

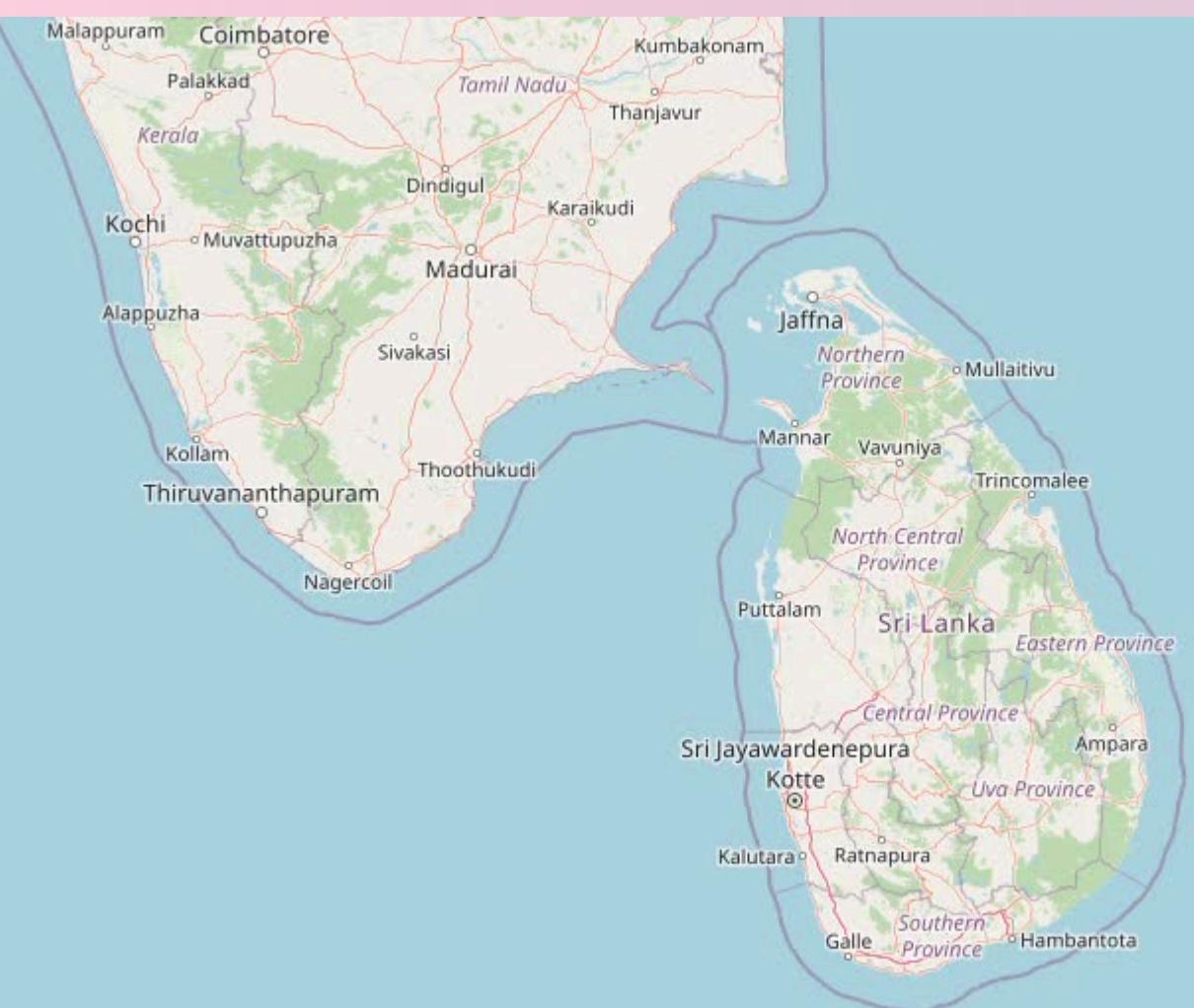


OCEAN SENTINEL

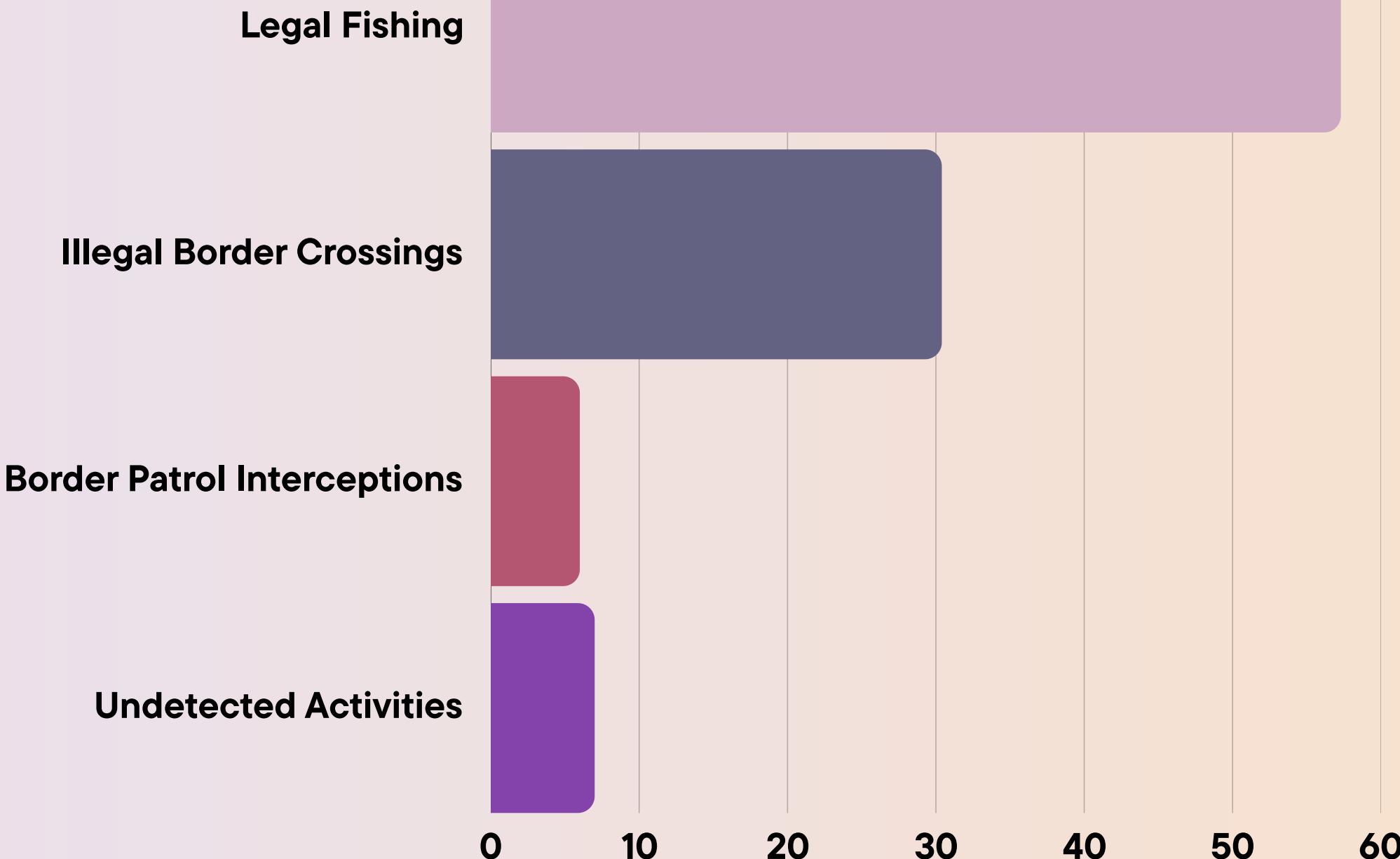
- Smart border detection and
control management

Ensuring diversity in the Water bodies

What is the prevailing problem?



- Sri Lankan Navy detains or apprehends Indian fishermen for trespassing and illegal fishing activities..
- Economic impact on fishermen due to seized boats and equipment, causing financial hardships for affected families.



RETHINKING SECURITY ?

The screenshot shows a news article from AP (Associated Press) with the headline "Fights over illegal fishing lead to armed conflict, deaths". Below the headline is a large image of a massive explosion or fire at sea. To the right of the image is an advertisement for Amazon Prime.

AP WORLD U.S. POLITICS SPORTS ENTERTAINMENT BUSINESS SCIENCE FACT CHECK ODDITIES BE WELL NEWSLETTERS PHOTOGRAPHY ...

• 'Snow White' US Education Department 'Good American Family' Spring equinox 'Big U'

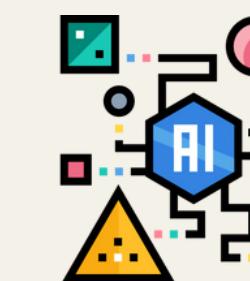
AP SETS THE STANDARD FOR POLITICAL REPORTING
SUPPORT INDEPENDENT, FACT-BASED JOURNAL

Fights over illegal fishing lead to armed conflict, deaths

A photograph of a Sri Lankan Coast Guard ship, specifically a PTI (Patrol Training Ship) boat. The ship is white with blue markings and has "PTI" and "TH" on its superstructure. The hull has "SRI LANKA COAST GUARD" written on it. A person is visible on the deck.

