

Suraksha Setu
An Engineering Project in Community Service

Individual Report

Submitted by

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*in partial fulfillment of the requirements for the degree of Bachelor of
Engineering and Technology*



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Bhopal
Madhya Pradesh

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Bonafide Certificate

Certified that this project report titled “**Suraksha Setu**” is the bonafide work of “Yashraj Singh Negi 21BAI10492” who carried out the project work under my supervision.

This project report (Phase II Final) is submitted for the Project Viva-Voce examination held on 10/05/2024.

Supervisor

Comments & Signature (Dr. Hariharan R)

Comments & Signature (Dr. Vijay Kumar Patidar)



Declaration of Originality

I, hereby declare that this report entitled “**Suraksha Setu**” represents my original work carried out for the EPICS project as a student of VIT Bhopal University and, to the best of my knowledge, it contains no material previously published or written by another person, nor any material presented for the award of any other degree or diploma of VIT Bhopal University or any other institution. Works of other authors cited in this report have been duly acknowledged under the section "References".

Date

Reg No & Name

Yashraj Singh Negi

(21BAI10492)



Acknowledgement

I would like to express our sincere gratitude to the individuals who contributed to the successful completion of this research project.

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Lastly, I would like to acknowledge the contributions of all individuals who have supported us in ways both seen and unseen, including our colleagues, friends, and family members. Their encouragement and understanding have been a constant source of motivation throughout this endeavor.

I am grateful for the collective efforts of everyone involved and recognize the role each individual has played in bringing this research to fruition.

Abstract

In the face of escalating natural disasters, the need for a well-coordinated and efficient response from rescue agencies is paramount. Our research endeavors to address this imperative by developing a revolutionary application, Suraksha Setu, which serves as a centralized platform for the registration and real-time tracking of rescue relief agencies during emergencies. This report presents the motivation, objectives, methodology, results, and conclusions of our project. The motivation behind Suraksha Setu stems from the critical gaps observed in traditional emergency response systems, particularly in reaching remote or disaster-stricken areas promptly. By leveraging technology, Suraksha Setu bridges this gap, providing instant and accurate location information to relief units. By harnessing the power of technology and collaboration, we aspire to orchestrate a symphony of solidarity where every action brings us closer to a safer, more resilient future.

Our project objectives encompass the establishment of a centralized registry, implementation of real-time location tracking, development of a secure communication platform, design of an intuitive user interface, and ensuring scalability for future integration. Through meticulous methodology involving data collection, preprocessing, feature extraction, and model training, we have trained an image classification system to assess the severity of damage caused by disasters using deep learning techniques. The results of our project demonstrate the efficacy of Suraksha Setu in providing timely alerts, facilitating resource allocation, and promoting community resilience. Thereby concluding, Suraksha Setu represents a significant advancement in emergency response technology, offering hope and resilience amid crises.

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1. INTRODUCTION

In the face of escalating natural and man-made disasters, the urgency for a well-coordinated and efficient response from rescue agencies cannot be overstated. Lives hang in the balance, and the ability to swiftly mobilize resources becomes a critical factor in determining the outcome. Recognizing this imperative, our team is embarking on a groundbreaking initiative to develop a revolutionary application that will serve as a centralized platform for the registration and real-time tracking of rescue relief agencies during emergencies. Picture this application as the conductor in a grand symphony of disaster response, where every note resonates with precision, and every movement is orchestrated seamlessly. The stage is set for a transformative revolution where technology assumes the role of the conductor, guiding disparate entities—rescue agencies, volunteers, and resources—into a harmonious ensemble. Our project goes beyond the creation of a mere platform; it aspires to compose a symphony of solidarity that reverberates across the landscapes of vulnerability.

In the symphony of disaster response, timing is of the essence. Our application ensures that rescue agencies can register swiftly and provide real-time updates on their locations, capabilities, and ongoing operations. This information becomes a vital part of the orchestration, allowing the conductor (the technology) to allocate resources with precision and direct the ensemble of rescue agencies where they are needed most. The technological symphony we are composing empowers not only the rescue agencies but also the communities at risk. By providing a centralized hub for information and communication, our application fosters collaboration and unity, turning chaos into harmony during the most critical moments. Imagine a world where different entities seamlessly join forces, guided by a common purpose and facilitated by advanced technology—a world where the symphony of solidarity drowns out the dissonance of disaster.

Through our project, we aim to redefine the paradigm of disaster response, transcending traditional boundaries and fostering a new era of collective resilience. The symphony we compose will not only save lives but also leave an indelible mark on the landscape of emergency management, demonstrating the transformative power of technology when harnessed for the greater good. Together, let us harmonize the response to crises, turning adversity into an orchestrated triumph of human solidarity.

1.1 Motivation

In today's rapidly advancing world, effective disaster management is absolutely essential. When emergencies strike, we often rely on those around us for assistance, but the reality is that this isn't always enough. In critical situations, people must actively seek help, and this process needs to be swift and streamlined because every second counts when lives are on the line. To address this urgency, we aim to leverage technology to minimize response times and connect those in distress with rescue and relief teams as quickly as possible.

Our initiative is not just about leveraging technology for the sake of innovation; it's about fundamentally reshaping the landscape of emergency response. By fostering collaboration between technology experts, first responders, and community members, we are creating a network of support that transcends geographical boundaries. This isn't just a platform; it's a lifeline, a beacon of hope in times of distress. We are providing a connective platform where a person in a critical situation asks for help, the instantaneous emergency alert responses will ensure that the required help reaches the victim thereby helping to avoid unfortunate delays. that It's a collaborative effort, to enhance connectivity and efficiency, ultimately making life safer and more interconnected for everyone.

