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SMART FISHING WITH AI : OPTIMIZING CATCH EFFICIENCY AND SUSTAINABILITY

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A B S T R A C T :

The global fishing industry faces significant challenges related to overfishing, inefficiency, and environmental impact. Traditional fishing methods often lead to the depletion of marine resources and excessive bycatch, harming both ecosystems and economic sustainability.To address these challenges, this project proposes an AI-based solution designed to optimize catch efficiency and promote sustainable fishing practices.The system leverages artificial intelligence, machine learning, and real-time environmental data to identify optimal fishing zones and times. By integrating computer vision for species recognition, the system aims to reduce bycatch and prevent the capture of endangered species.

Keywords: smart fishing technique for fishermaN

1. INTRODUCTION

Fishing is a vital industry that supports millions of livelihoods worldwide, but traditional methods often lead to overfishing and environmental harm. This project, "Smart Fishing with AI: Optimizing Catch Efficiency and Sustainability," aims to modernize fishing practices using artificial intelligence. By leveraging AI technologies such as computer vision and predictive analytics, the system helps identify fish-rich areas, reduce bycatch, and promote sustainable harvesting. The goal is to increase efficiency while protecting marine ecosystems for future generations.

2. PROPOSED SYSTEM

AI-Powered Fish Location Prediction: The system uses machine learning algorithms to predict the optimal fishing zones based on historical fishing patterns, water quality, temperature, and fish migration data. This reduces the time and fuel spent searching for fish.**Species Recognition and Bycatch Reduction:** By incorporating computer vision and image recognition techniques, the system can identify different species of fish in real-time. This helps avoid the capture of non-target species, reducing bycatch and protecting marine biodiversity.**Dynamic Route Optimization:** The system integrates IoT sensors to monitor factors such as weather conditions, water quality, and currents in real time. visit:http://www.elsevier.com/wps/find/authorsview.authors/ authorartworkinstructions. Artwork has no text along the side of it in the main body of the text. However, if two images fit next to each other, these may be placed next to each other to save space. For example, see Fig. 1.

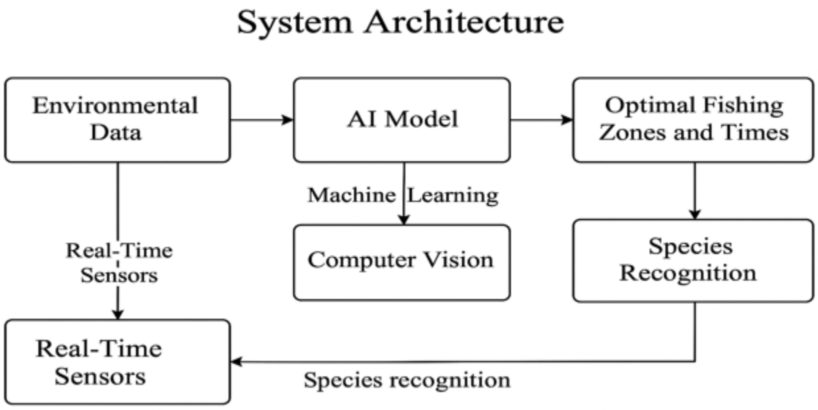
3. EXISTING SYSTEM

Traditional Fishing Methods: Reliance on manual methods and fishermen's experience without data-driven insights for optimal catch locations or times.**Limited Technology Integration**: Current systems primarily use sonar, GPS, and basic tools but lack advanced technologies such as AI and real-time data processing for decision-making.**Inefficient Catching**: Many existing systems do not integrate environmental factors (e.g., water temperature, salinity, weather conditions) that can affect fish behavior, leading to inefficient fishing operations.**Bycatch Issues**: Existing systems lack the ability to identify fish species in real-time, leading to unintended bycatch, which harms marine biodiversity and affects endangered species.

