities to intervene before situations escalate.

5. Education and Awareness

- **Prevention Tools:** The website will feature educational content that aims to raise awareness about cyberbullying, its impact, and the importance of online safety. This will include videos, articles, and quizzes to engage users.
- **Tips and Defense Tactics:** The website will offer a list of defense tactics such as:
  - How to block/report an abusive user
  - How to secure personal information online
  - Best practices for online communication

6. Privacy and Security

- **Secure Data Handling:** Victims' identities will be anonymized unless they opt to disclose them.
- **GDPR Compliance:** The project will comply with privacy regulations (e.g., GDPR) ensuring that users' rights are protected.
- **User Control:** Victims will have full control over their data, including the ability to delete interactions or reports at any time.

4.2 Design Procedure:

1. Website Design

- **Objective**: To create a visually appealing, user-friendly website that serves as the platform's interface.
- **Technologies**:
  - **React**: A JavaScript library for building dynamic, responsive user interfaces.
  - **Tailwind CSS**: A utility-first CSS framework for fast, customizable styling.
- **Features**:
  - Integration of the chatbot as the primary user interaction tool.
  - Navigation to other modules, such as educational resources and reporting forms.
- **Significance**: The website acts as the central hub where users can access all features in a seamless manner.

2. Chatbot Design

- **Objective**: To develop a conversational agent, "Billy," for providing real-time emotional support and collecting incident details.
- **Technology**: **Botpress** (a platform for building and deploying chatbots).
- **Design Process**:
  - Create **conversational flows**: Predefined scripts guide Billy to respond empathetically to victims and prompt for relevant incident information.
  - Example:
    - If a user indicates distress, Billy offers comforting responses and coping strategies.
    - If a user wants to report an incident, Billy asks for incident details like date, time, and evidence.
- **Significance**: Billy ensures victims feel supported and can report incidents in a safe, approachable manner.

3. NLP Integration

- **Objective**: To enhance chatbot functionality by understanding user input and extracting relevant details.
- **Technology**: Natural Language Processing (NLP) tools, such as Dialogflow or Rasa.
- **Key Tasks**:
  - **Intent Detection**: Recognize if the user needs emotional support or wants to report an incident.
  - **Entity Extraction**: Identify key details such as:
    - **Time**: When the incident occurred.
    - **Place**: Where it happened.
    - **Persons Involved**: Relevant individuals or groups.
- **Significance**: NLP ensures the chatbot can interpret user input effectively, making the interaction more natural and efficient.

4. Anonymization

- **Objective**: To safeguard user privacy by removing personally identifiable information (PII) before data storage or reporting.

- **Process**:
    - Implement algorithms to strip sensitive information from user inputs.
    - Replace PII with anonymized tokens (e.g., pseudonyms or unique IDs).
    - Use encryption for added security during data transmission and storage.
- **Significance**: Protects users from potential misuse of their information, fostering trust and encouraging more victims to come forward.

5. Real-time Reporting

- **Objective**: To send anonymized reports of incidents to law enforcement agencies promptly.
- **Technology**: Secure APIs for communication between the platform and the cyber-crime department.
- **Steps**:
    - Gather incident details from the chatbot.
    - Anonymize the data to ensure user privacy.
    - Transmit the data securely using encrypted connections.
- **Significance**: Speeds up the reporting process and ensures law enforcement receives actionable information while maintaining user confidentiality.

CHAPTER-5
OBJECTIVES

5.1 Primary Objectives

The primary objective of this research is to develop an integrated system that addresses the critical gaps in current methods of combating cyberbullying. The system will utilize real-time detection, emotional support, anonymous reporting, and collaboration with law enforcement to create a comprehensive solution for victims. Specifically, this project aims to:

1. Emotional Support Through AI-Driven Chatbot

- **Objective**: Provide victims with immediate and personalized emotional assistance.
- **How It Works**:
  - The chatbot (Billy) is designed to simulate empathetic human interaction, recognizing emotional cues from the victim's responses (e.g., sadness, anger, or fear).
  - It uses decision trees and predefined scripts to offer comforting messages, coping strategies, and advice tailored to the victim's emotional state.
- **Significance**:
  - Offers a non-judgmental, private space for victims to express their feelings.
  - Reduces feelings of isolation by providing emotional validation and practical tips in real-time.

2. Anonymous Reporting of Cyberbullying Incidents

- **Objective**: Enable victims to report incidents without fear of exposure or retaliation.
- **How It Works**:
  - An **Anonymous Reporting Form** captures the details of the cyberbullying incident, including evidence like screenshots or messages, without collecting personal information unless absolutely necessary.
  - Reports are securely transmitted to law enforcement or relevant authorities while maintaining the victim's anonymity.

- **Significance**:
  - Encourages victims to report incidents without hesitation, especially in cultures or situations where stigma or fear of retaliation is high.
  - Enhances law enforcement's ability to respond to and address cyberbullying cases systematically.

3. Raising Awareness and Educating Users

- **Objective**: Equip users with the knowledge and tools to prevent and respond to cyberbullying.
- **How It Works**:
  - A dedicated **educational section** on the platform provides:
    - **Prevention Tips**: Guides users on recognizing warning signs of cyberbullying, protecting personal information online, and avoiding risky behaviors.
    - **Defensive Strategies**: Explains how to block harmful users, report abusive content, and safeguard digital footprints.
    - **Awareness Campaigns**: Shares real-world case studies and interactive resources to engage users and build understanding.
- **Significance**:
  - Empowers individuals to be proactive in protecting themselves and others.
  - Promotes a culture of awareness and resilience against cyberbullying.

5.2 Specific Research Objectives

This research has several specific objectives that will contribute to the successful development and deployment of the proposed solution:

1. Emotional Support System

- **Objective**: To design and implement a chatbot, "Billy," that provides real-time emotional support to victims of cyberbullying.
- **Key Features**:
  - **Empathetic Interaction**: The chatbot will use decision trees and keyword recognition to respond empathetically to victims, offering them care, guidance, and coping strategies based on their emotional state.

  - **Guidance and Resources**: It will also provide victims with links to additional resources, such as legal advice, mental health support, or tips on handling online harassment.
- **Significance**:
  - Helps victims feel supported and less isolated during emotionally challenging moments.
  - Encourages users to seek further help and report incidents by creating a safe and approachable environment.

2. Data Anonymization and Privacy

- **Objective**: To ensure that all collected data is anonymized and handled securely in compliance with privacy regulations like GDPR.
- **Key Features**:
  - **Data Anonymization**: Personally identifiable information (PII) will not be collected unless it is absolutely required, such as for legal purposes.
  - **Secure Storage**: All data will be encrypted and stored in a restricted-access cloud database to prevent unauthorized access.
  - **Compliance with GDPR**: The system will follow strict guidelines to ensure user privacy and minimize data retention.
- **Significance**:
  - Protects victims from additional harm, such as data breaches or misuse of sensitive information.
  - Builds trust among users, encouraging them to engage with the platform without fear.

3. Integration with Law Enforcement

- **Objective**: To automate the reporting process by securely forwarding anonymized reports to law enforcement agencies.
- **Key Features**:
  - **Automated Reporting**: The system will compile reports containing incident details and supporting evidence, stripping away any PII unless explicitly permitted by the user.

  - **Enhanced Response Times**: The streamlined reporting mechanism will enable faster response from law enforcement agencies.
  - **Resource Allocation**: Crime statistics generated by the platform will help authorities prioritize high-risk areas and allocate resources accordingly.
- **Significance**:
  - Improves law enforcement's ability to address cyberbullying cases.
  - Strengthens collaboration between the platform and legal authorities to ensure justice for victims.

