Google Developer Group
On Campus

TechSprint

Leveraging the power of AI

Team Details

a. Team name: INNOVEX CODERS
b. Team leader name: Mithun Prasanna . V
c. Problem Statement:Oil Spill & Marine Pollution Detection: Real-Time Alerts from Satellite Imagery

Problem Statement:

Oil spills and marine pollution cause devastating damage to marine ecosystems, affect local economies, and endanger wildlife. Current detection methods are often slow, relying on manual reports or delayed analysis of data. By the time action is taken, the spill may have spread over a vast area.

Proposed Solution:

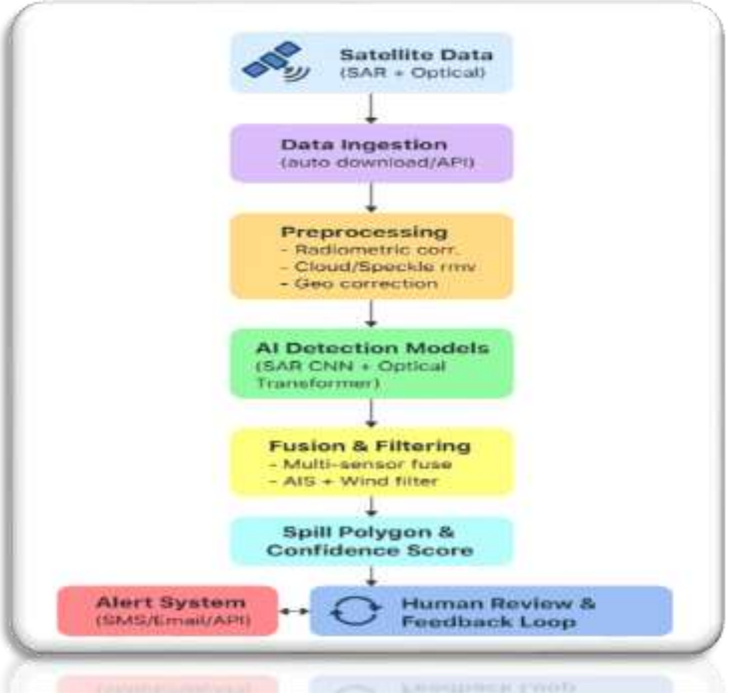
A real-time monitoring and alert system that uses satellite imagery combined with AI-based image processing to detect oil spills and marine pollution quickly and accurately.The system will automatically send alerts to relevant authorities, enabling rapid response to minimize environmental damage.Real-time alerts to coast guards,NGOs, and portsDashboard for monitoring & historical tracking

How different is it from any of the other existing ideas?

- **Real-time detection** (under 15 minutes after image capture)
- **Global coverage** with multi-satellite integration
- **Predictive spill** spread modeling
- **Public + private API** for integration with marine authorities

How will it be able to solve the problem?

- VECTOR:
- Convert raster detection vector polygons
- Export shapefile for GIS analysis
- Enables further spatial analysis & reporting
- VISUALIZATION:
- Overlay results on google earth maps
- White = oil spill, blue/black = ocean



Satellite Data
(SAR + Optical)

Data Ingestion
(auto download/API)

Preprocessing
- Radiometric corr.
- Cloud/Speckle rmv
- Geo correction

AI Detection Models
(SAR CNN + Optical Transformer)

Fusion & Filtering
- Multi-sensor fuse
- AIS + Wind filter

Spill Polygon & Confidence Score

Alert System
(SMS/Email/API)

Human Review & Feedback Loop

List of features offered by the solution

- **ENVIRONMENTAL** : Early detection prevents widespread ecological damage.
- **ECONOMIC** : Reduces clean-up costs and protects fishing/tourism industries.
- **GLOBAL REACH** : Can be scaled to monitor oceans worldwide.
- **SOCIAL** : Increases transparency & public awareness.