During early hours on Tuesday, the Sri Lankan Navy found the fishing boat to crossed the International Maritime Boundary Line.

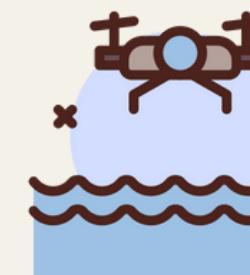
EXISTING SOLUTION



Ships can turn off AIS to evade detection, which is a common tactic used by illegal fishing vessels and smugglers.



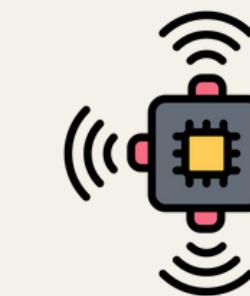
High operational costs and limited real-time data availability



Stationary and have limited coverage area.

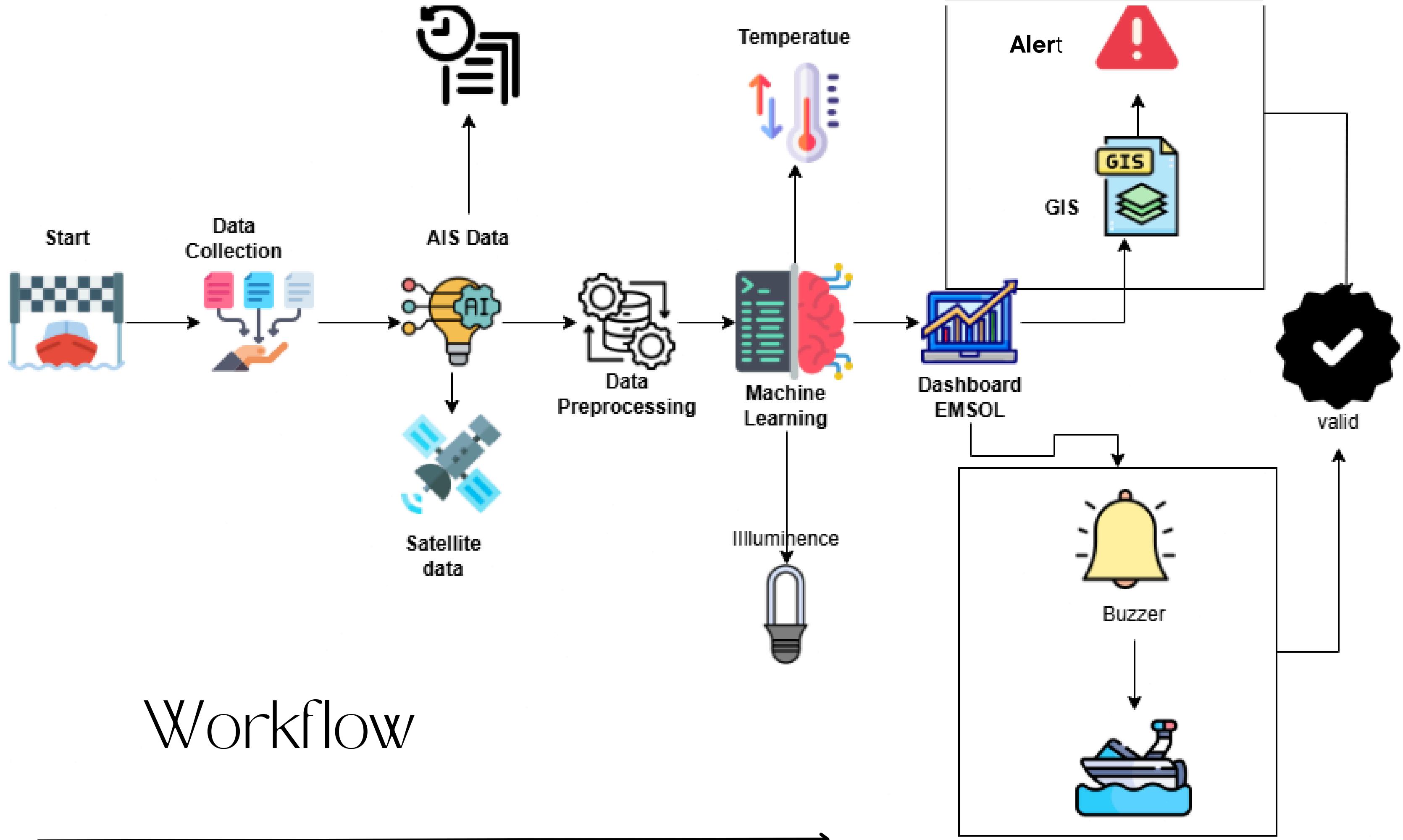


Expensive to deploy and maintain on a large scale.