4. Educational Outreach

- **Objective**: To develop and include educational content focused on preventing and understanding cyberbullying.
- **Key Features**:
  - **Prevention Resources**: Guides and tips on how to recognize, prevent, and respond to cyberbullying.
  - **Awareness Campaigns**: Content aimed at educating both potential victims and perpetrators about the consequences of cyberbullying.
  - **Interactive Materials**: Quizzes, infographics, and case studies to engage users and foster a deeper understanding.
- **Significance**:
  - Empowers users with knowledge and tools to protect themselves and others.
  - Contributes to societal change by targeting the root causes and behaviors associated with cyberbullying.

5.3 Societal Impact of the Research

This research has the potential to significantly impact society by addressing the growing issue of cyberbullying, which has been linked to mental health issues, social isolation, and in extreme cases, suicide. The anticipated societal impacts of this research include:

- **Empowerment of Victims:** By providing real-time emotional support and anonymous reporting channels, the research will empower victims of cyberbullying, helping them regain control over their lives and access necessary resources.

- **Reduction in Cyberbullying Cases:** Through increased awareness, detection, and intervention, the system will likely lead to a reduction in the occurrence and severity of cyberbullying incidents.
- **Improved Mental Health:** With the addition of emotional support through AI chatbots, victims may experience a reduction in feelings of isolation, fear, and anxiety, contributing to improved mental health outcomes.
- **Stronger Communities:** By fostering a safer online environment, the research will help create more supportive, respectful communities where individuals can engage without fear of harassment or abuse.

CHAPTER-6

SYSTEM DESIGN & IMPLEMENTATION

The cyberbullying detection and reporting system aims to provide a comprehensive platform for victims of cyberbullying by focusing on real-time emotional support, anonymous reporting, and law enforcement collaboration. The design ensures that machine learning is not used, and the system operates on rule-based logic and pre-set decision trees.

6.1 Use Case Diagram:

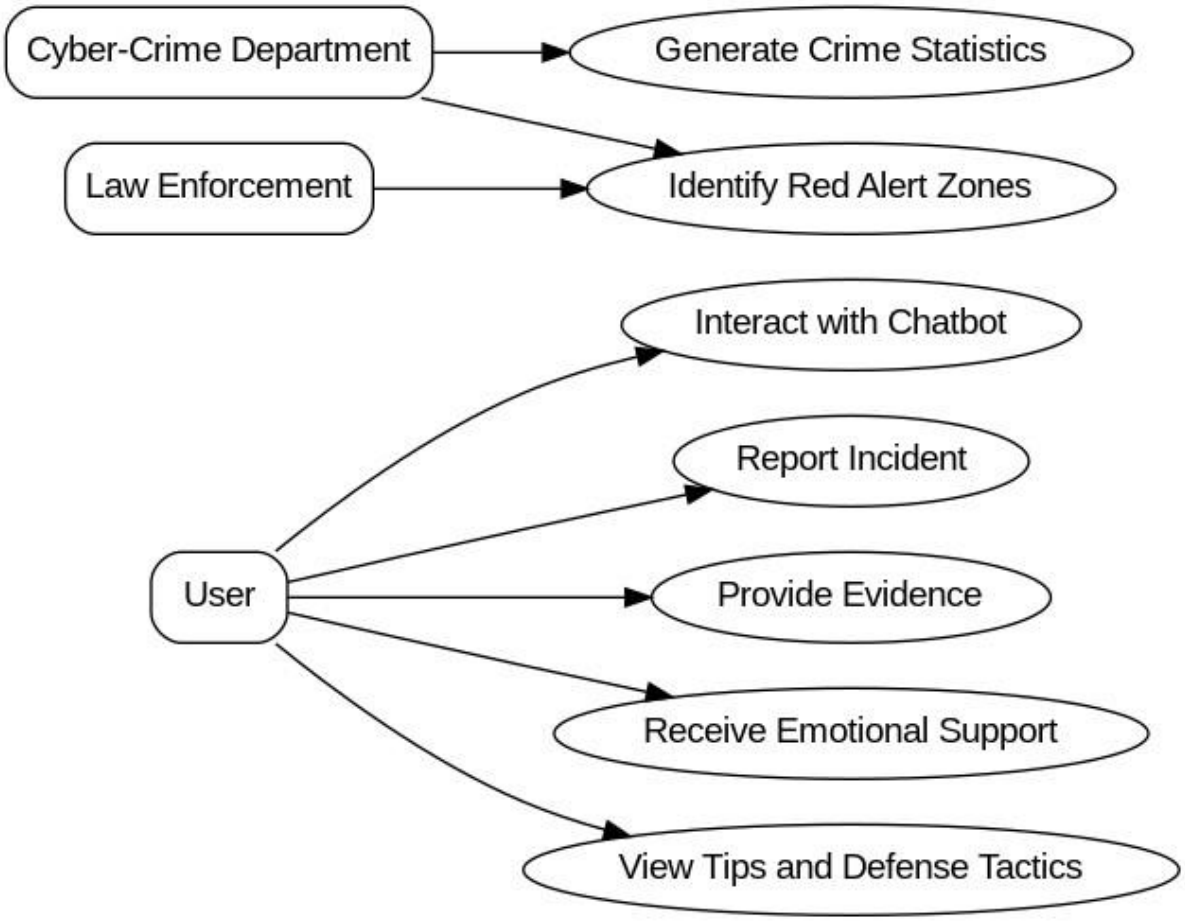

Fig 6.1 Use Case Diagram

Actors

1. **User:**
    - Represents victims or individuals using the website to report cyberbullying, seek emotional support, or view resources like tips and defense tactics.
2. **Cyber-Crime Department:**
    - Represents authorities who receive reports, access crime statistics, and analyze data to identify areas with higher cyberbullying incidents.
3. **Law Enforcement:**
    - Represents the authorities responsible for taking action in red alert zones flagged by the system.

Use Cases

1. **Interact with Chatbot:**
    - Users engage with the chatbot "Billy" to receive emotional support and provide initial details about their experience.
2. **Report Incident:**
    - Users anonymously report cyberbullying incidents.
3. **Provide Evidence:**
    - Users upload relevant evidence (e.g., screenshots or chat logs) to support their report.
4. **Receive Emotional Support:**
    - The chatbot offers comforting responses and guidance to victims of cyberbullying.
5. **View Tips and Defense Tactics:**
    - The website provides resources to educate users on how to protect themselves online and deal with cyberbullying effectively.
6. **Generate Crime Statistics:**
    - The system analyzes reported data to create visual statistics, aiding in identifying trends and high-crime areas.
7. **Identify Red Alert Zones:**
    - The system flags regions with high cyberbullying incidents as "red alert zones," ensuring prioritized attention from authorities.

6.2 Hardware and Software Details:

- **Hardware**:
  - Any system capable of supporting AI-based software.

- **Software**:
  - **Botpress**:
    - Botpress is a powerful, open-source platform designed to create and manage chatbot conversational flows.
    - It allows the development of dynamic, context-aware dialogues between the chatbot (Billy) and the users.
    - Botpress helps design natural conversations and interactions, where the chatbot can adapt its responses based on the user's input.
    - It integrates easily with NLP tools, enabling the chatbot to understand user emotions and offer empathetic support.
  - **NLP**:
    - NLP will be used for entity recognition (identifying names, dates, locations, etc.) and intent detection (understanding what the user intends to do or convey through their message).
    - Understand the meaning behind user messages (e.g., whether the user is expressing distress or asking for help).
    - Identify key phrases or entities related to cyberbullying incidents (e.g., names of perpetrators, types of abuse).
    - Tailor responses accordingly, offering comfort and guidance based on the user's emotional tone and intent.
  - **Database**:
    - A cloud-based database will be used to store anonymized user reports securely.
    - This includes data related to the bullying incidents and evidence (such as screenshots or chat logs).

