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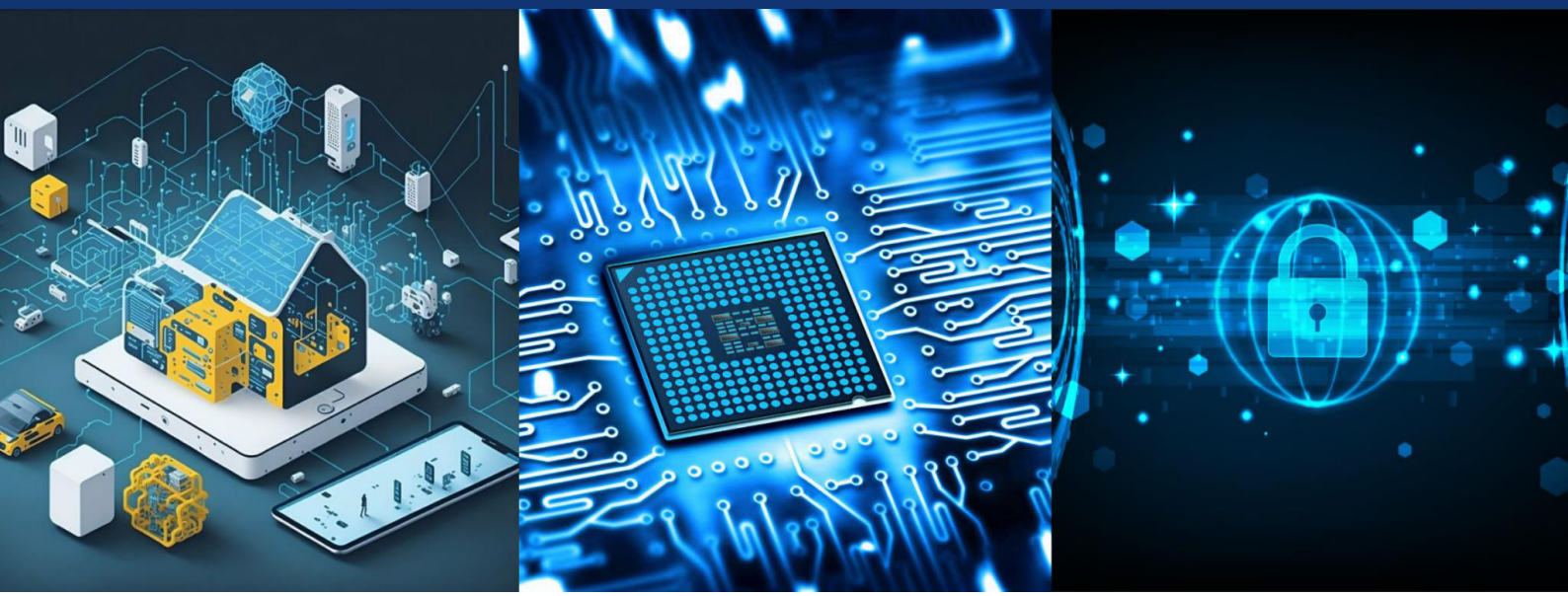