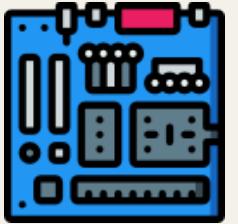
High false alarm rates due to wildlife or environmental factors.

Workflow

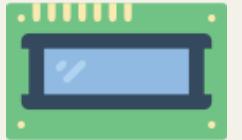


TECHSTACK

Hardware Components



Arduino Uno
Shield



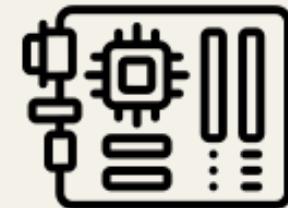
LCD Display



Humidity Sensor
(DHT11)



Temperature
Sensor (DHT11)



ESP32 Module

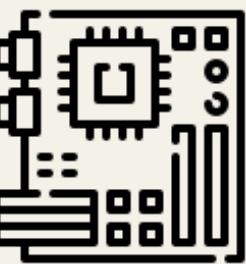


LDR (Light
Dependent
Resistor) Sensor



Python

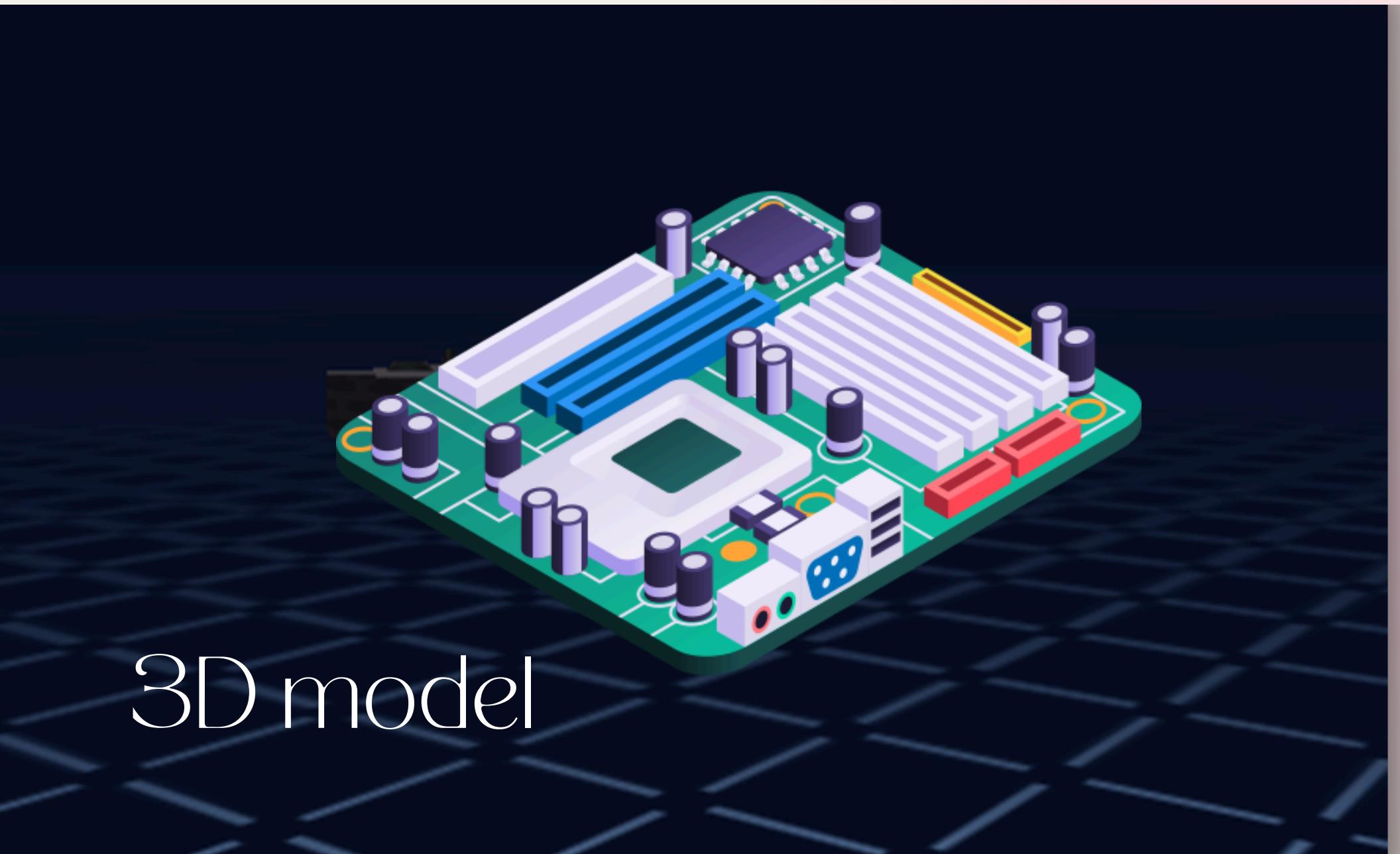
Software and Tools



Arduino IDE



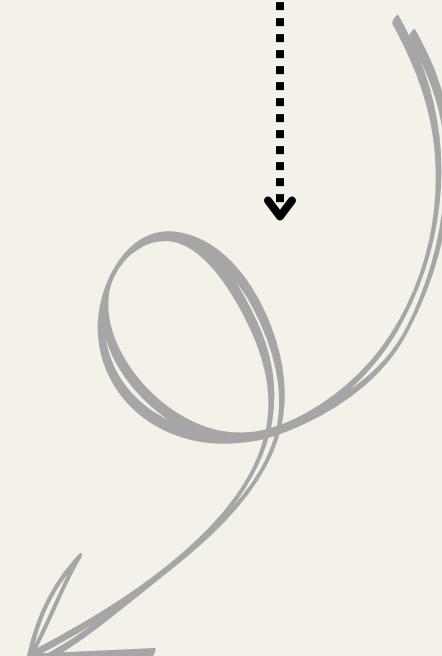
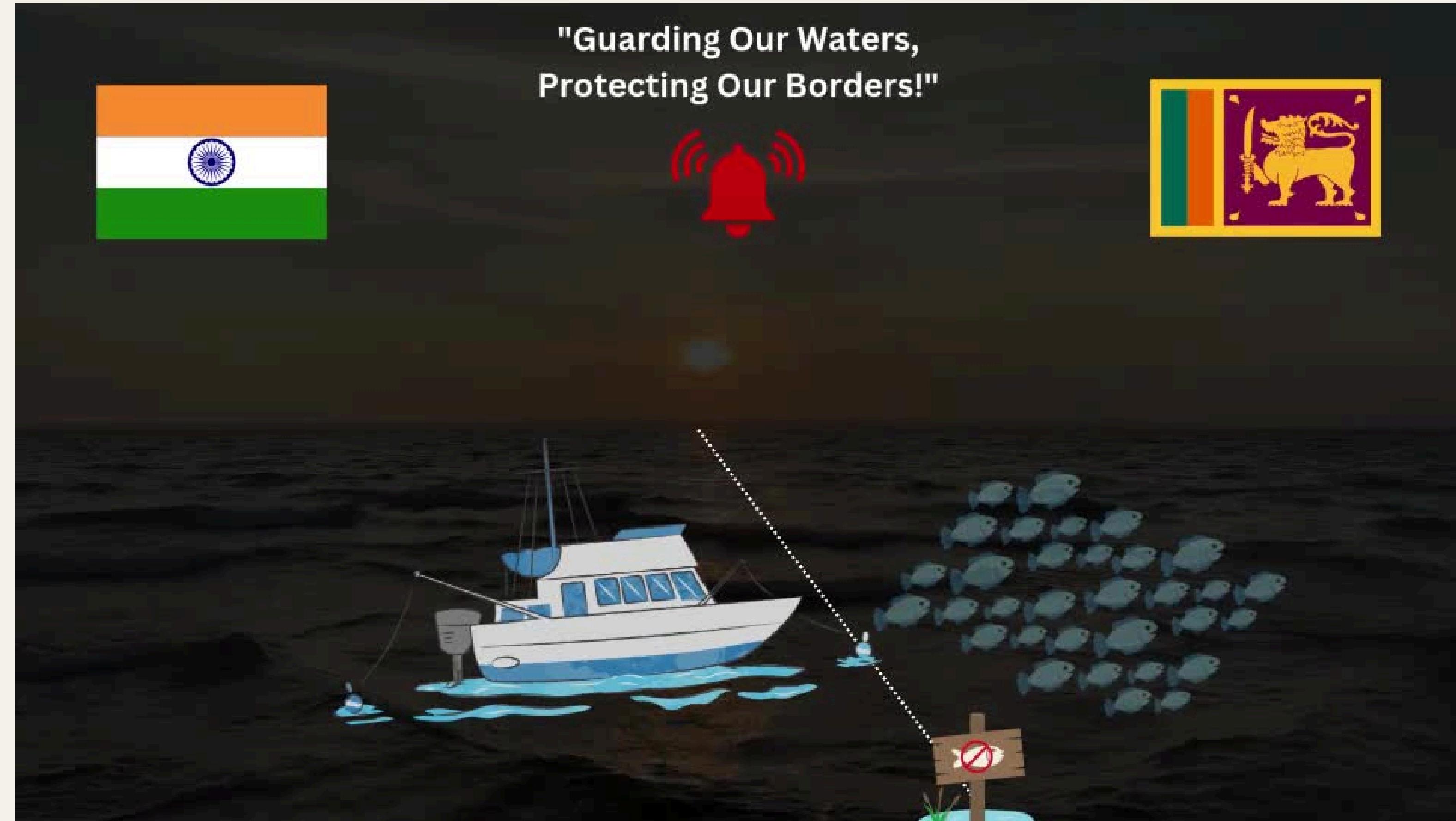
EMSOL