1.2 Objective

Our project aims to achieve the following objectives:

- **Establish a Centralized Registry:** Our first objective is to train a comprehensive database encompassing a wide array of rescue relief agencies. This database serves as a singular repository housing vital information, including contact details, areas of expertise, and available resources of each agency. By consolidating this critical data into a centralized registry, we aim to streamline information access and facilitate seamless collaboration among stakeholders involved in emergency response efforts.
- **Implement Real-Time Location Tracking:** The second objective involves the development and implementation of a robust geospatial tracking system. This system enables rescue agencies to share their real-time locations during emergency situations, fostering improved situational awareness and resource optimization. By visualizing the geographical distribution of responding agencies, decision-makers can make informed allocation decisions, thereby enhancing the overall efficacy of relief operations.
- **Design an Intuitive User Interface:** Our fourth objective centers on the design and development of an intuitive and user-friendly interface for the emergency response application. By prioritizing ease of use and accessibility, our interface aims to empower rescue agency personnel with the necessary tools and functionalities to navigate the application seamlessly. Through intuitive design principles, we seek to alleviate the cognitive burden associated with complex technologies, allowing responders to focus on their core mission objectives.

2. Review of Literature

1- Tingsanchali (2012) explores the complexities of urban flood disaster management in their article published in *Procedia Engineering*. The study delves into the various strategies and challenges associated with mitigating flood disasters in urban settings. Through a thorough examination of relevant literature and case studies, the author highlights the importance of proactive measures in addressing urban flood risks. The article underscores the need for comprehensive planning, effective infrastructure development, and community involvement to enhance resilience and minimize the impacts of floods on urban areas. Tingsanchali's work provides valuable insights for policymakers, urban planners, and disaster management professionals striving to develop sustainable strategies for managing urban flood disasters.

2- Feng and Cui (2021) offer a comprehensive review of emergency response strategies in disasters, examining both current practices and future perspectives. Published in *Natural Hazards*, their study explores various aspects of emergency response, including preparedness, coordination, communication, and technological advancements. Through a synthesis of existing literature and case studies, the authors identify key challenges and opportunities in disaster response efforts. They emphasize the importance of integrating traditional approaches with emerging technologies such as artificial intelligence and remote sensing to enhance the effectiveness of response operations. The article provides valuable insights for policymakers, emergency responders, and researchers seeking to improve disaster response practices and build resilience in vulnerable communities.

3- Singh (2018) presents a PhD forum paper discussing the innovative approach of monitoring and detecting floods through the fusion of sensor data and social media streams. The paper explores the potential of leveraging both traditional sensor data and real-time information from social media platforms to enhance flood monitoring and early warning systems. Singh proposes a framework for integrating these diverse data streams, emphasizing the importance of interdisciplinary collaboration between engineering, social sciences, and computer science fields. By combining technological advancements with the power of social media, the author suggests a more comprehensive approach to flood management, enabling

more timely and accurate responses to flood events. Singh's work contributes to the ongoing efforts to improve disaster preparedness and response strategies through the integration of multiple data sources.

4- Abid and Abid (2021) present a comprehensive exploration of how artificial intelligence (AI) can enhance disaster management efforts through an integrated approach. Published in *Sustainability*, their article highlights the potential of AI technologies in various phases of disaster management, including preparedness, response, recovery, and mitigation. The authors discuss how AI-driven solutions such as predictive modeling, data analytics, and machine learning can improve decision-making processes, resource allocation, and early warning systems in disaster scenarios. They emphasize the importance of integrating AI tools with existing disaster management frameworks to maximize efficiency and effectiveness. Through case studies and examples, Abid and Abid illustrate the benefits of incorporating AI into disaster management practices, ultimately advocating for a more resilient and adaptive approach to addressing natural and human-induced disasters.

5- Singh (2018) discusses in this PhD forum paper the innovative approach of monitoring and detecting floods by integrating sensor data with real-time information from social media platforms. The study explores the potential of combining traditional sensor data with the vast and rapidly updated data available on social media to enhance flood monitoring and early warning systems. Singh proposes a framework for integrating these diverse data streams, emphasizing interdisciplinary collaboration between engineering, social sciences, and computer science fields. By leveraging technological advancements and harnessing the power of social media, the author suggests a more comprehensive approach to flood management, enabling more timely and accurate responses to flood events. Singh's work contributes to ongoing efforts to improve disaster preparedness and response strategies through the integration of multiple data sources.

6- Alam (2011) examines flood disaster preparedness within the Indian context in this article published in the *International Journal on Recent Trends in Engineering & Technology*. The study delves into the specific challenges and strategies associated with preparing for floods in India, considering factors such as geography, climate, infrastructure, and

socioeconomic conditions. Through a review of relevant literature and case studies, the author highlights the importance of proactive measures in mitigating the impacts of floods and enhancing community resilience. The article emphasizes the need for comprehensive planning, effective early warning systems, infrastructure development, and community engagement to improve flood disaster preparedness in India. Alam's work contributes valuable insights to the ongoing efforts aimed at reducing the vulnerability of Indian communities to flood disasters.

7- Tripathi (2015) conducts an analysis of flood disasters in India and evaluates the trends and preparedness measures in the *Interdisciplinary Journal of Contemporary Research*. The study examines historical data to identify patterns and trends in flood occurrences across different regions of India. Tripathi also assesses the level of preparedness and response mechanisms in place to mitigate the impacts of floods. Through a comprehensive review of literature and empirical data, the author highlights the challenges faced by India in managing flood disasters, including issues related to infrastructure, governance, and socioeconomic factors. The article underscores the importance of improving disaster preparedness through better planning, early warning systems, community engagement, and infrastructure development. Tripathi's analysis contributes valuable insights to the discourse on flood management in India, providing recommendations for enhancing resilience and reducing the vulnerability of communities to flood disasters.

8- Rachmawati, Kismartini, and Suharyanto (2018) present a study on the flood disaster management model in Wonosari Village, Semarang City, published in *E3S Web of Conferences*. The research focuses on developing a comprehensive flood disaster management model tailored to the specific context of Wonosari Village. Through a combination of field observations, surveys, and interviews, the authors analyze the existing flood management practices and community resilience strategies in the village. The study identifies key challenges faced by the community during flood events and proposes a management model that integrates various measures such as early warning systems, infrastructure development, community participation, and coordination among stakeholders. By emphasizing a community-centered approach, the model aims to enhance the village's resilience to flood disasters and improve its capacity to effectively respond and recover from such events.

