

ABSTRACT

This project presents an integrated weather monitoring and prediction system that leverages the Arduino platform with a DHT-11 sensor for real-time data collection of environmental parameters, such as temperature and humidity. Utilizing advanced machine learning algorithms, the system analyzes the sensor data to predict weather conditions with a focus on rain probability. These predictions are facilitated by a RandomForestClassifier, a robust predictive model trained on historical weather data, allowing for high accuracy in forecasting. The system also incorporates a mailing API, which automates the distribution of weather forecasts to a list of subscribers, providing them with timely and relevant weather updates. Furthermore, the project employs Python scripts that schedule the execution of these tasks, ensuring that the data collection, analysis, and communication processes are performed efficiently and consistently at predetermined times. Through meticulous error handling, the system is designed to operate reliably, managing anomalies and ensuring continuous service. Comprehensive logging is implemented to maintain a detailed account of system performance and facilitate troubleshooting. Rigorous testing protocols are established to ensure component functionality and overall system integrity. Security is a paramount consideration.

Keywords : *Arduino IDE, DHT-11 Sensor, Data Collection, Machine Learning, Random Forest Classifier/Regressor, Weather Forecasting, Predictive Modeling, Humidity and Temperature Data, Rain Probability Analysis, Automated Email Notifications, SMTP Protocol, Python Scripting, Serial Data Communication, Scheduled Execution, Data Analysis, Historical Weather Patterns, Model Training and Validation, Algorithm Optimization, Real-time Monitoring, User Engagement, Data Security and Privacy Compliance, System Scalability, Operational Logging.*

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