Google Technologies used in the solution

Google Earth Engine:
Accessing Satellite Imagery

https://share.google/cd0HLtWNpsJH6wgfE

Process flow diagram or Use-case diagram

- PREPROCESSING:
- SAR data contains noise(speckle)
- Use focal mean filter to smooth image
- Improves accuracy of oil spill detection
- THRESHOLDING:
- Oil spills appears as dark patches (low backscatter)
- Apply threshold: pixels < -22db= potential oil spills
- Result: binary classification (oil vs non oil)
- MASKING:
- Keep only detected oil pixels
- Mask removes all other regions
- Result: clean oil spill detection map
- AREA ESTIMATION:
- Multiply oil pixels by area (10m resolution)
- Convert to square kilometers

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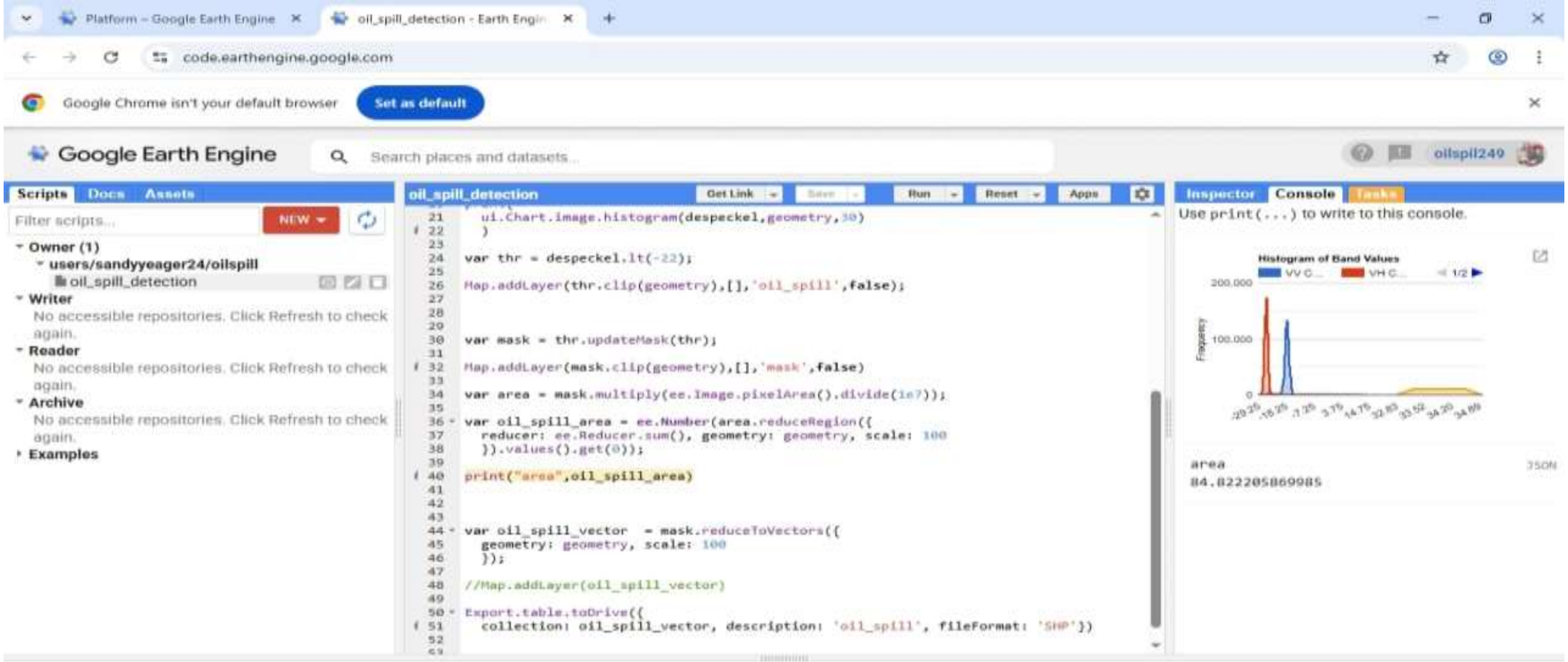
Wireframes/Mock diagrams of the proposed solution (optional)