6.3 System's Design and its Core Components:

1. User Interface (UI) Design

The website will feature an intuitive, user-friendly interface with easy navigation for both victims and those seeking to report cyberbullying. Key features will include:

- **Homepage**: The homepage will serve as the first point of contact for users. It will provide a clear introduction to the platform's purpose—combating cyberbullying—and offer a welcoming environment.

- **Chatbot Interaction**:
  - Billy, the chatbot, will be placed prominently on the homepage. It will be an interactive feature that users can access directly for real-time emotional support.
  - The chatbot will have a friendly tone to encourage victims to express their emotions and share their experiences without feeling judged or isolated.
  - Billy will provide personalized responses based on the user's emotional state, offering comfort, guidance, and empathy.

- **Report Submission**:
  - Victims can submit reports of cyberbullying through an easy-to-use form on the website.
  - Users will have the option to upload evidence, such as screenshots or messages, to support their report. The platform will ensure that all reports are anonymous, so victims' identities remain protected.
  - This feature will aim to streamline the reporting process, ensuring that it is straightforward and quick to submit, thus encouraging more victims to come forward.

Design Principles:

- **Clean, Minimalistic Design**:
  - The UI will focus on a **minimalistic layout** that avoids unnecessary distractions. This makes it easier for users to find what they need without feeling overwhelmed.
  - Key elements such as the chatbot and report submission form will be easy to access, with clear calls to action (CTAs) that guide users step by step.

- **Mobile-Friendly Design**:
  - The website will be **responsive**, meaning it will automatically adjust to various screen sizes and devices, such as smartphones and tablets.
  - This ensures that users, regardless of whether they are on a desktop computer or mobile device, will have a **consistent and user-friendly experience**. Mobile accessibility is crucial, as many victims of cyberbullying may access the platform via their phones.

- **Color Schemes and UI Elements**:
  - The platform will use color schemes that promote **calmness and safety**. Colors like **blues** and **greens** are known to have soothing effects, which can help alleviate anxiety and stress, making users feel more at ease.
  - The UI elements, such as buttons, forms, and navigation bars, will be designed with **soft tones** and **gentle contrasts** to create a sense of safety and support.

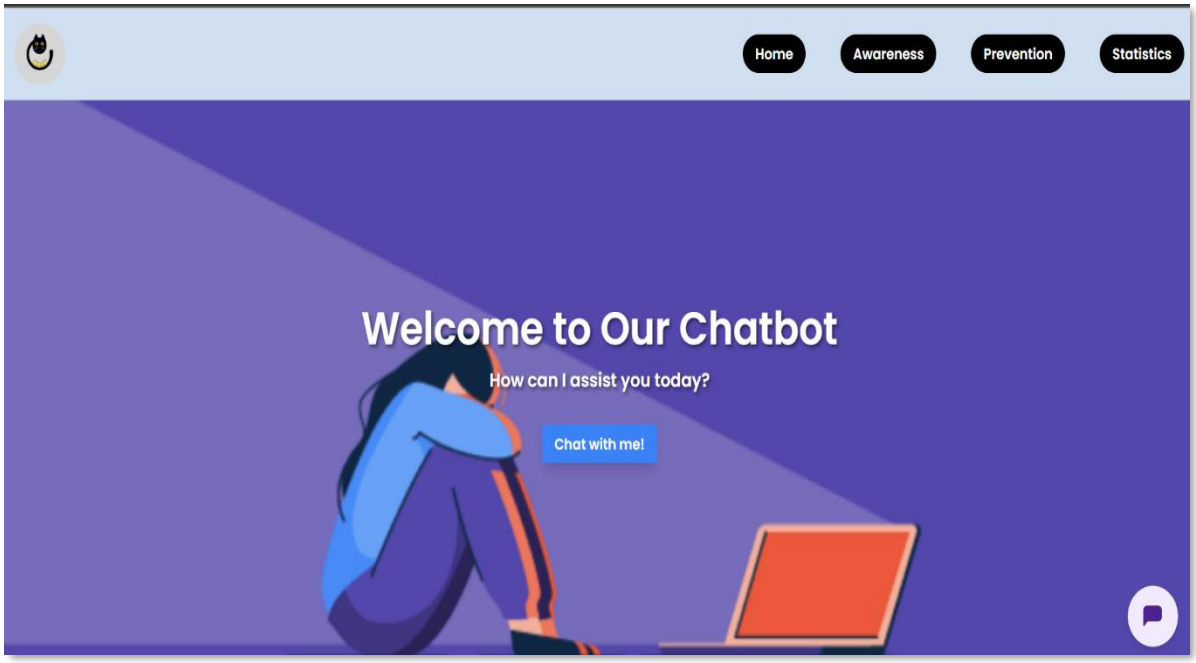

Fig 6.2 User Interface Website

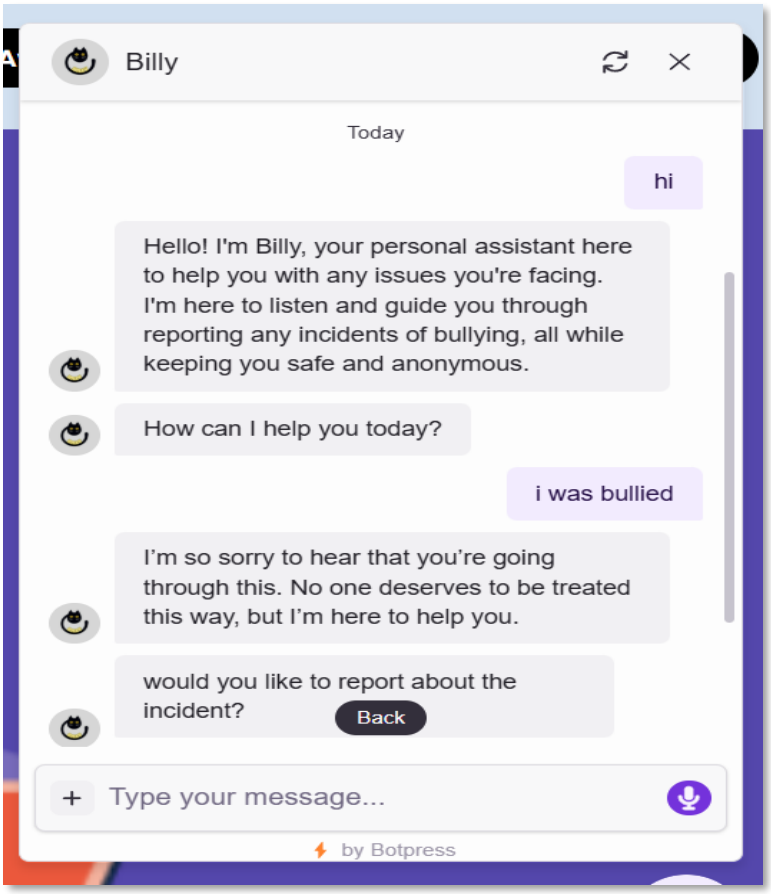

Fig 6.3 User Interface Chatbot

2. Chatbot Design (Billy)

The chatbot will serve as the primary point of contact for victims, offering real-time emotional support and collecting important information for reporting incidents. The chatbot's design will include:

- **Decision Trees**: A set of pre-programmed scripts will guide the chatbot to offer support based on user inputs. For example, if the victim reports feeling sad, the chatbot will respond with comforting phrases, coping strategies, or ask if they want to talk more.

  Purpose: Decision trees are pre-designed logical flows that dictate how the chatbot interacts with users based on their responses.

