System Design for Real-Time Weather Prediction

Part 2: System Design and Implementation

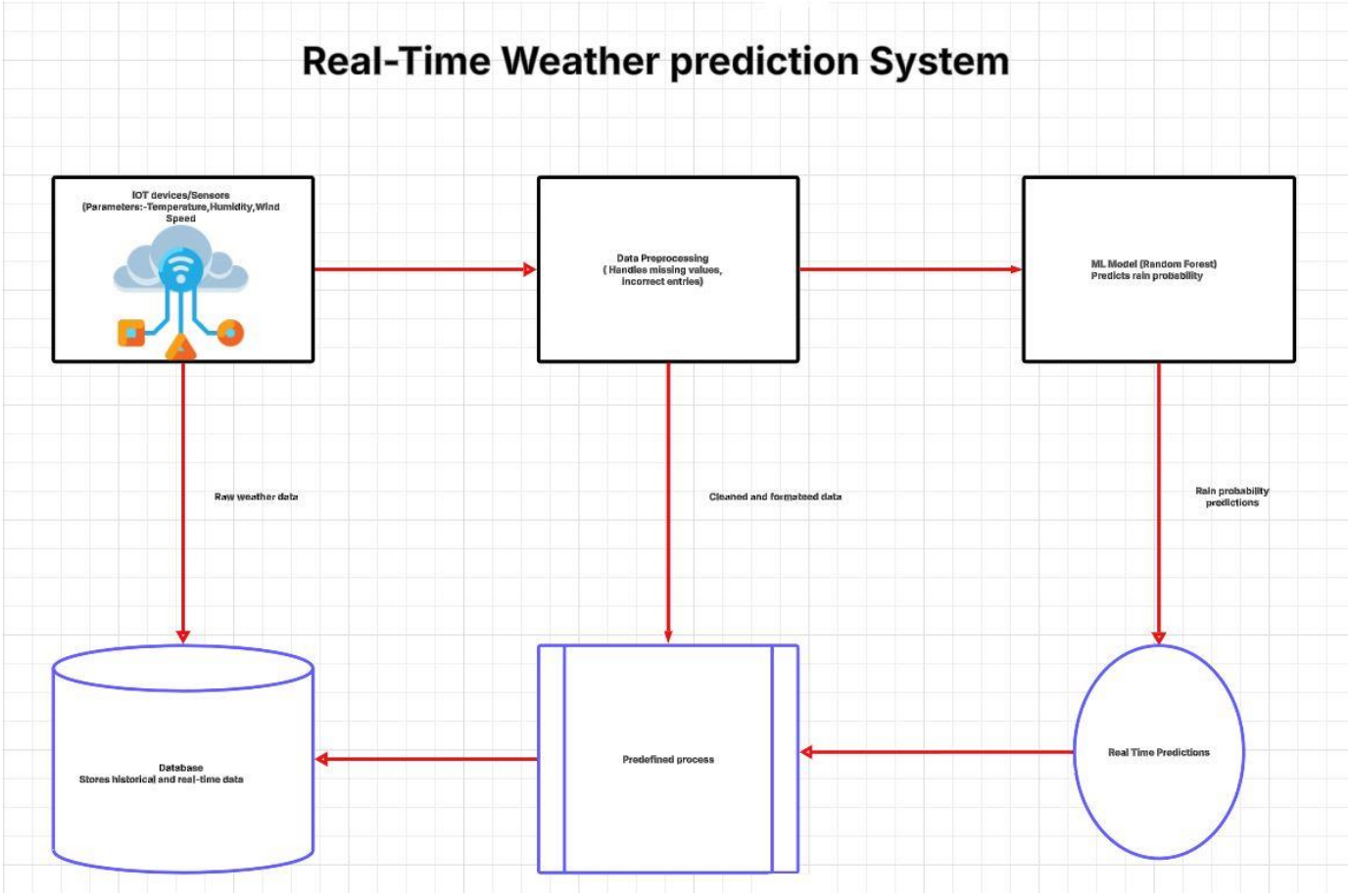
Team Name: Team Alpha

Event: Intellihack 5.0

Date: [Insert Date]

1. System Design

System Diagram:



Data Flow:

- IoT devices → Data Preprocessing → Machine Learning Model → User Interface.

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2. Component Description

IoT Devices/Sensors:

- Collect weather data at 1-minute intervals.
- Transmit data to a central server.

Data Preprocessing:

- Handle missing data and incorrect entries.
- Format the data for model input.

Machine Learning Model:

- Predict rain probability using the trained Random Forest model.
- Update predictions in real-time as new data arrives.

User Interface:

- Display predictions to farmers in an easy-to-understand format (e.g., rain probability percentage) to farmers.
- Provide alerts for upcoming rain.

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3. Handling Sensor Malfunctions

Missing Data:

- If a sensor malfunctions and stops sending data, the system will:
    - Use the most recent available data.
    - Fill missing values with the mean or median of the feature.

Incorrect Readings:

- If a sensor sends incorrect data (e.g., negative humidity), the system will:
    - Detect and remove outliers.
    - Replace incorrect values with the mean or median.

Redundancy:

- Deploy multiple sensors for each feature to ensure data reliability.
- If one sensor fails, others can provide backup data.