Rachmawati, Kismartini, and Suharyanto's research contributes valuable insights to the field of flood disaster management, offering practical solutions for vulnerable communities in Semarang City and potentially serving as a model for similar contexts elsewhere.

10- Kumar, Kshirsagar, Tapaswi, Yadav, and Sreeshma (2021) explore the application of deep learning algorithms in predicting flood disasters. Published in an unspecified volume and issue with ISSN No: 0377-9254, the study investigates the effectiveness of deep learning techniques in forecasting flood events. Through the utilization of advanced machine learning models, the authors analyze historical data and environmental factors to develop predictive models capable of anticipating flood occurrences with increased accuracy and precision. The article discusses the methodology employed in training and evaluating these deep learning algorithms, highlighting their potential to contribute to early warning systems and disaster preparedness efforts. Kumar et al.'s research underscores the significance of leveraging technological innovations to enhance flood prediction capabilities, ultimately aiming to mitigate the impacts of flood disasters on vulnerable communities.

11- Jayashree, Sarika, Solai, and Prathibha (2017) present a novel approach for early flood warning utilizing Android and Internet of Things (IoT) technologies. Published in the 2017 Second International Conference on Computing and Communications Technologies (ICCCT 17), the study introduces a system designed to provide timely alerts and notifications to communities at risk of flooding. The authors describe the architecture and implementation of the system, which integrates sensors deployed in flood-prone areas with an Android application. These sensors collect real-time data on water levels and transmit it to a central server, where it is processed to generate flood warnings. The Android application then delivers these warnings to users, enabling them to take proactive measures to mitigate the impacts of flooding. Jayashree et al.'s research demonstrates the potential of IoT and mobile technology in improving early warning systems for natural disasters, contributing to efforts aimed at enhancing community resilience and disaster preparedness.

13- Singh, Basnyat, Roy, and Gangopadhyay (2020) introduce a flood detection framework that integrates physical sensing with social sensing techniques. The article, published in 2020, presents a novel approach to detecting floods by combining data from traditional physical

sensors with information gathered from social media platforms. The authors describe the architecture of the framework, which utilizes data fusion techniques to analyze inputs from both sources and generate timely flood alerts. By leveraging the collective intelligence of social media users alongside data from conventional sensors, the framework aims to improve the accuracy and reliability of flood detection systems. Singh et al.'s research demonstrates the potential of integrating diverse data sources in disaster management efforts, contributing to the development of more effective and comprehensive flood detection and early warning systems.

14- Khan, Alam, Shahid, and Suud (2017) conduct a survey focusing on prior investigations related to flash floods and hurricanes, with a concise encapsulation of hydrological technologies and instrumentation. The study, presented at the 2017 IEEE 3rd International Conference on Engineering Technologies and Social Sciences (ICETSS), explores the existing research landscape regarding flash floods and hurricanes, particularly emphasizing hydrological technologies and instrumentation. Through a comprehensive review of literature and empirical data, the authors highlight key findings, methodologies, and advancements in the field. The survey provides insights into the current state of knowledge and identifies areas for further research and development in the context of disaster management and mitigation strategies. Khan et al.'s research contributes to the ongoing efforts aimed at improving understanding and preparedness for flash floods and hurricanes, ultimately aiming to enhance resilience and reduce the impacts of such events on communities and infrastructure.

15- Bhatt, G, Shankar, and Haralikar (2021) present a study on the utilization of wireless sensor networks (WSNs) to optimize search and rescue management in flood scenarios. The research, presented at the IEEE International Conference on Electronics, Computing, and Computation Technologies (CONNECT) in 2021, focuses on leveraging WSNs to enhance the efficiency and effectiveness of search and rescue operations during flood events. The authors describe the architecture and implementation of the proposed system, which involves deploying a network of wireless sensors to monitor flood-affected areas in real-time. These sensors collect data on various parameters such as water levels, weather conditions, and infrastructure damage, which is then transmitted to a central command center for analysis and decision-making. By leveraging WSNs, the system enables rapid and coordinated response

efforts, facilitating the timely identification and rescue of individuals in distress. Bhatt et al.'s research contributes to the advancement of search and rescue management strategies in flood disasters, demonstrating the potential of WSNs to improve emergency response capabilities and mitigate the impacts of floods on human lives and infrastructure.

16- Feng and Cui (2021) provide a comprehensive review of emergency response strategies in disasters, examining both current practices and future perspectives. Published in *Natural Hazards*, their study explores various aspects of emergency response, including preparedness, coordination, communication, and technological advancements. Through a synthesis of existing literature and case studies, the authors identify key challenges and opportunities in disaster response efforts. They emphasize the importance of integrating traditional approaches with emerging technologies such as artificial intelligence and remote sensing to enhance the effectiveness of response operations. The article provides valuable insights for policymakers, emergency responders, and researchers seeking to improve disaster response practices and build resilience in vulnerable communities.

17- Kamyabinia, Sauré, Salman, Bénichou, and Patrick (2024) conduct a comprehensive literature review on optimization models for disaster response operations. Published in *OR Spectrum*, the study surveys existing research on the application of optimization techniques in the context of disaster response. The authors examine various optimization models and methodologies proposed in the literature, focusing on their effectiveness in improving decision-making processes, resource allocation, and logistics management during disaster response operations. Through a systematic analysis of empirical studies and theoretical frameworks, the review identifies key trends, challenges, and opportunities in the field. Kamyabinia et al.'s research provides valuable insights for policymakers, emergency responders, and researchers seeking to enhance the efficiency and effectiveness of disaster response efforts through the application of optimization techniques.

18- Frykmer, Tehler, Uhr, and Wester (2021) propose a design science approach to advancing the field of disaster response management. Published in the *International Journal of Disaster Risk Science*, the article advocates for the integration of design science principles into the

development of solutions for disaster response. The authors argue that traditional approaches to disaster management often overlook the importance of design in addressing complex and dynamic challenges. They highlight the need for a systematic and iterative approach that leverages design principles to create innovative solutions tailored to the unique context of disaster response. Through a synthesis of existing literature and case studies, Frykmer et al. illustrate how a design science approach can facilitate the development of more effective and sustainable strategies for disaster response management. Their research contributes to the ongoing discourse on improving disaster response practices, emphasizing the importance of interdisciplinary collaboration and innovation in addressing the evolving nature of disaster risks.