  How It Works: The chatbot uses structured scripts where each user input leads to a predefined response or question.

For example:

- **User Input**: "I feel sad."
- **Chatbot Response**: "I'm sorry to hear that. Would you like to talk about what happened or hear some tips to feel better?"
- Depending on the user's next choice, the chatbot can:
  - Offer comforting phrases.
  - Suggest coping strategies.
  - Guide the user to report the incident or provide evidence.

These trees ensure the chatbot handles conversations systematically, providing relevant responses without needing advanced AI

- **Emotional Recognition**: While no machine learning is employed, the chatbot will recognize emotional cues based on keywords and predefined patterns.

Purpose: Emotional recognition enables the chatbot to identify and respond appropriately to the user's emotional state based on text inputs.

How It Works:

Keyword Detection: The chatbot scans messages for keywords that indicate emotions.

- For example:
  - Words like "sad," "hurt," "scared," or "angry" trigger responses that provide empathy or support.
  - Phrases like "I feel unsafe" or "I'm being bullied" may initiate questions about the incident or offer immediate reporting options.

Predefined Patterns: Regular expressions or simple pattern-matching algorithms help identify common emotional phrases or complaints.

Example:

- **User Input**: "I'm scared and don't know what to do."
- **Chatbot Response**: "I understand this must be overwhelming for you. I'm here to help. Can you share a little more about what's troubling you?"

Fig 6.4 Decision Trees

3. Anonymity and Reporting System

An essential feature of the platform is ensuring that all reports of cyberbullying are submitted anonymously. Key components include:

- **Anonymous Reporting Form**: The report form will ask for minimal personal information, prioritizing the incident details and supporting evidence. The form will explicitly reassure users of their anonymity.

  Purpose: To provide victims or witnesses of cyberbullying with a secure way to report incidents without revealing their identity.

Key Features:

- **Minimal Personal Information**:

  The form avoids asking for unnecessary personal details, focusing solely on the incident.

  Examples of requested information:

  - **Incident Details**: Description of the bullying event (e.g., messages, comments, or actions).
  - **Date and Time**: When the incident took place.
  - **Evidence Upload**: Users can attach screenshots, chat logs, or other supporting files to validate the report.
- **Explicit Assurance of Anonymity**:

- The form includes a clear statement reassuring users that their identity will not be shared or stored.
- Example statement: *"Your identity is not required to submit this report. All data you provide will remain confidential and used solely for addressing the incident."*

Reporting Process:

- **Step-by-Step Workflow**:
  1. **Accessing the Form**: Users navigate to the reporting page or are directed there via the chatbot if they express a desire to report.
  2. **Filling Incident Details**: The user provides specifics of the incident and uploads any evidence.
  3. **Confirmation**:
     - A confirmation message reassures the user that their report has been submitted successfully.
     - Optionally, a unique report ID can be generated for follow-up or law enforcement purposes.
- **Forwarding to Authorities**:
  - Once submitted, the report (without identifying the user) is securely forwarded to the relevant cyber-crime department.
  - The data may also be aggregated into the platform's statistical database for monitoring cyberbullying trends.

#	name	description	date	phnum	location	evidence
1	{"first":"eshan","last"	i was bullied on insta	2023-01-01T12:12:00	3216549878	banglore	https//files.bp
2	{"first":"dinesh","last'	my snapchat account	2024-02-02T11:00:0	6549873218	banglore	https//files.bp
3	{"first":"vamsi","last"	instagram account ha	2024-01-10T10:30:0	643218895	delhi	https//files.bp
4	{"first":"ganesh","last	whatsapp is hacked	2023-12-13T09:10:0	65432164564	mumbai	https//files.bp
5	{"first":"dinesh","last'	twitter was hacked	2024-10-11T12:12:00.	6549783216	hyderabad	https//files.bp
6	{"first":"dinesh","last'	i was bullied on insta	2024-10-10T12:30:0	1234567898	Banglore	https//files.bp
7	{"first":"vamsi","last"	i was bullied	2024-01-10T10:34:0	654897325	Delhi	https//files.bp
8	{"first":"eshan","last"	i was bullied	2024-10-12T12:12:00	654321654	banglore	

Fig 6.5 Database

- **Secure Database**: All data submitted, including evidence and reports, will be stored securely in a cloud-based database with restricted access.

  Purpose:

  - To store all submitted data, including:
    - Incident reports.
    - Evidence such as screenshots, messages, or other digital proof.
    - Statistical data for crime tracking.
  - To maintain the anonymity and confidentiality of victims while preventing unauthorized access.

Key Features:

1. **Cloud-Based Storage**:
   - The database is hosted on a **cloud platform**, ensuring scalability, reliability, and high availability.
   - Cloud providers often offer advanced security features like encryption, backups, and disaster recovery.

2. **Restricted Access**:
   - Only authorized personnel, such as system administrators or law enforcement, can access the database.
   - Access is controlled using multi-factor authentication (MFA) and role-based permissions to minimize risks.

3. **Regular Monitoring**:
   - The database is monitored for suspicious activities, such as unauthorized login attempts or unusual data access patterns.
   - Logging and auditing systems ensure transparency and accountability.

4. **Anonymized Data Storage**:
   - Personal identifiers are stripped from stored data wherever possible to protect user identity.
   - Data is stored in a way that ensures anonymity even if accessed maliciously.

4. Integration with Law Enforcement

Once a report is submitted, the platform will automatically generate a detailed cyberbullying report database that includes:

- A summary of the bullying incident.
- Relevant evidence, such as screenshots or text from social media.
- A report indicating the location of the incident (based on IP addresses, if available).
- Timestamp of the incident.

This report will be forwarded to the relevant law enforcement agency (cyber-crime unit) while maintaining the victim's anonymity.

5. Educational Resources and Public Awareness

The website will include a dedicated section offering:

- **Prevention Tips**: Educational content on identifying cyberbullying, how to avoid becoming a victim, and how to protect personal information online.

  Purpose:

  - To help users recognize early signs of cyberbullying and avoid risky online behavior.
  - To educate on safe online practices and reduce vulnerability.

  Content:

  - **Identifying Cyberbullying**: Examples of bullying behavior, such as abusive messages, public shaming, or harassment.
  - **Avoiding Risks**: Guidelines like avoiding oversharing personal information, being cautious about interactions with strangers, and securing accounts with strong passwords.
  - **Protecting Personal Information**: Steps like using privacy settings, not sharing sensitive details, and being vigilant about phishing attempts.
- **Defensive Strategies**: Tips for dealing with cyberbullying, including how to block users, report content, and protect digital footprints.

  Purpose:

  - To equip users with actionable steps to respond effectively if they are targeted by cyberbullying.

  Content:

  - **Blocking Users**: Instructions on how to block offenders on different platforms to stop

further interactions.

- **Reporting Content**: Guidance on reporting inappropriate or harmful content to platform administrators for removal or action.
- **Protecting Digital Footprints**: Tips on maintaining privacy, such as regularly reviewing online profiles, using secure passwords, and avoiding public Wi-Fi for sensitive activities.

