

PROJECT REPORT :

UDYOG GADH

Automated Satellite Surveillance & Revenue Recovery System for CSIDC

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1. The Story Behind the Project

Managing industrial land is not just about maps; it's about being present on the ground. For the **CSIDC (Chhattisgarh State Industrial Development Corporation)**, managing over **5,000 acres** of high-value land—from Urla to Bhilai—is a monumental task.

Currently, this burden falls on a handful of field officers. They are expected to physically patrol vast areas, often in difficult weather, to spot encroachments or vacant plots. It is a humanly impossible task to be everywhere at once. As a result, violations go unnoticed until it is too late, and valuable land sits idle instead of generating revenue for the state.

We asked ourselves a simple question: *Why are we relying on 19th-century manual patrols to manage 21st-century industrial assets?*

2. The Problem: The "Visibility Gap."

Through our research, we identified that the current system isn't broken; it is simply overwhelmed.

- **The Scale Challenge:** You cannot patrol 5,000 acres manually. It leaves massive “blind spots” where illegal construction hides.
- **The “Reactive” Trap:** Officers usually react only after a complaint is filed. By then, a temporary shed had become a permanent concrete structure, leading to years of court battles.
- **The Hidden Loss:** “Ghost Plot”- Land that was allotted but is sitting empty- are bleeding the state of potential tax revenue and jobs.

3. Our Solution: A Digital Watchdog

Udyog Gadh is our answer to these challenges. It is an automated, satellite-based surveillance system that acts as an "Eye in the Sky" for the CSIDC.

We wanted to build something that doesn't just "digitize" records but actively **protects** them.

- **It's Proactive:** It alerts authorities *before* an encroachment becomes permanent.
 - **It's All-Weather:** We specifically chose Sentinel-1 Radar Technology because we know Chhattisgarh has a heavy monsoon season. Unlike normal cameras, Radar sees through clouds and rain, ensuring monitoring never stops.
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4. How It Works

We built a pipeline that turns raw satellite data into actionable insights:

1. **We Start with the Truth:** We take the official government maps (Shapefiles), which act as the "legal boundary."
2. **We Watch from Above:** Every 12 days, the Sentinel-1 satellite scans the area.
3. **We Compare:** Our AI looks at the difference between the *Official Map* and the *Satellite View*.
 - *Is there concrete where there should be grass?* (Potential Encroachment)
 - *Is there grass where there should be a factory?* (Potential Ghost Plot)
4. **We Act:** If a violation is found, the system flags it on a dashboard and prepares a notice automatically.

4.1 The Intelligence Behind The Eye

To turn satellite signals into reliable evidence, Udyog Gadh doesn't just look at pictures; it performs a two-layered mathematical analysis:

- **The Rapid Assessment:** For a quick scan of an entire estate, the system compares the Legal Plot Area from our database against the average radar Backscatter Intensity. By using a threshold of -11.0 dB, the system can instantly estimate if a plot is being used as intended or if unauthorized structures are appearing.

- **The Pixel-Perfect Check:** When a potential violation is flagged, the system switches to a "pixel-counting" mode. It analyzes every individual 100-square-meter block within the plot. Any pixel with a signal stronger than our threshold is confirmed as concrete or metal. This allows us to calculate the exact square footage of encroachment to be included in legal notices.
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5. The Impact: Why This Matters

This isn't just about saving time; it's about changing how governance works.

- **From Months to Minutes:** A survey that used to take a team 30 days to complete can now be scanned by Udyog Gadh in 30 seconds.
 - **Unlocking Revenue:** By identifying unused land, the state can re-allocate it to industries that actually want to build factories and create jobs.
 - **Empowering Officers:** We aren't replacing field officers; we are giving them a superpower. Instead of wandering randomly, they now have precise GPS coordinates of where to go.
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6. The Future Vision

We believe **Udyog Gadh** is the first step toward a "Smart Industrial State."

Today, we are monitoring boundaries. Tomorrow, this same system can monitor industrial health, road infrastructure, and environmental compliance. We are moving from a system of "**Reactive Checks**" to a future of "**Proactive Protection**."

Secure the Land. Secure the Revenue. Build the Future.