3D model

Our solution

OCEAN SENTINEL



ML Model -

The datasets being imported to the esp module code

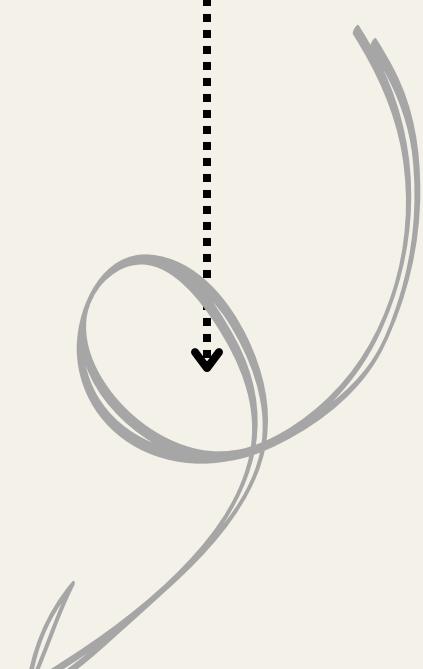


```
import pandas as pd
import geopandas as gpd
from shapely.geometry import Point
import folium

# Sample AIS Data (Ship Movements) embedded as DataFrame
ais_data = pd.DataFrame({
    'timestamp': pd.to_datetime(['2025-02-27 08:00:00', '2025-02-27 08:10:00', '2025-02-27 08:20:00']),
    'latitude': [6.0, 6.1, 6.2],
    'longitude': [80.0, 80.1, 80.2],
    'speed': [10, 12, 9],
    'vessel_type': ['Fishing', 'Fishing', 'Cargo']
})

# Sample EEZ Data (Sri Lanka and Nearby Borders)
ee_border = gpd.GeoDataFrame({
    'country': ['Sri Lanka', 'India'],
    'geometry': [
        Point(79.8, 6.0).buffer(2), # Fake boundary for Sri Lanka
        Point(82.0, 8.0).buffer(2) # Fake boundary for India
    ]
})

# Convert AIS Data to GeoPandas
ais_gdf = gpd.GeoDataFrame(ais_data, geometry=gpd.points_from_xy(ais_data.longitude, ais_data.latitude))
```



ML Model -

The datasets being imported to the esp module code



```
    print(f"\u26a1 Failed to send webhook alert. )\n")
except Exception as e:
    print(f"\u2022 Error sending webhook alert: {e}\n")

vessel Tracking
def check_vessel(vessel_id, lat, lon):
    if is_outside_indian_ocean(lat, lon):
        print(f"\u26a1 Alert: Vessel {vessel_id} outside Indian Ocean at {lat}, {lon}")
        send_email_alert(vessel_id, lat, lon)
        send_sms_alert(vessel_id, lat, lon)
        send_webhook_alert(vessel_id, lat, lon)
    else:
        print(f"\u2708 Vessel {vessel_id} is within Indian Ocean boundaries.\n")

example Data
vessel_data = [
    {"vessel_id": "V001", "latitude": -10.5, "longitude": 90.2}, # Inside
    {"vessel_id": "V002", "latitude": 35.0, "longitude": 85.0} # Outside
]

for vessel in vessel_data:
    check_vessel(vessel["vessel_id"], vessel["latitude"], vessel["longitude"])

Vessel V001 is within Indian Ocean boundaries.
Alert: Vessel V002 outside Indian Ocean at 35.0, 85.0
Failed to send email: (535, b'5.7.8 Username and Password not accepted. For more information, go to\n5.7.8 https://support.google.com/mail/?p=BadCred
Failed to send SMS: HTTP 401 error: Unable to create record: Authentication Error - invalid username
✓ 0s completed at 5:10PM
```