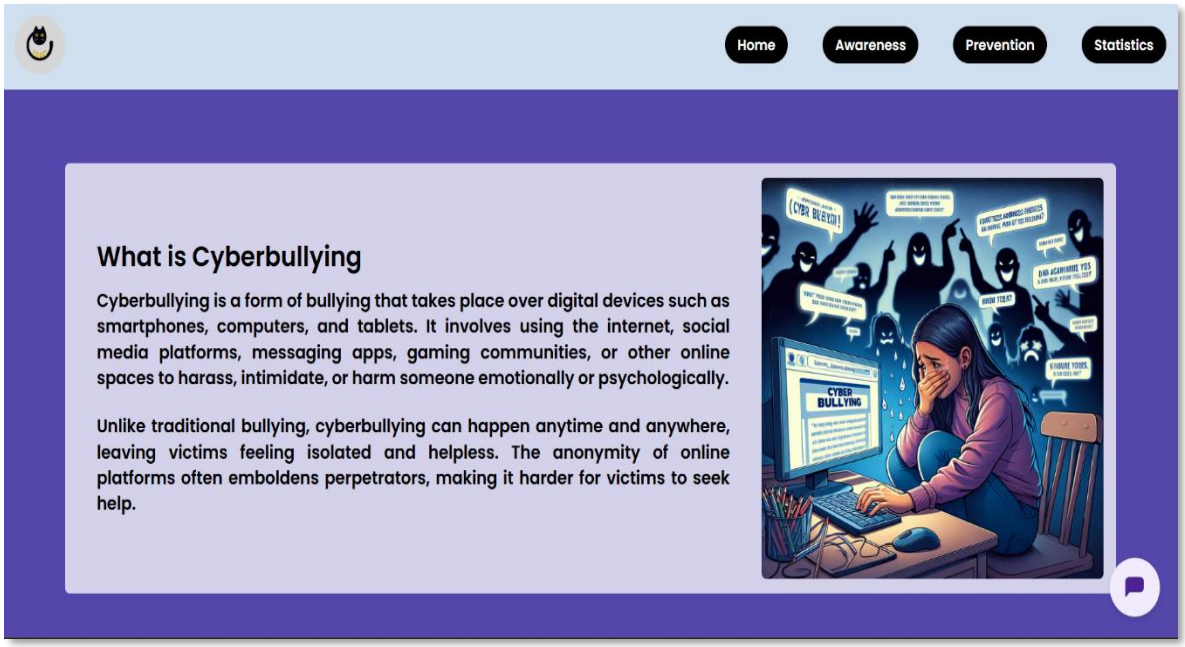

Fig 6.6 Educational Resources

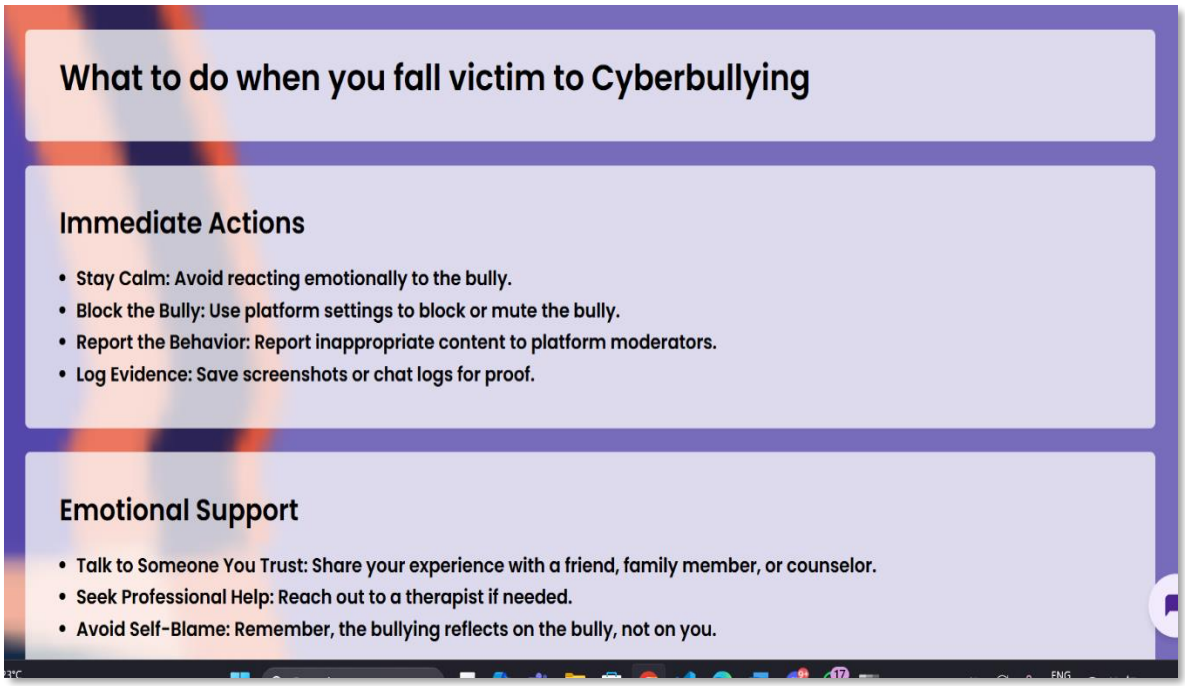

Fig 6.7 Tips and Defence Tactics

6. Data Privacy and Security

A core aspect of the design is ensuring data privacy and compliance with data protection regulations (e.g., GDPR). Features include:

- **Anonymous Data Handling**: No personally identifiable information (PII) will be stored unless absolutely necessary (e.g., for law enforcement purposes).

  Objective: To protect the user's identity while still allowing for effective reporting and intervention.

  Implementation:

  - **No Personally Identifiable Information (PII)**:
    - The system avoids collecting sensitive user details (e.g., name, address, or contact information) unless absolutely required, such as during law enforcement involvement.
    - This minimizes the risk of user data being exposed or misused.
  - **Use of Unique Identifiers**:
    - Reports and evidence are tagged with anonymous identifiers instead of user details, ensuring data cannot be traced back to the victim.
  - **Encryption of Sensitive Data**:
    - If any PII must be stored temporarily, it will be encrypted to prevent unauthorized access.

  Benefits:

  - Ensures that victims feel safe using the platform without fear of exposure.
  - Aligns with privacy laws requiring minimal data collection.
- **Data Retention Policy**: The system will have a clear data retention policy that ensures user data is kept only as long as necessary for reporting and legal purposes.

7. System Architecture

The platform will rely on a **multi-tier architecture**, with separate layers for:

- **Frontend**: Built with frameworks like React and Tailwind CSS for an interactive, dynamic experience.
  - **React**: This JavaScript library will be used to build the user interface of the platform. React is known for creating **interactive, dynamic, and responsive** web applications. It allows for smooth updates and rendering, making the user experience seamless.

- **Tailwind CSS**: This utility-first CSS framework will be used for styling. It enables rapid design and customization of UI components. With Tailwind, developers can build responsive and modern-looking pages without writing custom CSS from scratch.

- **Backend**: Natural Language Processing for the streamlined workflow of chatbot.
  - **Natural Language Processing (NLP)**: The backend will leverage NLP technologies to power the chatbot. NLP enables the chatbot to understand and process user inputs in natural language, allowing it to respond intelligently. This makes the chatbot capable of interpreting the emotional state of the victim and offering relevant support.
  - The backend will also manage tasks such as user authentication, storing reports, and managing sessions for each user interaction.

- **Database**: A cloud-based database powered by Botpress to store user reports, evidence, and educational content.
  - **Cloud-Based Database**: The system will use a cloud-based database to store crucial data such as **user reports**, **evidence** (e.g., screenshots or chat logs), and **educational content** (e.g., resources on cyberbullying prevention). Storing data in the cloud ensures scalability, high availability, and data redundancy. Cloud solutions like AWS, Google Cloud, or Azure may be used for this.
  - **Botpress Integration**: The database will be integrated with **Botpress**, which is a popular open-source conversational AI platform. This platform will store chat logs, user preferences, and any other relevant data to help personalize the chatbot's interactions.