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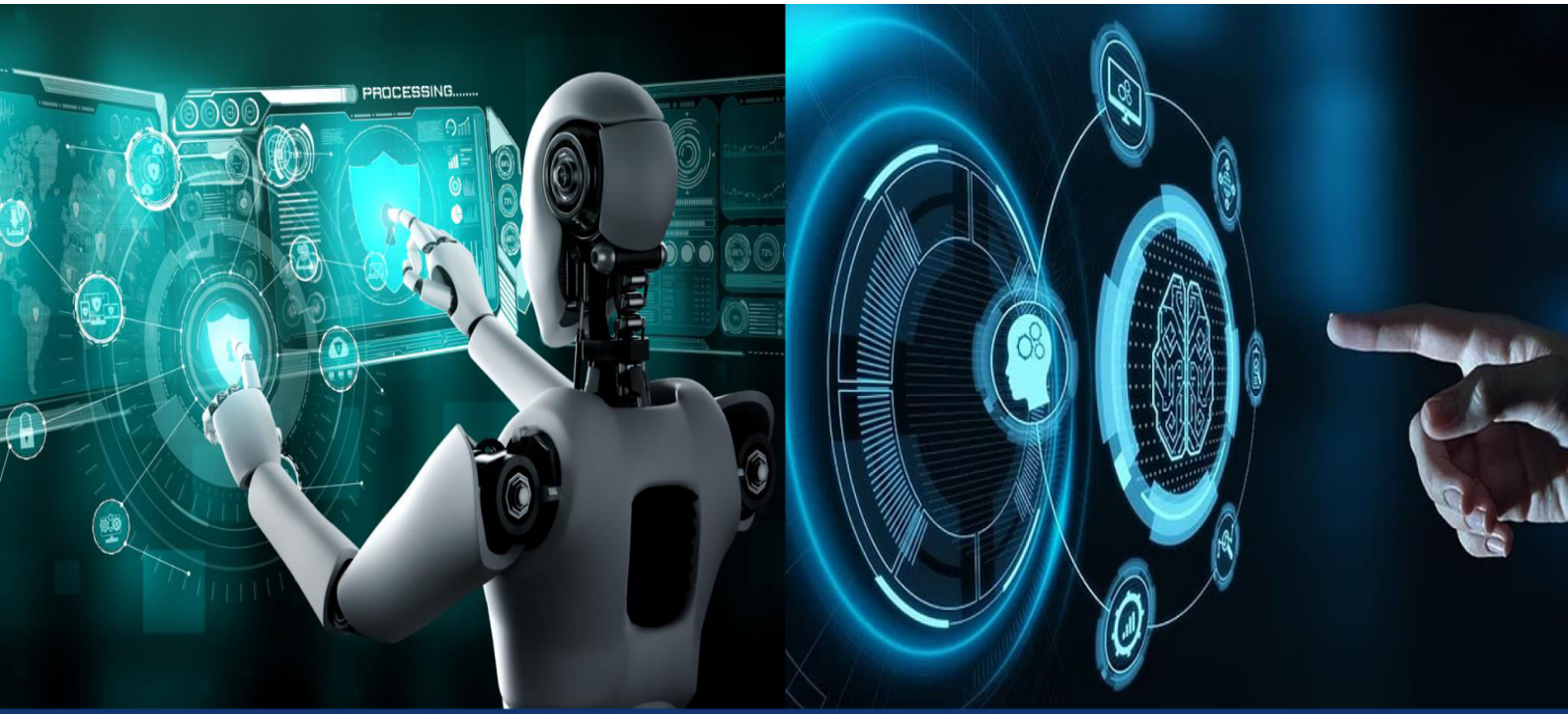

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International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

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AI-Based Cloudburst Prediction System Using Machine Learning & Deep Learning Techniques

Swathika T, Rebha P A, R.Raja Monsingh

U.G. Student, Department of AI&DS, Christ the King Engineering College, Coimbatore, Tamil Nadu, India

U.G. Student, Department of AI&DS, Christ the King Engineering College, Coimbatore, Tamil Nadu, India

Associate Professor, Department of AI&DS, Christ the King Engineering College, Coimbatore, Tamil Nadu, India

ABSTRACT: Cloudbursts are sudden and intense rainfall events that can cause floods and landslides. This project presents an AI-Powered Global Cloudburst Prediction System developed as a real-time web application. The system uses weather data from the OpenWeatherMap API and analyzes parameters like temperature, humidity, pressure, windspeed, and rainfall intensity. A hybrid AI model using Logistic Regression, Random Forest-inspired logic, and LSTM improves prediction accuracy and risk analysis. The application provides interactive visualization, risk alerts, and early warning support for effective disaster preparedness and management.

KEYWORDS: Cloudburst Prediction, Artificial Intelligence, Machine Learning, Deep Learning, Early Warning System.

I. INTRODUCTION

Cloudbursts are sudden and intense rainfall events that can cause severe disasters such as floods, landslides, and infrastructure damage, making accurate prediction very important in recent years. The proposed AI-Powered Global Cloudburst Prediction System uses real-time weather data from the OpenWeatherMap API to analyze parameters like temperature, humidity, pressure, wind speed, and rainfall intensity. The system combines Machine Learning and Deep Learning techniques, including Logistic Regression, Random Forest-inspired logic, and LSTM models, to improve prediction accuracy and risk analysis. An interactive web-based dashboard provides graphical visualization, maps, and alert notifications to help users monitor weather conditions effectively. This project aims to support disaster preparedness and early warning systems by providing intelligent real-time cloudburst prediction and environmental monitoring