19-Frykmer, Tehler, Uhr, and Wester (2021) propose a design science approach to enhancing the field of disaster response management. Published in the *International Journal of Disaster Risk Science*, the article advocates for integrating design science principles into disaster response practices. The authors argue that traditional approaches to disaster management may overlook the significance of design in addressing complex challenges. They underscore the importance of a systematic and iterative approach that applies design principles to develop innovative solutions suited to the dynamic nature of disaster response. Through a synthesis of existing literature and case studies, Frykmer et al. illustrate how a design science approach can foster the creation of more effective and sustainable strategies for disaster response management. Their research contributes to advancing the discourse on improving disaster response practices, emphasizing interdisciplinary collaboration and innovation to address evolving disaster risks.

20- Mayer (2019) conducts a comprehensive review of the literature on community resilience and disaster recovery, published in *Current Environmental Health Reports*. The article examines various studies and findings related to the concept of community resilience in the context of disaster events. Mayer synthesizes research on factors influencing community resilience, such as social cohesion, infrastructure, governance, and individual and collective coping mechanisms. Additionally, the review explores strategies and interventions aimed at enhancing community resilience and facilitating disaster recovery processes. Through an analysis of empirical evidence and theoretical frameworks, Mayer highlights the importance

of understanding and fostering community resilience to mitigate the impacts of disasters and promote long-term recovery. The article provides valuable insights for researchers, policymakers, and practitioners involved in disaster preparedness and response efforts, emphasizing the critical role of communities in building resilience to environmental hazards.

3. TOPIC OF THE WORK

3.1. METHODOLOGY

3.1.1. Introduction

In recent years, the increasing frequency and severity of natural disasters have underscored the need for effective disaster management strategies. Traditional approaches to disaster response often face challenges such as communication gaps, resource allocation inefficiencies, and delays in emergency assistance. To address these challenges, this study aims to develop a comprehensive web-based platform for natural disaster management. The platform integrates user-centric features such as emergency alerts, blog submissions, and government scheme updates, augmented by machine learning algorithms for content moderation and classification. This methodology section provides a detailed overview of the research methods, data collection procedures, data analysis techniques, and resources utilized in the development and evaluation of the web-based platform.

3.1.2. Type of Research

The research adopts a mixed-methods approach, combining qualitative and quantitative methodologies to achieve comprehensive insights into the development and implementation of the web-based platform for natural disaster management.

3.1.2.1 Qualitative Research

Qualitative research methods are employed to explore user experiences, perceptions, and interactions with the web-based platform. Semi-structured interviews, focus group discussions, and content analysis techniques are utilized to gather qualitative data regarding user preferences, satisfaction levels, and suggestions for platform improvement.

3.2.2.2 Quantitative Research

Quantitative research methods are employed to assess the effectiveness and efficiency of the web-based platform in disaster management. Data analytics, statistical analysis, and machine learning algorithms are utilized to analyze user interactions, emergency response times, and

the accuracy of content moderation algorithms.

3.1.3. Data Collection Process

The data collection process involves the systematic gathering of information from various sources, including user interactions with the web-based platform, machine learning model training data, and government scheme updates.

3.1.3.1 Website Development

The development of the web-based platform encompasses several stages, including requirements analysis, design, implementation, testing, and deployment. Agile development methodologies are employed to iteratively refine the platform features based on user feedback and evolving disaster management needs.

3.1.3.1.1 Requirements Analysis

A multidisciplinary team comprising software developers, domain experts, and stakeholders collaborates to define the functional and non-functional requirements of the web-based platform. User stories, use cases, and personas are employed to capture user needs and preferences accurately.

3.1.3.1.2 Design

The design phase focuses on creating intuitive user interfaces (UI) and seamless user experiences (UX) for the web-based platform. Wireframing, prototyping, and mockups are utilized to visualize the layout, navigation flow, and interaction patterns of the platform.

3.1.3.1.3 Implementation

Frontend and backend development teams collaborate to implement the design specifications and functional requirements of the web-based platform. HTML, CSS, JavaScript, and Python are utilized to develop responsive UI components, server-side logic, and database interactions.

3.1.3.1.4 Testing

Comprehensive testing strategies, including unit testing, integration testing, and user

acceptance testing (UAT), are employed to ensure the reliability, scalability, and security of the web-based platform. Automated testing frameworks and manual test cases are utilized to validate platform functionality and performance.

3.1.3.1.5 Deployment

The web-based platform is deployed on secure and scalable infrastructure on Render for the back-end and front is deployed on Vercel. Continuous integration and continuous deployment (CI/CD) pipelines are established to automate the deployment process and facilitate rapid updates and feature releases.

3.1.3.2 User Interactions

User interactions with the web-based platform are captured and analyzed to evaluate user engagement, platform usability, and effectiveness in disaster management.

3.1.3.2.1 User Registration

User registration data, including demographic information, contact details, and account preferences, are collected during the onboarding process. Secure authentication mechanisms, such as email verification and two-factor authentication (2FA), are employed to protect user accounts and prevent unauthorized access.

3.1.3.2.2 Emergency Button Activations

The emergency button feature allows users to trigger alerts during natural disasters or emergencies. When activated, the button sends the user's location and contact information to designated emergency responders, enabling timely assistance and rescue operations.