- **Chatbot Engine**: Botpress for conversational flow design.
  - **Botpress**: This tool will be used to design and manage the chatbot's conversational flow. It will be responsible for interpreting user inputs and generating relevant responses.
  - **Botpress** will also integrate with NLP to enable Billy (the chatbot) to understand and respond to user emotions in real-time. The chatbot will be the core of the platform, providing victims with immediate emotional support and guiding them through the process of reporting cyberbullying.

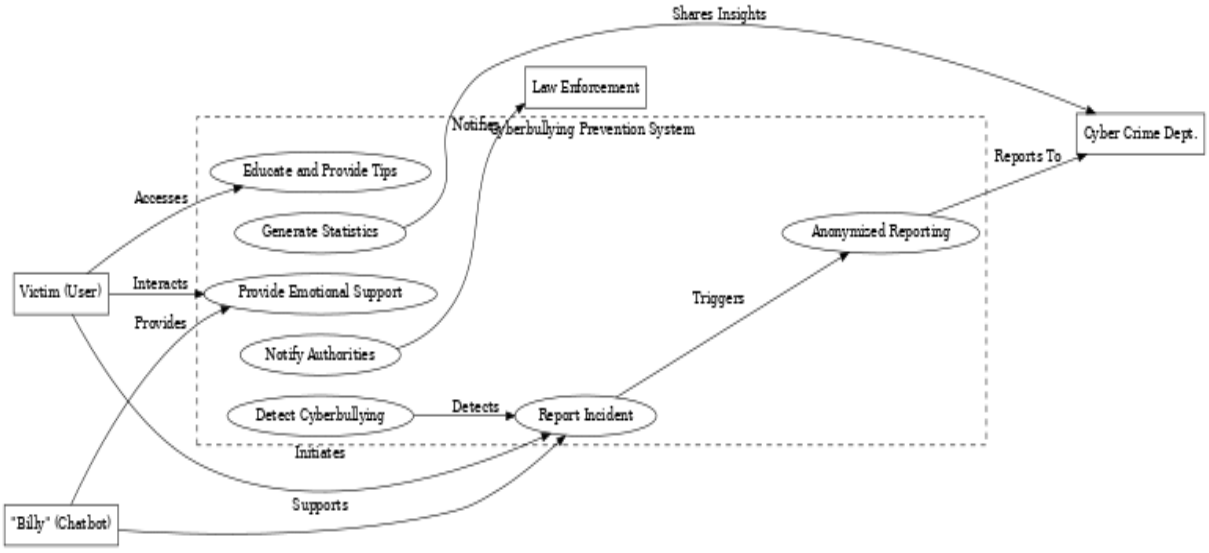

Fig 6.8 System Architecture

CHAPTER-7

TIMELINE FOR EXECUTION OF PROJECT

(GANTT CHART)

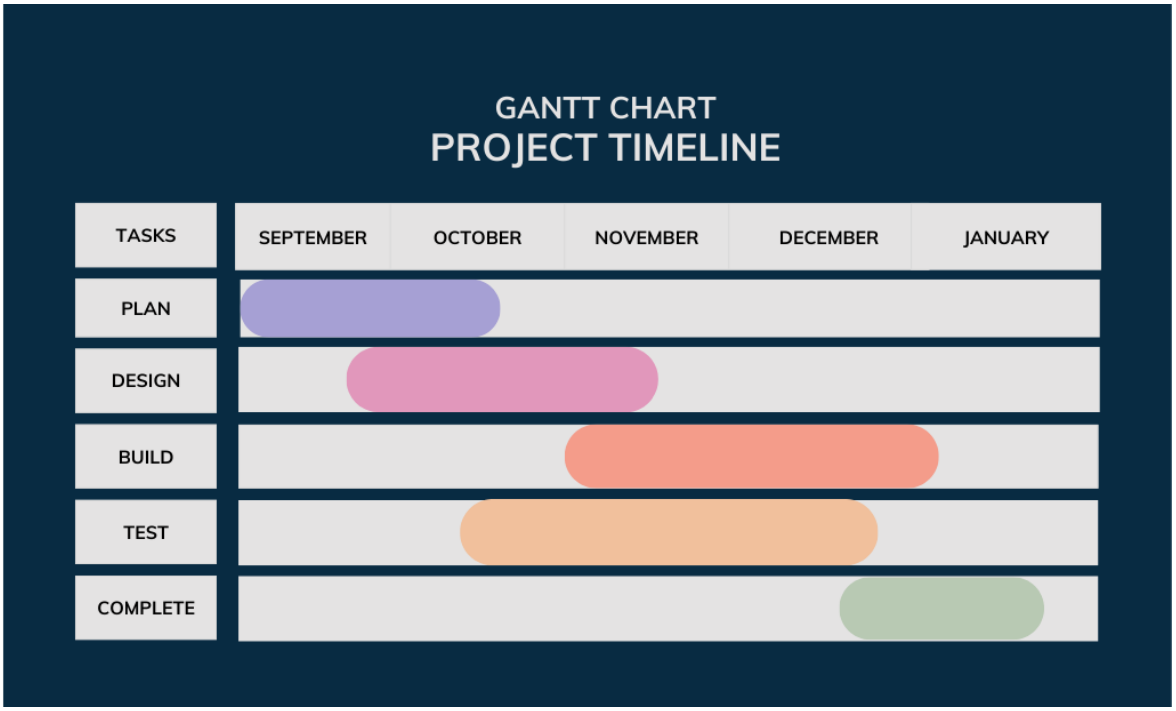

Fig 7.1 Gantt Chart

CHAPTER-8

OUTCOMES

This chapter highlights the anticipated outcomes of the research and development efforts in creating the proposed system to combat cyberbullying. These outcomes are classified into measurable technical achievements, societal impacts, and contributions to the field of cyberbullying prevention.

8.1 Technical Outcomes

1. **Emotionally Intelligent Chatbot (Billy):**
   - Successful Implementation: The AI chatbot, Billy, will be implemented to provide real-time emotional support to victims of cyberbullying. Billy will interact empathetically and intelligently with users, recognizing their emotional state and offering relevant support.
   - Seamless chatbot interactions that adapt to the victim's emotional state, fostering a supportive and empathetic experience.
2. **Anonymized Reporting Mechanism:**
   - Secure and Anonymous Reporting: Victims will be able to report incidents of cyberbullying securely without revealing their identity, ensuring privacy and protecting them from retaliation.
   - Automated generation and submission of reports database with relevant evidence, improving efficiency and response times.

8.2 Societal Outcomes

1. **Increased Victim Support:**
   - **Emotional Relief**: By providing immediate emotional support through Billy, victims can experience a reduction in the immediate psychological impact of cyberbullying, such as stress, anxiety, and depression.
   - Provision of resources and self-help tools empowers individuals to cope with and prevent further harassment.
   - **Accessible Help**: The platform makes support accessible to victims who may not have access to traditional counseling or therapy, providing an alternative, easily accessible solution.

- The chatbot will engage with victims in real-time, offering emotional comfort and personalized responses based on the victim's distress levels. By analyzing text for emotional cues, the chatbot will provide empathetic messages to help victims cope with their experiences.
- Victims will experience a more supportive environment when reporting bullying. Instead of dealing with a cold or impersonal process, they will interact with an AI-driven system that cares for their emotional well-being while guiding them through reporting options.

2. **Improved Reporting Rates:**
   - **More Accurate Data**: With an increased number of reports, authorities and researchers will have more accurate data on the scope of cyberbullying, allowing for better-targeted interventions and policies.
   - **Quicker Law Enforcement Response**: With automated report generation, the system ensures timely submission of evidence to law enforcement, improving their ability to respond to incidents quickly and efficiently.
   - **Reduced Fear of Retaliation**: Anonymity in reporting lowers the fear of being targeted by perpetrators, encouraging more victims to share their experiences without the risk of further harm.