II. LITERATURE SURVEY

The concept of The literature survey highlights various research works related to weather forecasting, flood prediction, and cloudburst prediction using Artificial Intelligence, Machine Learning, and Deep Learning techniques. Previous studies introduced systems using Logistic Regression, Decision Trees, Random Forest, and LSTM networks to analyze weather parameters and improve prediction accuracy. Some systems focused on rainfall and flood prediction, while others developed interactive dashboards and real-time weather monitoring applications using IoT and cloud computing technologies. These studies demonstrated that AI-based models can effectively identify hidden weather patterns and provide early warning support for natural disasters. However, many existing systems suffer from limitations such as lack of real-time visualization, region-specific implementation, high computational requirements, and absence of hybrid prediction models. The proposed AI-Powered Global Cloudburst Prediction System overcomes these limitations by integrating real-time weather

III. METHODOLOGY

The methodology of the AI-Powered Global Cloudburst Prediction System begins with collecting real-time weather data such as temperature, humidity, pressure, wind speed, and rainfall intensity from the OpenWeatherMap API. The collected data is preprocessed and analyzed using hybrid Machine Learning and Deep Learning techniques, including Logistic Regression, Random Forest-inspired logic, and LSTM models, to predict cloudburst probability and risk levels.

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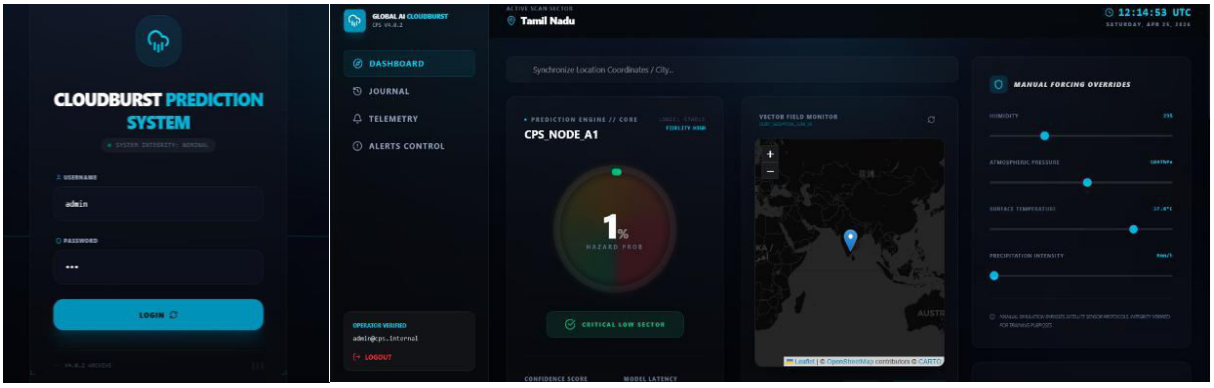
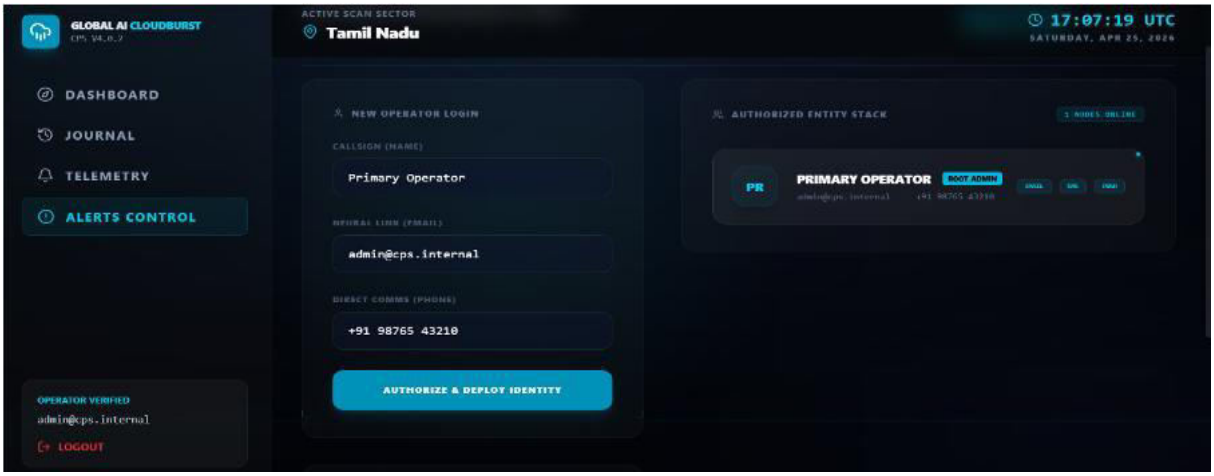
The prediction results are displayed through interactive visualizations and alert notifications, while the processed data is securely stored for future analysis and monitoring.