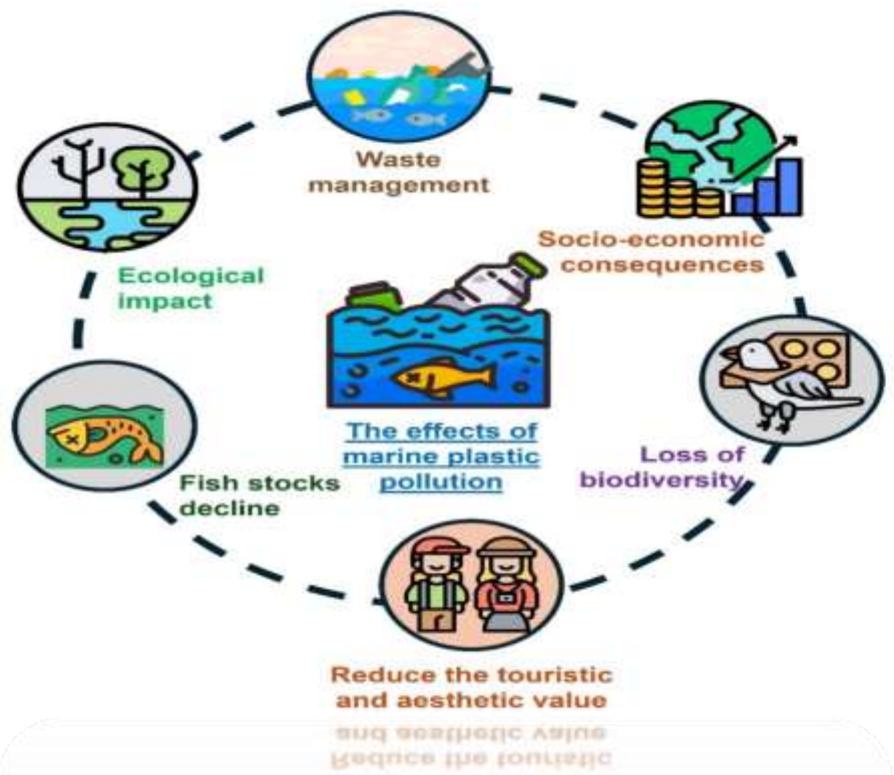
Owner (1)
users/sandyyeager24/oilspill
oil_spill_detection
Writer
No accessible repositories. Click Refresh to check again.
Reader
No accessible repositories. Click Refresh to check again.
Archive
No accessible repositories. Click Refresh to check again.
Examples

```
  ui.Chart.image.histogram(despeckel,geometry,30)
  )

var thr = despeckel.lt(-22);

Map.addLayer(thr.clip(geometry),[],'oil_spill',false);



var mask = thr.updateMask(thr);

Map.addLayer(mask.clip(geometry),[],'mask',false)

var area = mask.multiply(ee.Image.pixelArea().divide(1e7));

var oil_spill_area = ee.Number(area.reduceRegion({
  reducer: ee.Reducer.sum(), geometry: geometry, scale: 100
  }).values().get(0));

print("area",oil_spill_area)



var oil_spill_vector  = mask.reduceToVectors({
  geometry: geometry, scale: 100
  });

//Map.addLayer(oil_spill_vector)

Export.table.toDrive({
  collection: oil_spill_vector, description: 'oil_spill', fileFormat: 'SHP'})
```