3. **Awareness and Education:**
   - **Preventive Measures**: Through comprehensive educational content, users will be equipped with the knowledge to prevent themselves from becoming victims in the first place, reducing the occurrence of cyberbullying.
   - **Social Norms Change**: Increased awareness of cyberbullying may lead to a shift in societal attitudes, making bullying online less acceptable and fostering a culture of respect and kindness.
   - **Empowerment Through Education**: The platform not only educates victims but also empowers other users (bystanders, friends, family) to identify bullying and intervene or offer help, promoting a supportive community

4. **Reduced Cyberbullying Incidents:**
   - **Long-Term Cultural Shift**: As awareness increases and victims are supported, society as a whole may adopt stronger values of empathy, respect, and kindness online, leading to a long-term reduction in cyberbullying.
   - **Proactive Monitoring**: The reporting system enables authorities to identify patterns in cyberbullying, allowing them to act more proactively in preventing incidents before they escalate.
   - **Fostering a Safe Online Environment**: As more people report incidents and the system becomes more effective, the overall environment of the internet becomes safer for everyone, reducing the prevalence of online abuse and harassment.

CHAPTER-9
RESULTS AND DISCUSSIONS

The proposed cyberbullying detection and support system aims to provide real-time emotional support to victims while ensuring their anonymity during reporting. This section discusses the expected results from the system's implementation, including its potential effectiveness, user engagement, and the overall impact it could have compared to existing tools in addressing cyberbullying.

1. Emotional Support Effectiveness

One of the key strengths of this system is its ability to provide real-time emotional support through a chatbot interface. By incorporating a chatbot designed specifically to respond to victims of cyberbullying, the system not only detects the incident but also offers comforting responses tailored to the victim’s emotional state. Previous research on chatbots for mental health support has shown that AI-based systems can help reduce distress and provide psychological comfort [4]. In a similar context, this system is expected to alleviate feelings of isolation and distress among victims of cyberbullying by offering empathetic and understanding responses.

The chatbot's ability to recognize emotional cues in users' text inputs enables it to adjust responses accordingly, offering personalized advice and resources for coping with the effects of bullying. As chatbots have been shown to increase user engagement in mental health contexts, it is anticipated that this aspect will encourage more victims to report incidents of bullying, feeling supported rather than alone [8].

2. Anonymity and Privacy Protection

The second significant result of the project is the system’s strong emphasis on protecting the anonymity of users who report cyberbullying incidents. Drawing inspiration from previous works on anonymized reporting, the system ensures that no personally identifiable information (PII) is stored or exposed, reducing the fear of retaliation. Victims can report bullying without worrying about their identity being compromised, which is a key deterrent in many existing

systems that either fail to protect user identities or make the reporting process cumbersome[10].

By integrating robust privacy features such as encrypted data storage and secure user authentication processes, the system ensures that sensitive user information is kept confidential, aligning with legal standards such as GDPR. This level of privacy protection is expected to increase the number of reports submitted by victims who might otherwise avoid reporting due to fears of exposure or retaliation.

3. Reporting Mechanism and Speed

The real-time reporting feature of the system is another area where it stands out from traditional tools. Unlike older systems that depend on manual interventions or human moderators [1], our system automates the reporting process, making it faster and more efficient. Once the chatbot interacts with the user, it compiles all relevant information into a report, which can be submitted to law enforcement or school authorities instantly. This reduces delays that may occur in traditional systems, allowing quicker intervention in urgent cases of cyberbullying.

Additionally, the system's ability to provide high-level reports enriched with details about the bullying incident (e.g., the type of bullying, emotional cues) is expected to improve the effectiveness of the intervention. These detailed reports can help authorities or moderators act swiftly, based on comprehensive information.

4. User Experience and Engagement

The integration of educational content—tips, defensive tactics, and strategies for managing online harassment—is expected to increase overall user engagement. Cyberbullying prevention and educational content have been proven to raise awareness and help reduce the occurrence of bullying in online environments. By educating users on how to protect themselves and how to deal with cyberbullying, the system aims to create a more proactive user base [7].

The feedback from initial testing of chatbot-driven educational systems has been positive, with users appreciating the information on personal defense strategies and how to report incidents

of cyberbullying in a safe manner. This aspect of the system helps empower users to not only seek support but also take action when necessary, potentially reducing the recurrence of bullying in the long term.

5. Limitations and Areas for Improvement

While the system offers several innovations, there are still challenges to address. For example, while the chatbot is effective in providing emotional support, it may not be able to fully grasp the nuances of complex emotional situations. Emotion detection via NLP has its limitations, especially in cases where the user's emotional state is complex or ambiguous [2]. Further refinements in the chatbot's emotional recognition capabilities may be necessary to enhance its accuracy in such cases.

Additionally, while the system ensures anonymity, some users may still feel hesitant to report bullying incidents due to mistrust of digital systems or concerns about the potential for data breaches. Further user education and transparency about how the data is handled will be crucial in overcoming this hurdle.

CHAPTER-10
CONCLUSION

Cyberbullying is a pervasive issue that poses severe psychological, emotional, and social challenges to victims, particularly in the digital age. This research presents a comprehensive framework aimed at addressing the multifaceted nature of cyberbullying through innovative technological solutions and victim-centric approaches. By integrating real-time detection, emotional support via the chatbot "Billy," anonymous reporting mechanisms, statistical insights, and educational initiatives, the system offers a holistic strategy to combat online harassment.

The incorporation of Natural Language Processing (NLP) and machine learning ensures that the detection of harmful content is both accurate and adaptive to evolving linguistic patterns. The empathetic chatbot not only provides immediate emotional support but also empowers victims to report incidents anonymously, fostering a safer digital environment. Meanwhile, statistical analysis identifies high-risk areas, enabling targeted interventions by law enforcement, while awareness campaigns aim to reduce incidents in the long term.

Despite its strengths, the framework acknowledges certain limitations, such as scalability challenges, cultural nuances, and the need for ongoing technological updates. Addressing these limitations through continuous refinement and collaboration with stakeholders will be crucial for ensuring the system's efficacy and sustainability.

In conclusion, this research contributes a novel, victim-centric approach to cyberbullying prevention, emphasizing immediate intervention, long-term prevention, and societal impact. By fostering collaboration between technology, law enforcement, and education, the proposed system represents a significant step toward creating a safer and more inclusive online environment for all.