ML Model -

The datasets being imported to the esp module code

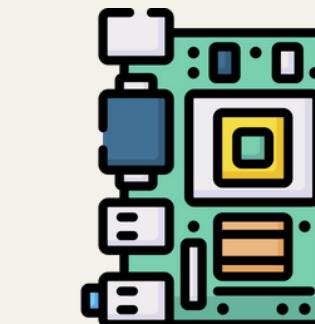
```
print(f Average CV Score: {np.mean(cv_scores)})\n\n# Train the model on the training set\nrf.fit(X_train, y_train)\n\n# Make predictions\ny_pred = rf.predict(X_test)\n\n# Evaluate the model\naccuracy = accuracy_score(y_test, y_pred)\nprint(f"Test Accuracy: {accuracy}")\nprint("Classification Report: ")\nprint(classification_report(y_test, y_pred))\nprint("Confusion Matrix: ")\nprint(confusion_matrix(y_test, y_pred))\n\n\nCross-Validation Scores: [0.89285714 0.9 0.88571429 0.9 0.9 ]\nAverage CV Score: 0.8957142857142857\nTest Accuracy: 0.8833333333333333\nClassification Report:\nprecision recall f1-score support\n\n 0 0.91 0.87 0.89 160\n 1 0.86 0.90 0.88 140\n\naccuracy\nmacro avg 0.88 0.88 0.88 300
```



