**AI-Powered Weather Forecasting for Small-Scale Fishers**

**Problem Statement:**

Small-scale fishers often face unpredictable weather conditions at sea. Without access to reliable forecasts, they risk their lives and livelihoods due to sudden storms, high waves, and rough seas. Many rely on traditional weather knowledge, which may not always be accurate.

Existing weather forecasting systems are expensive, complex, or inaccessible to small fishing communities. Fishers need a simple, affordable, and accurate system to help them make informed decisions before going out to sea.

**Objective:**

This project aims to develop an AI-powered weather forecasting system that provides small-scale fishers with real-time weather updates and early warnings. The system will use solar-powered buoys to collect live weather data, AI models to analyse patterns, and SMS alerts to notify fishers of dangerous conditions.

**Methodology:**

* **Solar-Powered Smart Buoys Floating buoys equipped with sensors to measure**:
  + Wind speed
  + Air pressure
  + Wave height
  + Temperature
  + Humidity
  + Solar-powered to ensure continuous operation.
* Wireless transmission using GSM or satellite to send real-time data to cloud servers.
* **AI-Powered Weather Prediction:**

Machine learning models trained on historical and real-time weather data.

Cloud-based AI system to analyse data and predict dangerous conditions like storms and high waves. Continuous learning to improve forecast accuracy over time.

* **Real-Time Communication System:**
* SMS alerts: Fishers receive warnings via text messages in their local language.
* Mobile application: Displays live weather updates, forecasts, and safety alerts.
* Voice notifications (optional): Audio alerts for fishers who cannot read SMS messages.

**Key Features:**

* **Smart Buoy Network:** Solar-powered, IoT-enabled weather monitoring.
* **AI-Powered Forecasting:** Uses machine learning for better accuracy.
* **Real-Time Alerts:** SMS, mobile app, and voice notifications.
* **Localized Forecasting:** Designed for coastal fishing communities.
* **Scalable & Affordable:** Low-cost and easy to expand to more regions.
* **Automated Weather Logging:** Stores past weather data to refine AI predictions.
* **Multi-Language Support:** Alerts and mobile app available in local dialects.
* **Emergency SOS System:** Allows fishers to send distress signals if caught in dangerous conditions.
* **Offline Forecast Storage:** Fishers can download weather forecasts when internet access is limited.
* **Community Weather Reports:** Fishers can share real-time sea conditions, improving system accuracy.

**Abstract Statement:**

This project introduces an AI-driven early warning system for small-scale fishers, integrating IoT, AI, and real-time communication to predict dangerous weather. The system consists of solar-powered buoys collecting real-time weather data, machine learning models analysing weather trends, and SMS-based alerts warning fishers of rough sea conditions.

By providing affordable, accurate, and localized weather predictions, this system helps fishers make safer decisions, prevent accidents, and protect their livelihoods. It is a cost-effective, scalable, and sustainable solution that can be implemented in coastal communities worldwide.

**Expected Outcome:**

* Fewer fishing accidents due to timely weather warnings.
* Improved economic stability as fishers can plan their trips safely.
* More accurate local weather forecasts tailored for fishing communities.
* A scalable system that can be expanded to other coastal regions.

**Impact:**

This project will enhance safety, economic stability, and climate resilience for small-scale fishers. By leveraging AI, IoT, and solar energy, it provides a sustainable and practical solution for weather forecasting in underserved coastal areas. This initiative supports disaster prevention, environmental sustainability, and better decision-making for communities that depend on fishing for their livelihood.

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