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APPENDIX-A

PSUEDOCODE

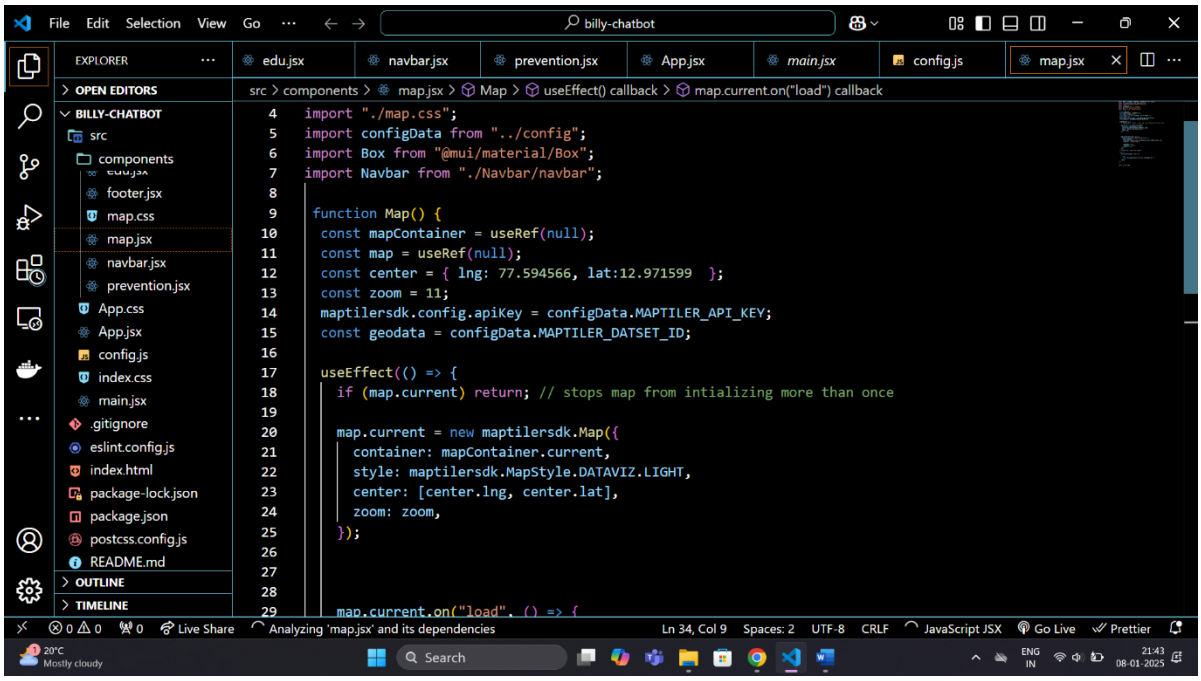
```
BEGIN
  // Initialization
  Initialize the web application
  Initialize database with tables:
    - Users (anonymous IDs)
    - Reports (incident details, evidence)
    - Statistics (location-based crime data)
  Set up modules for:
    - Chatbot ("Billy")
    - Reporting System
    - Tips & Defense Tactics
    - Statistics Visualization

  // Homepage
  FUNCTION displayHomepage():
    Display options:
      1. Chat with Billy
      2. Report an Incident
      3. View Tips & Defense Tactics
  END FUNCTION

  // Chatbot Module
  FUNCTION chatbotBilly(userInput):
    Analyze userInput using sentiment analysis
    IF distress detected THEN
      Respond with comforting messages
      PROMPT: "Would you like to report this incident?"
      IF user agrees THEN
        CALL reportingModule()
      END IF
```

```
    ELSE
        Respond with friendly, supportive dialogue
    END IF
END FUNCTION

// Reporting Module
FUNCTION reportingModule():
    Display: "Please provide details of the incident."
    PROMPT user to enter:
        - Description of incident
        - Evidence (e.g., screenshots, links)
        - Location of incident
    Store details in the database, ensuring anonymity
    Update statistics table with location data
    Acknowledge the user: "Your report has been submitted anonymously."
END FUNCTION

// Tips & Defense Tactics Module
FUNCTION displayTips():
    Display curated tips to:
        - Recognize signs of cyberbullying
        - Respond effectively without escalating
        - Protect online privacy
        - Report offenders to relevant authorities
END FUNCTION

// Statistics Module
FUNCTION generateStatistics():
    Retrieve and analyze reports from the database
    Group incidents by location and calculate frequency
    Highlight high-crime areas (Red Alert Zones) on a map
    Display statistics and heatmap for public visibility
END FUNCTION
```

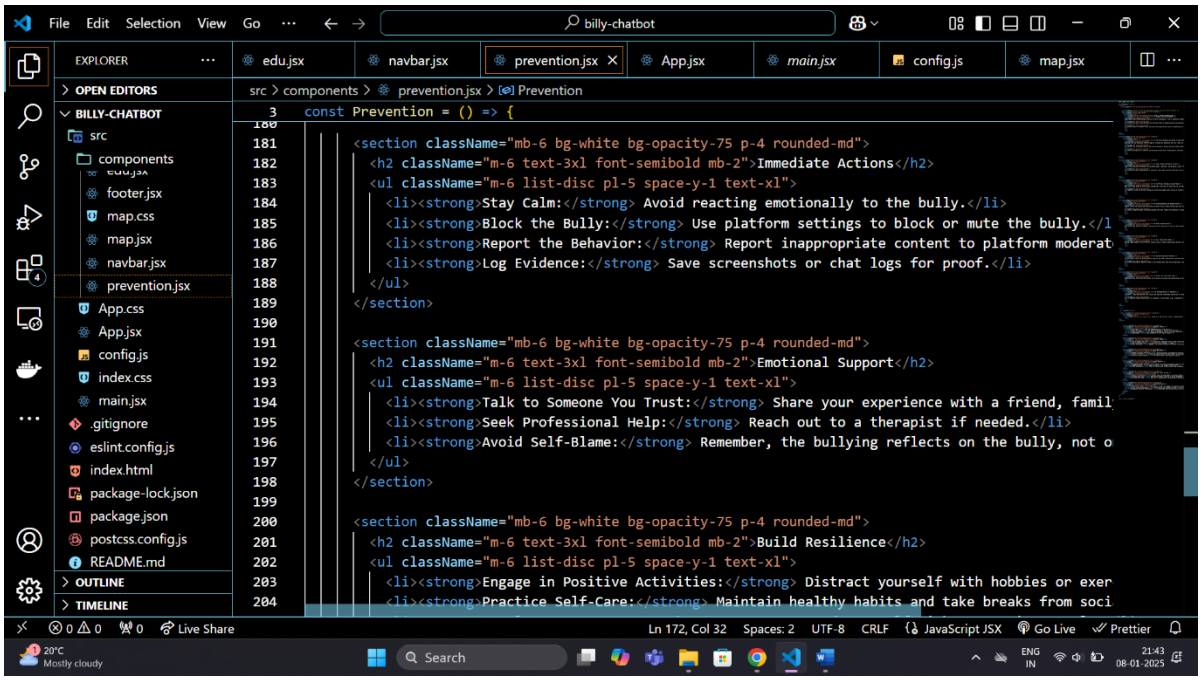
```
  // Main Application Workflow
  WHILE applicationIsRunning:
    CALL displayHomepage()
    PROMPT userSelection
    SWITCH userSelection:
      CASE "Chat with Billy":
        PROMPT userInput
        CALL chatbotBilly(userInput)
      CASE "Report an Incident":
        CALL reportingModule()
      CASE "View Tips & Defense Tactics":
        CALL displayTips()
      DEFAULT:
        Display "Invalid Option. Please try again."
    END SWITCH
  END WHILE

END
```

APPENDIX-B

SCREENSHOTS



Screenshot 1: Workflow – Back-End



Screenshot 2: Workflow – Front-End

APPENDIX-C

ENCLOSURES

JOURNAL PUBLICATION CERTIFICATES :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PLAGIARISM CHECK REPORT:

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SDG MAPPINGS:

This project is mapped to SDG-3, SDG-11, and SDG-16.

SDG 3: Good Health and Well-being

- **Mental Health Support**: The chatbot ("Billy") provides immediate emotional comfort and guidance to victims of cyberbullying, addressing mental health and emotional well-being.
- **Preventive Measures**: By providing tips and defense tactics, the website empowers users to avoid situations that could lead to cyberbullying and promotes a healthier online environment.

SDG 11: Sustainable Cities and Communities

- **Tracking Crime Patterns**: The platform calculates cyber-crime statistics and identifies high-risk areas, enabling authorities to focus resources and create safer online and offline communities.

SDG 16: Peace, Justice, and Strong Institutions

- **Anonymous Reporting**: Encourages users to report cyberbullying without fear of retaliation, fostering a culture of accountability and trust.
- **Evidence Collection**: Gathers and stores information for law enforcement, contributing to effective justice systems.
- **Reducing Online Harassment**: The project supports building a peaceful digital space by reducing online abuse and promoting safer interactions.