IV. EXPERIMENTAL RESULTS





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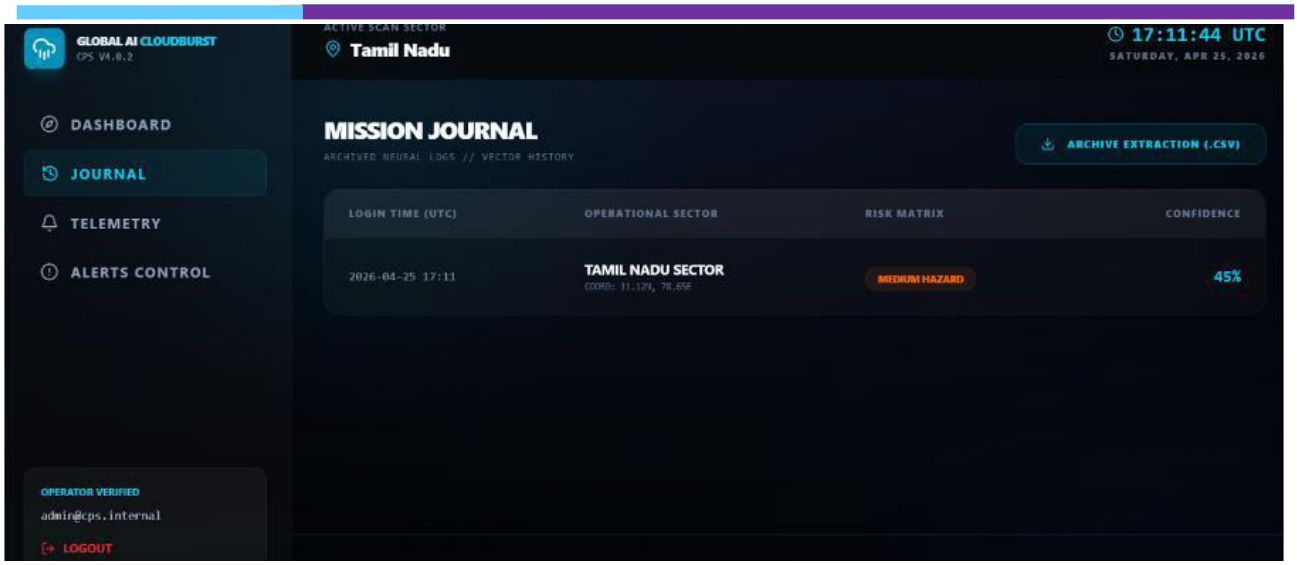

Figure 1 shows the Login Page of the system, Figure 2 presents the Dashboard interface, Figure 3 illustrates the Alert System for cloudburst risk notifications, Figure 4 represents the System Workflow and Monitoring process, and Figure 5 displays the Journal Dashboard of the application.

V. CONCLUSION

The project titled "AI-Powered Global Cloudburst Prediction System Using Hybrid Machine Learning and Deep Learning Techniques" was successfully developed as a real-time web-based application for predicting and monitoring cloudburst events. The system uses real-time weather data from the OpenWeatherMap API and applies hybrid AI techniques such as Logistic Regression, Random Forest-inspired logic, and LSTM-based trend analysis to calculate cloudburst probability and risk levels accurately. Interactive dashboards, visualizations, maps, and alert mechanisms help users monitor weather conditions effectively and support early disaster preparedness and public safety. The system demonstrated efficient performance in data collection, prediction, visualization, and alert generation, while its modular and user-friendly design improves scalability and usability. Future enhancements such as integrating trained AI models with large-scale datasets, adding satellite and radar analysis, cloud deployment, mobile applications, notification systems, database support, and advanced analytics can further improve the system's prediction accuracy, scalability, and real-world disaster management capabilities.

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