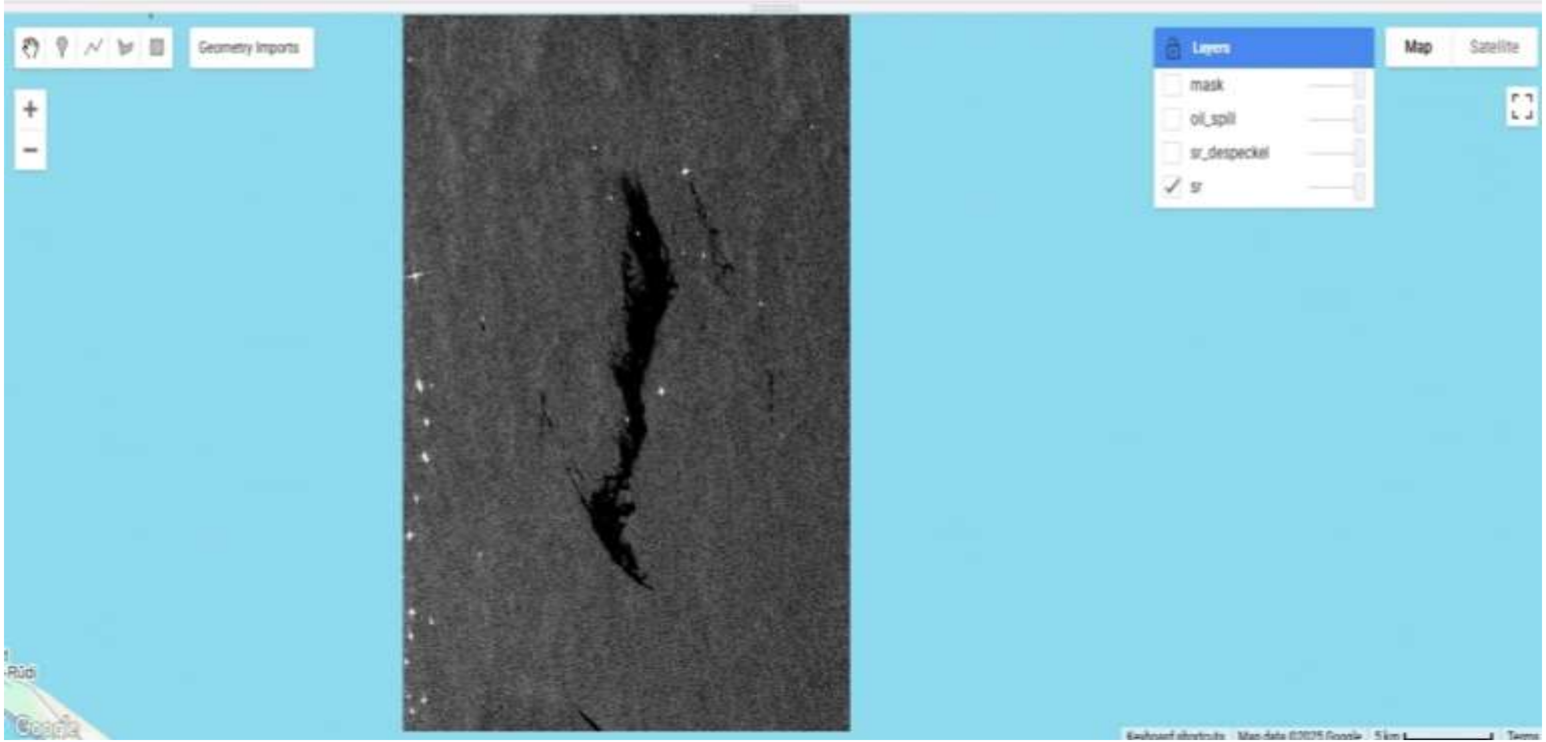
Use print(...) to write to this console.

```
area
84.82220586985
```

