

HOW CAN LARGE SOLAR POWER OPERATORS USE VISUAL AI TECHNOLOGY TO DETECT AND RESPOND TO INTRUSIONS IN REAL TIME?

PROBLEM

Tata Power Solar experienced intrusions and theft at its sprawling, remote installations. Relying on traditional security measures to detect unauthorized entry along the 4.6-mile periphery of the site was neither efficient nor effective.

SOLUTION

Avathon deployed Industrial AI platform to automatically detect unauthorized human activity within one meter of the plant's periphery and immediately launch autonomous tracking drones feeding live images of the intruders to security personnel.

OUTCOME

Since Tata Power Solar implemented Avathon Industrial AI platform nearly two years ago, thefts at the plant have stopped entirely—resolving their critical security challenge and allowing them to reduce their 24/7 security staff by 75%.

Tata Power Solar (TPS), India's largest integrated solar power company with an 8.3 GW solar energy portfolio, operates 17 utility-scale solar energy projects across 13 states in India—most of which are located far from population centers, with boundary perimeters over four miles long.

TPS faced a common challenge for large plant operators: solar panels deployed in remote locations offer an attractive target for opportunistic criminals who want to steal and sell valuable solar panel components on the black market. Other risk factors for companies like TPS include intruders who purposely or accidentally damage equipment, stray grazing livestock, and wildlife that wander onto the property and cause harm. While such incidents don't happen every day, they can potentially happen any day, with real consequences including capital losses, revenue losses, repurchase costs, danger to employees, etc.

The random nature of when and where an intrusion might occur makes it more difficult to right-size the solution for the challenge. Staffing security teams day and night to sufficiently guard the grounds of a huge periphery is expensive, as is assigning personnel to constantly monitor camera systems, maintain security lights and fences, etc. Even so, given such large boundaries in rugged locations, an intruder or a team of intruders could realistically come and go

in broad daylight unless the security team happened to be nearby to pursue them, typically on foot due to the terrain.

All these conditions made it very laborious yet ineffective to deter thefts and intrusions 24/7 with typical security measures at Tata Power Solar sites. Seeking an automated, dependable, and cost-effective method for security at their large, remote sites, they engaged Avathon to deliver a scalable AI-powered solution that combined computer-vision-equipped CCTV cameras, automated drones and alert systems, and smaller, more empowered security teams.



AN AUTONOMOUS SECURITY APPROACH WITH AVATHON VISUAL AI TECHNOLOGY AT THE CORE

As the first step, Avathon designed and helped deliver an intelligent network of CCTV cameras that provide complete video coverage of their site's 4.6-mile periphery. Bullet-style cameras with 90m infrared range were favored to allow the AI-enabled video feeds to detect objects both day and night, mounted every 90m on poles in a connected loop to prevent blind spot issues (e.g., camera 1 covers the base of pole 2, camera 2 covers the base of pole 3, etc.). Because these cameras perform well in darkness, TPS could leave their street lights off at night, saving electricity costs. A further benefit here was that the streetlights could become another layer in Industrial AI platform's alarm notification process, turning on at the very moment alerts initiate to illuminate the ground where teams should focus their attention.

Industrial AI platform operates at the center of TPS's security solution, leveraging Avathon's advanced computer vision capabilities on the camera's edge to recognize any human presence or stray animals within 1m inside or outside the virtual boundary. A combined data feed of 2250fps from 75 active cameras passes to the server-side for immediate deployment of response rules governed by Industrial AI platform's management suite, with drill-down details available in the customer's customizable dashboard.

Whenever the Industrial AI platform-equipped cameras detect an intrusion on TPS's boundary areas, a wave of alert notifications and system responses are triggered. These include buzzers in the security control room, mobile and email alerts, turning on lights in the intrusion area—and, most notably—launching autonomous drones to investigate the problem.

The drone (one of two per site, covering designated zones) takes off without human assistance to hover over the intrusion point and capture close-up images of the intruder, assisting in active mitigation efforts as it gathers valuable data for both prosecution and learning how to better thwart future intrusions. The drone can reach the target area within one minute of intrusion. Coordinates of the perpetrator's location pass from Industrial AI platform to the drone in real time as they traverse from one camera's visual field to the next.

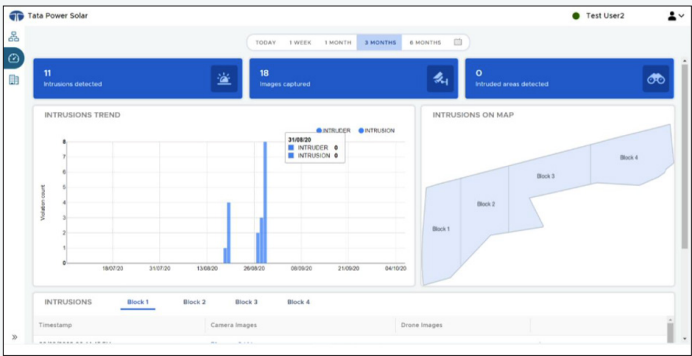
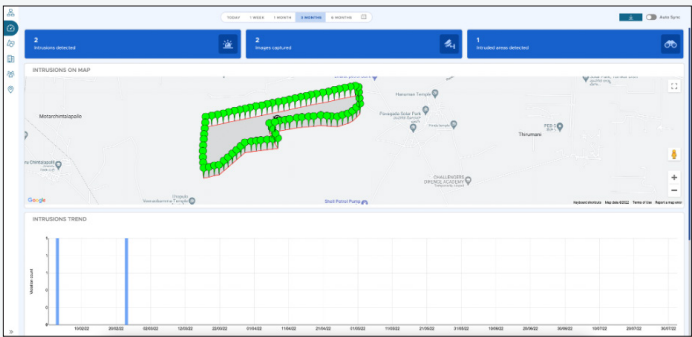
The drone and cameras capture the suspect's every movement while security teams assess the threat via the CCTV video feed and the drone snapshots. This enables them to organize appropriate counteractions quickly, keeping them safe and in complete control of the situation through Industrial AI's eyes in the sky.



REALIZING POWERFUL RETURNS FROM A HIGHLY SCALABLE SOLUTION

Since deploying Avathon Industrial AI platform at several sites in one vicinity, Tata Power Solar has yet to experience a single successful theft. Beyond the solution's capability to detect intrusions and mount a formidable real-time defense of large and remote solar power plants, it functions as a powerful deterrent to criminal opportunists, as their chance of evading detection is effectively zero.

Industrial AI platform's flawless track record of protecting TPS sites has delivered obvious ROI for Tata Power Solar. It has also created substantial cost reductions for the company. Whereas before, they required 24 workers at a time to patrol and manage site security in one vicinity, now they only use a team of six—a 75% staff reduction.



Last but not least, the scalability of Industrial AI platform—its power to observe and understand contextual behaviors through the lens of business rules connected to autonomous actions—has opened the customer's eyes to further applications leveraging computer vision. The hardware investment for their security solution can also serve business priorities like monitoring solar panel soiling levels, conducting site surveys, PPE and HSE compliance, etc. Tata Power Solar envisions a rewarding future using Industrial AI platform to solve additional critical challenges across their large solar power plants.

ABOUT AVATHON

Avathon, a leader in Industrial AI, extends the life of critical infrastructure while advancing the journey toward full autonomy. Avathon's Industrial AI platform empowers commercial and government customers with scalable, secure, and value-driven solutions that enhance efficiency and resilience across heavy industry.