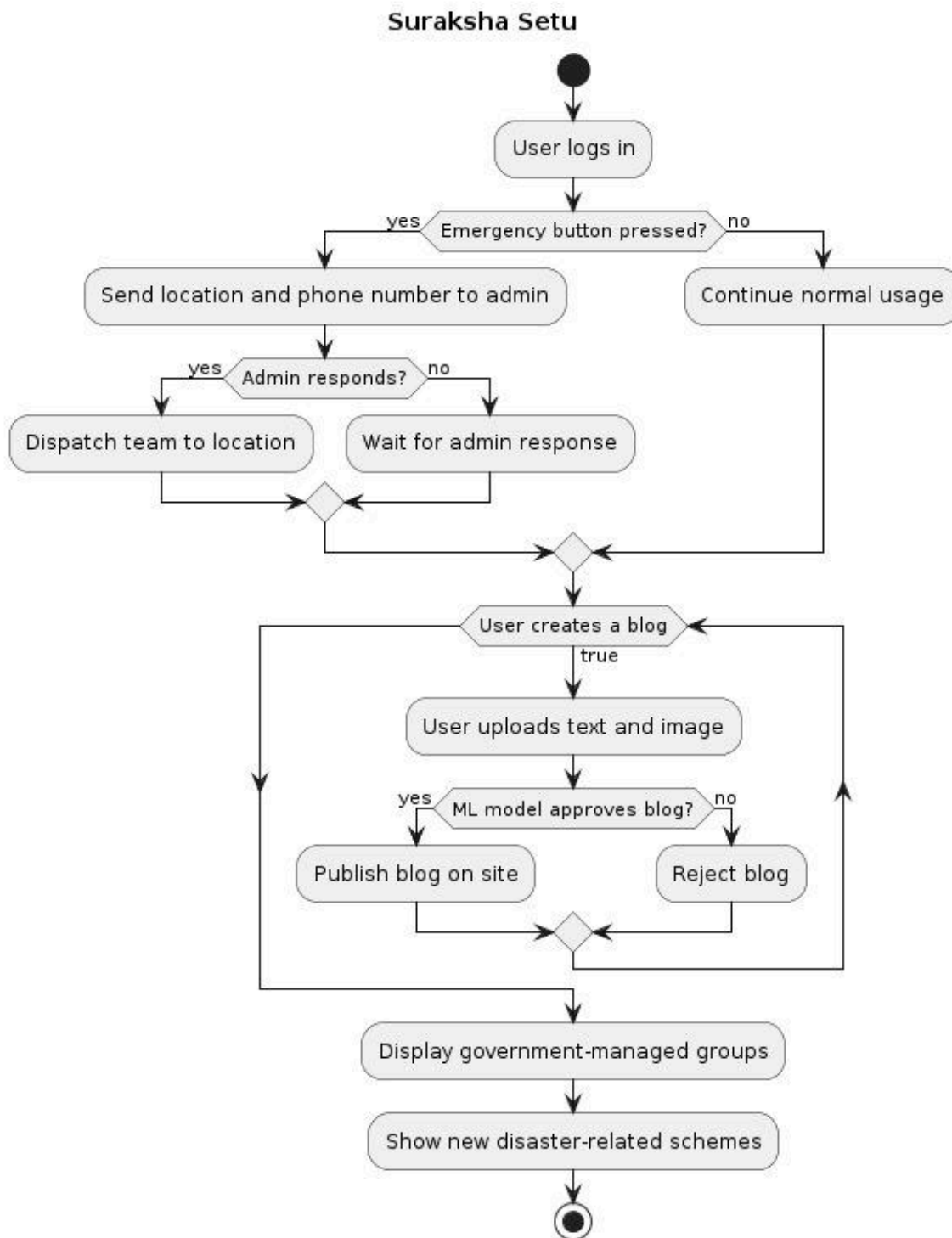
3.1.3.2.3 Blog Submissions

Users can submit blogs containing text and images related to natural disasters, emergency preparedness, and community resilience. Content moderation algorithms analyze blog submissions to ensure relevance, accuracy, and adherence to platform guidelines before publication.

3.1.3.2.4 Government Scheme Updates

Government agencies and disaster management authorities can disseminate information about new schemes, policies, and initiatives through the web-based platform. Users receive updates and notifications about available resources, funding opportunities, and support services to mitigate the impact of natural disasters.

3.2 WORKING PRINCIPLE



A) User Request:

A user initiates a request, expressing the need to analyze and classify data related to disaster damage.

B) Dataset Access:

Access is granted to relevant datasets, which may include diverse sources such as CrisisMMD and Disaster Damage Dataset.

C) Data Merging:

Datasets are merged to create a comprehensive and enriched dataset, combining information from different perspectives.

D) Data Preprocessing:**• *Feature Engineering:***

Extracts pertinent features from the data to enhance its richness and predictive capabilities.

• *Data Cleaning:*

Addresses errors and inconsistencies in the dataset to ensure data integrity.

• *Data Merging and Cleaning:*

Combines multiple datasets into one coherent structure and further cleans the data for analysis.

E) Image Files Handling:

Reads and processes image files associated with the dataset.

F) Metadata Analysis:

Analyzes metadata, providing a descriptive overview of the data and aiding in the

organization of information.

G) Image Classification System:

Employs an image classification system to categorize and label images based on the nature of disaster damage.

H) Data Encoding and Cleaning:

Encodes data to ensure compatibility with the model and performs additional cleaning for optimal model input.

I) Image Resizing:

Resizes images to a standardized format, ensuring uniformity and facilitating efficient processing.

J) Feature Extraction:

Extracts relevant features from the data to provide meaningful input for the model.

K) Model Training:

Trains the model using a designated training dataset, allowing it to learn and adapt to patterns in the data.

L) Model Evaluation:

Assesses the model's performance using a separate test dataset, validating its accuracy and effectiveness in disaster damage classification.

M) Results Production:

Produces results, which may include insights into the classification accuracy, predictive capabilities, and overall effectiveness of the developed model.