Architecture diagram of the proposed solution

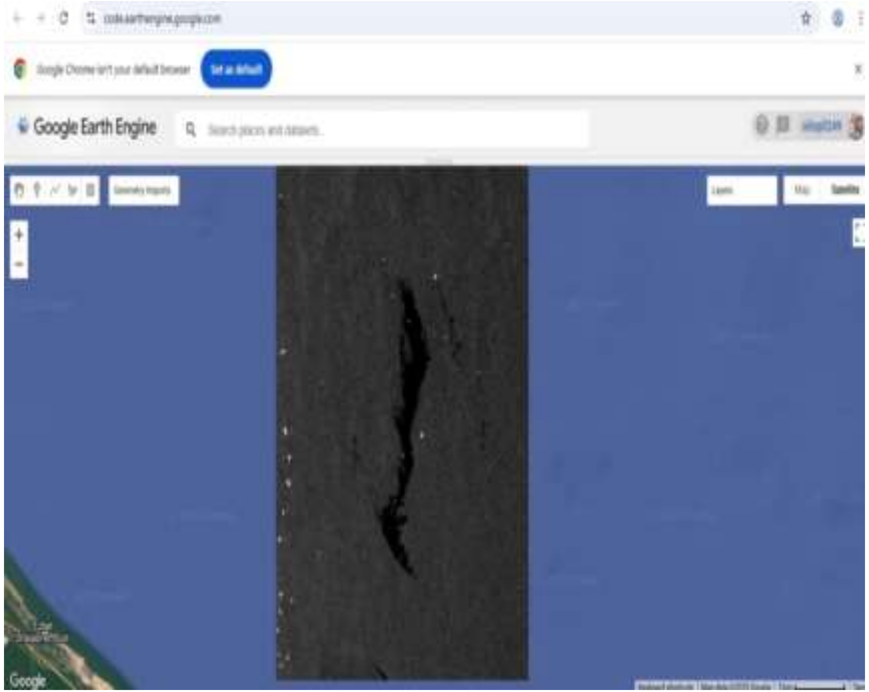

Waste management
Socio-economic consequences
Ecological impact
The effects of marine plastic pollution
Loss of biodiversity
Fish stocks decline
Reduce the touristic and aesthetic value

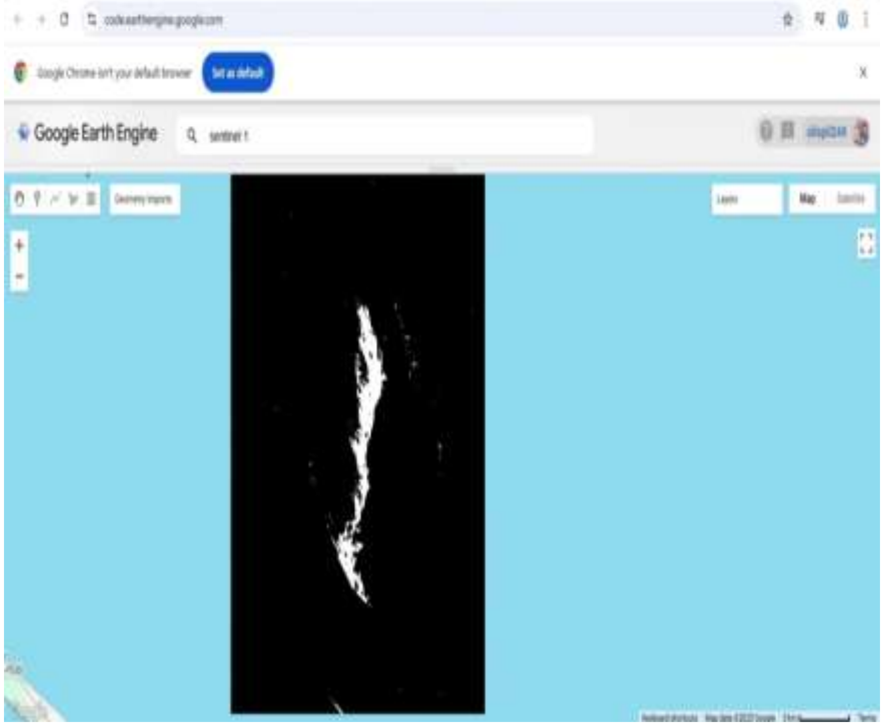
Snapshots of the MVP



☐ mask
☐ oil_spill
☐ sr_despeckel
✓ sr

Additional Details/Future Development (if any)


code.earthengine.google.com
Google Chrome isn't your default browser
Set as default
Google Earth Engine
Search places and datasets...
Geometry Imports
Layers
Map
Satellite
Google



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Provide links to your:

https://drive.google.com/file/d/1n7IY5v8-SRf4SotqGVh8r10gc9tzJMX8/view?usp=sharing

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Thank you!