4. ADVANTAGES

All **Enhanced Catch Efficiency**: By predicting optimal fishing zones and times using AI, the system reduces the time and fuel spent searching for fish, leading to higher catch rates and lower operational costs.**Reduction of Bycatch**: Real-time species recognition through computer vision helps avoid capturing non-target species, reducing bycatch and contributing to the conservation of marine biodiversity.**Operational Cost Reduction**: Dynamic route optimization minimizes fuel consumption and operational time, reducing the costs associated with fishing trips and increasing the overall economic efficiency of fishing operations.

5.ARCHITECTURE



6 .MODULE

Data Acquisition Module

- Collects real-time data from:
- IoT sensors (water temperature, salinity, depth, turbidity)
- GPS trackers,Weather APIs (for wind speed, sea conditions, etc.)
- Sonar and radar systems for fish location

AI-Powered Fish Detection & Classification Module

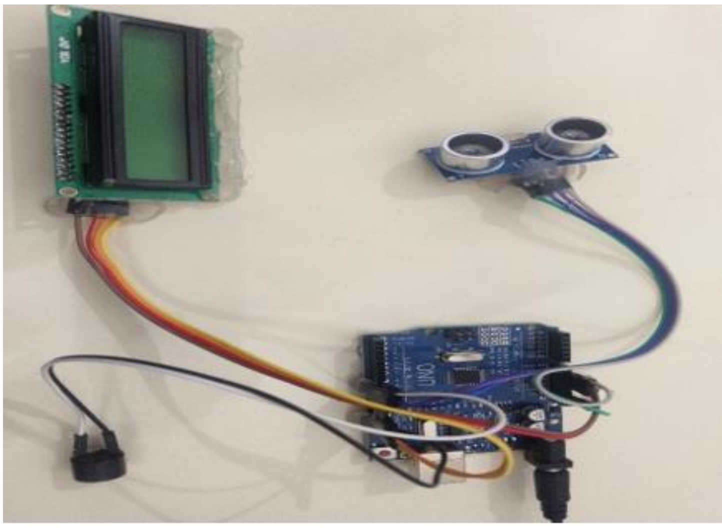
- Uses computer vision (via underwater cameras) to:
- Detect and recognize fish species,Estimate population density
- Avoid endangered or non-target species (reduce bycatch)

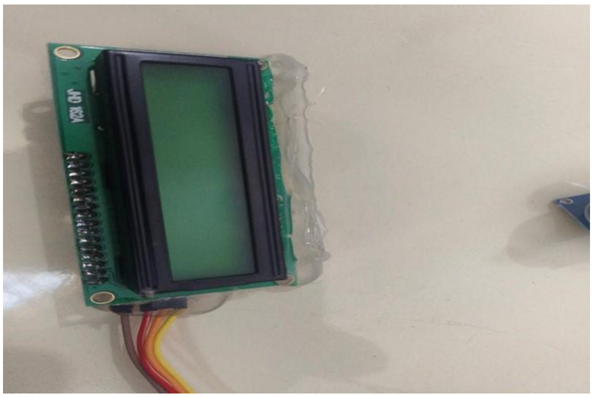
7.REQUIREMENTS

Hardware Requirements

- Needs a basic computer or tablet (like Raspberry Pi or laptop)
- At least 8 GB RAM and 128 GB storage
- Camera to capture fish images,GPS for location tracking
- Sensors to measure sea temperature and water quality
- Battery or solar power to run at sea
- Mobile or tablet screen for easy use by fishermen

8. SETUP





9.SAMPLE CODE

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from statsmodels.tsa.arima.model import ARIMA
from pmdarima import auto_arima
    #  Use auto_arima to find the best ARIMA parameters
auto_model = auto_arima(sales_data['Sales'], seasonal=False, stepwise=True, suppress_warnings=True, trace=True)
# Fit the ARIMA model with the best parameters found
arima_model = ARIMA(sales_data['Sales'], order=best_order)
arima_result = arima_model.fit()

    #  Forecast sales for 2025 and 2026 (2 years, 730 days)
forecast = arima_result.get_forecast(steps=730)
forecast_df = forecast.summary_frame(alpha=0.05)  # 95% confidence intervals

    #  Plot forecasted values
forecast_dates = pd.date_range(start='2025-01-01', end=‘2025-12-31', 5freq='D’)
```

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