Score:

accuracy: 0.776 - precision: 0.787 - recall: 0.776 - f1_score: 0.781

3.3 RESULTS

Login/Signup Page:

Suraksha Setu

Sign in Sign up

Login

Email address

Password

Submit

Suraksha Setu

Sign in Sign up

Register

Name

Email address

Password

Phone Number

Address

Afghanis Badakhsh Ashkash

Type

☒ Person

☐ Organization

Upload photo

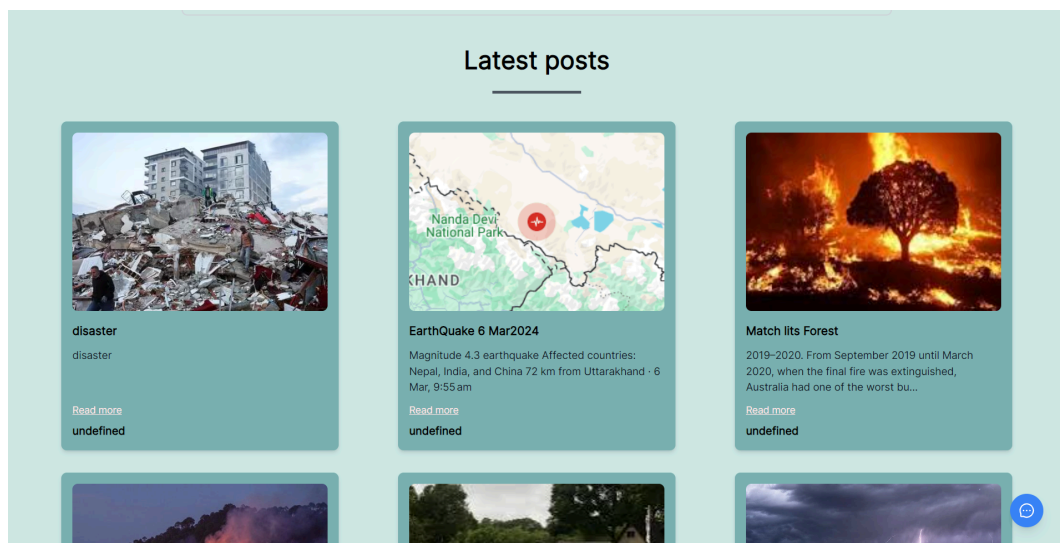
Choose File No file chosen

Submit

The secure login/signup page employs robust authentication protocols to ensure user data integrity. User-friendly React JS components enhance the interface, providing a seamless and responsive experience for individuals accessing the Suraksha Setu platform.

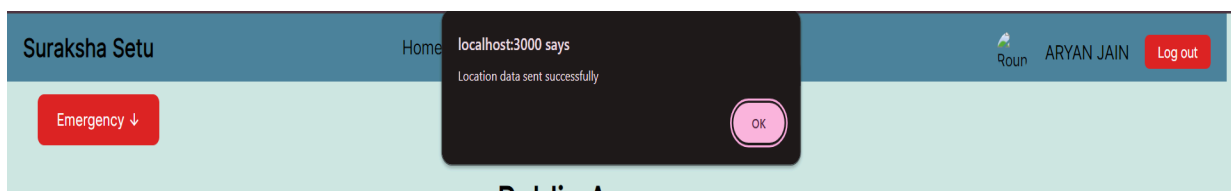
Latest Post Section:

The Latest Post section is dynamically rendered, presenting real-time disaster updates. This technology ensures an engaging and responsive display of information, allowing users to stay informed about the latest events through an interactive interface.



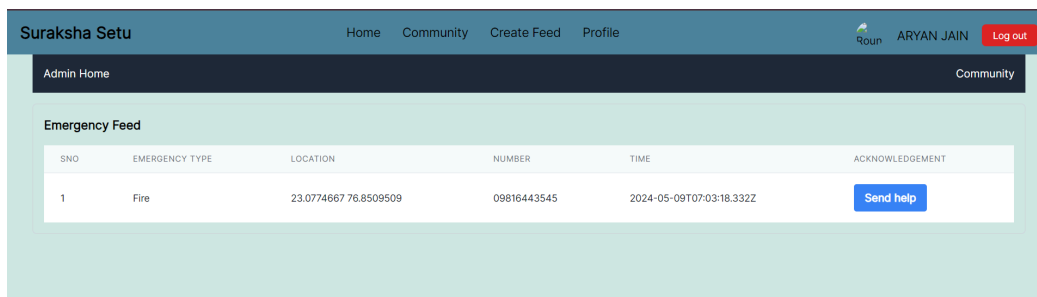
Alert Message:

In a disaster scenario, Suraksha-Setu facilitates swift user-location transmission to relevant organizations. Additionally, a React-powered alert message ensures an immediate and visually intuitive notification for users, fostering quick awareness and response during critical situations.



Admin Page:

The admin page will handle all the requests done by the user in the time of emergency. On the Admin page the organizations will get the location of the user in need and they will send the relief workers to the desired location. They will also have the user data in case there is a need for contacting the user.