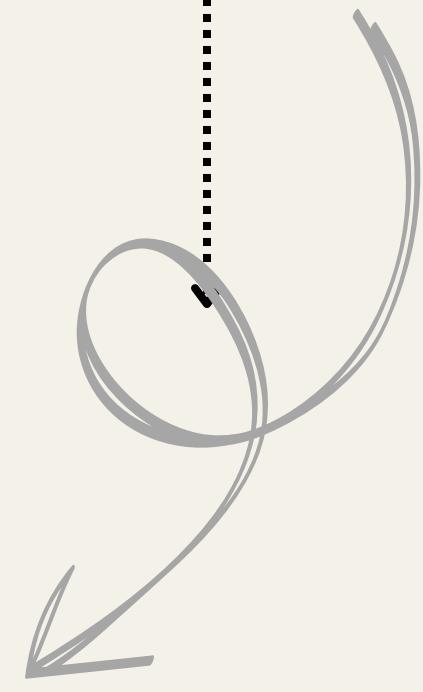
DATASET



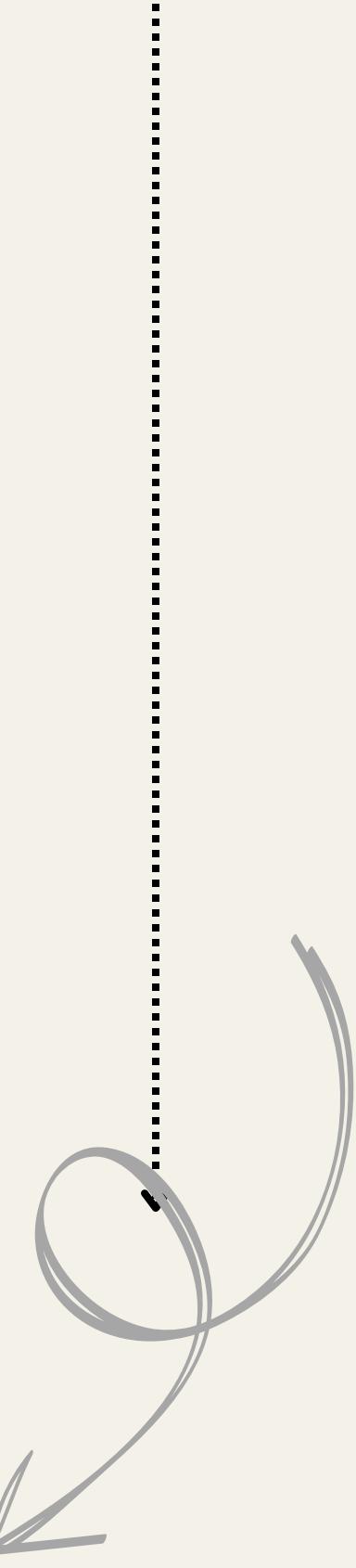
ESP 32t



ARDUINO



ESP CODE - The datasets being imported to the esp module code



Home

SJIT TEST

SJIT TEST

Filters

Realtime - last minute



Edit mode



Alerts

Dashboards

Device

Devices

Assets

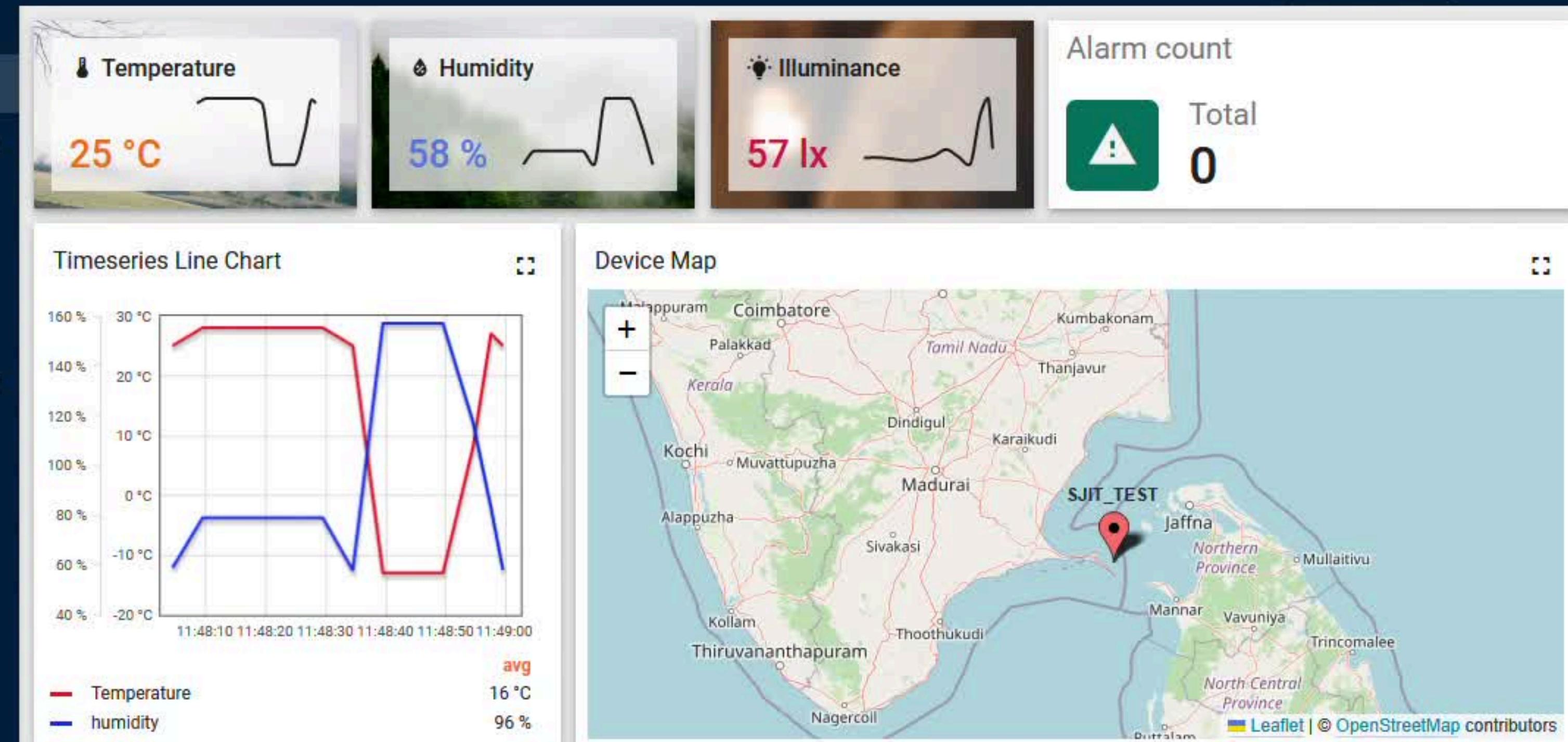
Entity views

Profiles

Clients

Rule chains

Notification center



Our Dashboard