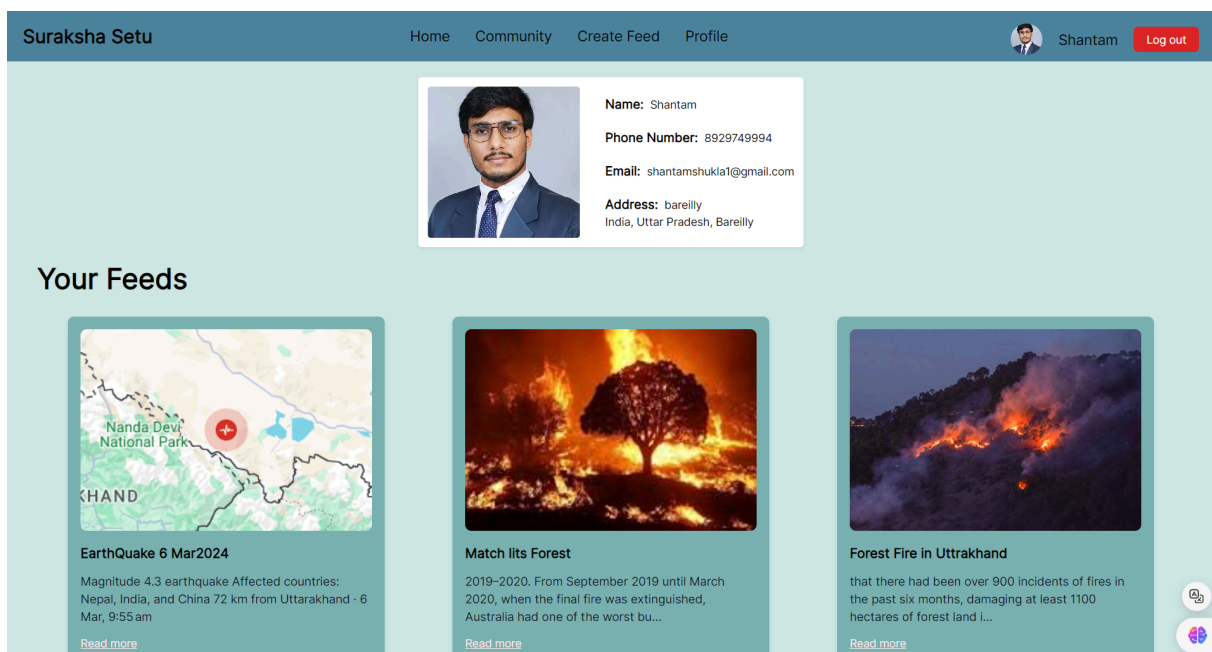


The screenshot shows the 'Admin Home' page of the Suraksha Setu application. At the top, there is a navigation bar with links for Home, Community, Create Feed, and Profile. The user is logged in as ARYAN JAIN. Below the navigation bar, there is a dark blue header with 'Admin Home' on the left and 'Community' on the right. The main content area is titled 'Emergency Feed' and contains a table with the following data:

SNO	EMERGENCY TYPE	LOCATION	NUMBER	TIME	ACKNOWLEDGEMENT
1	Fire	23.0774667 76.8509509	09816443545	2024-05-09T07:03:18.332Z	Send help

Profile Page:

The Profile Page utilizes React components to showcase user details and a curated feed of their posts. This integration enhances the visual appeal and user-friendliness of the interface, allowing users to manage personal information and contributions seamlessly while navigating the Suraksha Setu platform.

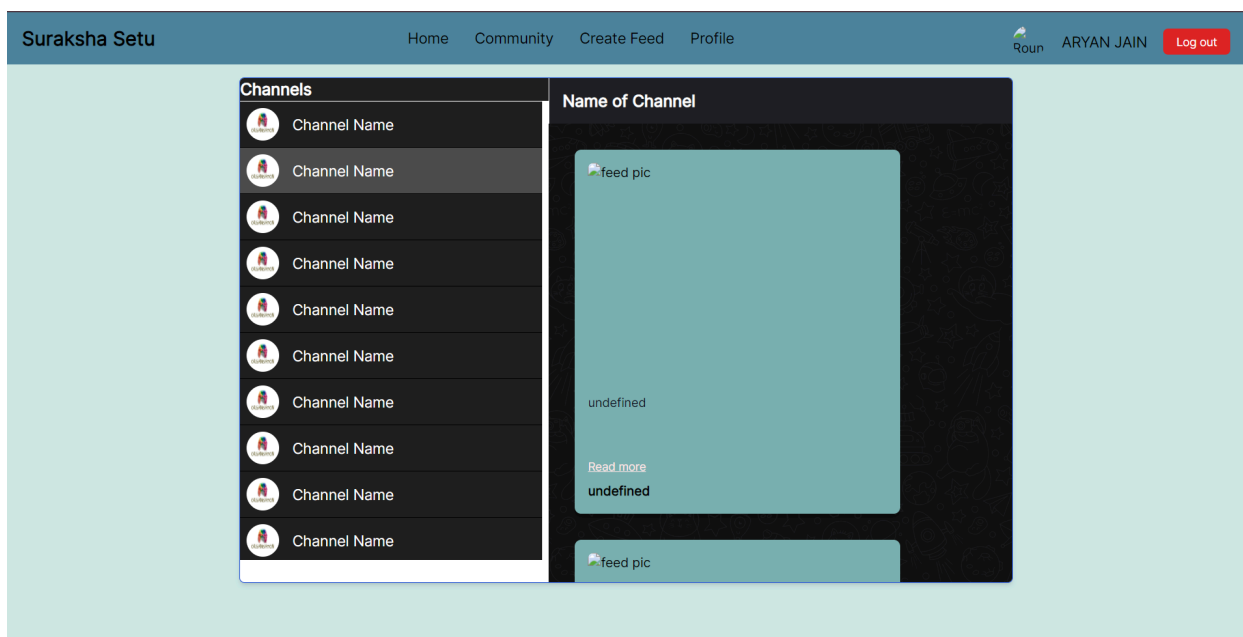


The screenshot shows the 'Profile' page of the Suraksha Setu application for user Shantam. The navigation bar at the top includes links for Home, Community, Create Feed, and Profile. The user's profile information is displayed in a white box on the right, including a profile picture, name (Shantam), phone number (8929749994), email (shantamshukla1@gmail.com), and address (bareilly, India, Uttar Pradesh, Bareilly). Below the profile information, the section 'Your Feeds' displays three posts:

- EarthQuake 6 Mar2024**: Magnitude 4.3 earthquake Affected countries: Nepal, India, and China 72 km from Uttarakhand - 6 Mar, 9:55am. [Read more](#)
- Match lits Forest**: 2019-2020. From September 2019 until March 2020, when the final fire was extinguished, Australia had one of the worst bu... [Read more](#)
- Forest Fire in Uttrakhand**: that there had been over 900 incidents of fires in the past six months, damaging at least 1100 hectares of forest land i... [Read more](#)

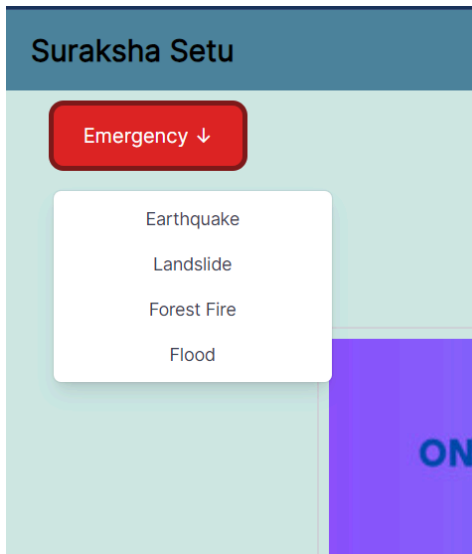
Community:

The Community section harbors an interactive interface displaying broadcasting channels connecting various NGOs. This implementation ensures a dynamic and engaging platform for the exchange of crucial information related to disasters and their prevention, fostering collaborative efforts among organizations involved in disaster management.



Disasters:

Upon clicking the Emergency button, users are presented with various emergency options through React components. This functionality enables users to access and select specific emergency scenarios, streamlining the process for seeking help or information during critical situations. The React-driven interface ensures a user-friendly experience, facilitating quick decision-making in emergencies.



Public Awareness:

The site will be focussing on disaster management and reducing the aftereffects of the disaster and preventing the losses. The public awareness carousel will show various schemes by the government and prevention tips to the users for the time of emergencies.

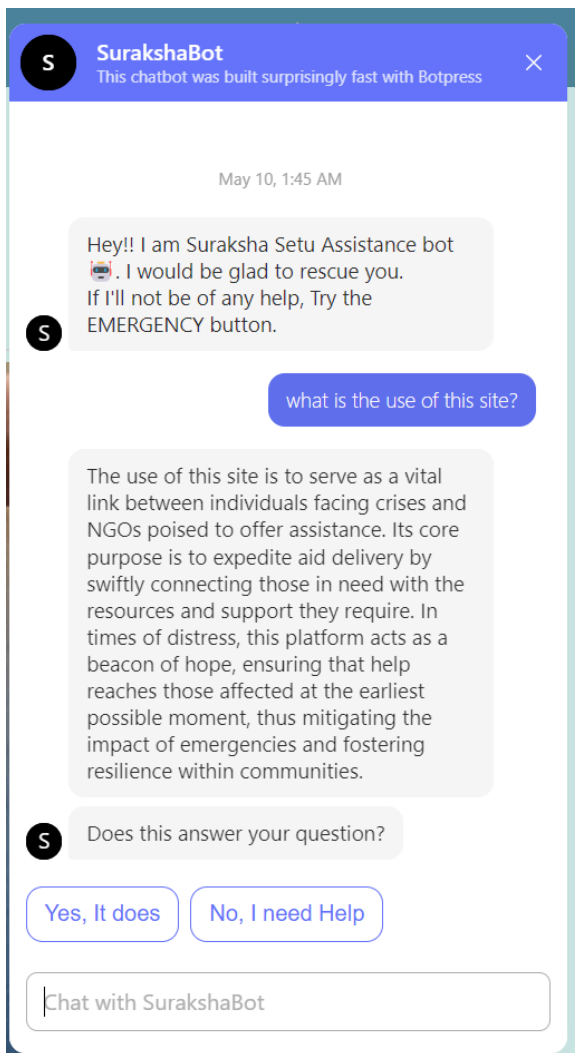


Public Awareness:

The site will be focussing on disaster management and reducing the aftereffects of the disaster and preventing the losses. The public awareness carousel will show various schemes by the government and prevention tips to the users for the time of emergencies.

Suraksha Bot Integration:

There is an integrated chat bot which will guide users and can handle their queries. This chat bot will specifically answers all the disaster related questions and will reject the question unrelated to it.



3. CONTRIBUTION

Deep Learning Model Training: Trained an advanced deep learning algorithm utilizing Python and its libraries, meticulously tailored to process and analyze crisis-related data. The model underwent rigorous training to accurately classify emergency situations, ensuring swift and precise response measures.

Model Integration: Used TensorFlow for integrating the deep learning model in the React application. It is a JavaScript library for training and deploying deep learning models in the browser or on React.js.

Data Administration: Oversaw the management of extensive datasets, encompassing images and crisis-related information like tweets.

Team Coordination: Diligently contributed towards the success of this project and used my effective interpersonal skills along with data analysis and deep learning knowledge to complete this project. Beyond technical tasks, I actively contributed to fostering a culture of innovation within the team.

4. CONCLUSION

Suraksha Setu is not just a website, but a comprehensive platform for natural disaster management. It empowers users to alert authorities in times of emergency with the simple press of a button. This sends their location and contact details to administrators who can promptly dispatch rescue teams. The immediacy of this feature can significantly reduce response times, potentially saving lives and mitigating the impact of disasters.

The platform also harnesses the power of Machine Learning with a model trained on MobilenetV2. This model scrutinizes user-uploaded content, such as text and images, to ensure relevance to disaster management. Approved content is then published as blog posts, contributing to a collective knowledge base. These user-generated insights and experiences can serve as valuable resources for others seeking information or dealing with similar situations. This feature not only fosters a sense of community but also promotes a culture of shared learning and preparedness.

Moreover, Suraksha Setu serves as a bridge between government bodies and the public. It provides updates on new schemes and initiatives related to disaster management, ensuring that users are always informed about the resources available to them. By facilitating this flow of information, the platform lays the groundwork for long-term resilience-building efforts. In essence, Suraksha Setu is a testament to the transformative potential of technology in service of the greater good. It stands as a beacon of hope and resilience, guiding us towards a safer and more prepared future.

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6. BIODATA



Yashraj Singh Negi (21BAI10492)

Yashraj is a passionate Computer Science student currently in the pre-final year at Vellore Institute of Technology, Bhopal. His focus lies in the domains of Artificial Intelligence and Machine Learning, where he exhibits a profound understanding and practical application. Proficient in Python and its libraries, he has leveraged his skills in numerous projects, notably contributing to endeavors such as Payment Fraud Detection and Animal Image Recognition Systems. With a commendable GPA of 7.63, Yashraj demonstrates academic excellence alongside his fervor for technology.

Determined to expand his knowledge horizon, Yashraj holds certifications in Applied Data Science, Applied Machine Learning, and MERN stack development. His commitment to continuous learning is evident through his achievements, including a remarkable 5-star rating in Python on the HackerRank platform. Beyond academia, Yashraj is an avid blogger, curating insightful content on his platform "Code Week with Yashraj," aimed at simplifying complex technical concepts for a diverse audience.

His multifaceted persona extends beyond the realms of technology, having actively participated in co-curricular activities during his high school tenure. As a former vice-captain and captain, he displayed leadership prowess, coupled with victories in cricket tournaments, debates, acting, public speaking, and Model United Nations. Yashraj's holistic approach towards personal and professional growth sets him apart as an individual committed to excellence and innovation.