Infinitas Algorithms — Capabilities & Portfolio

Executive Summary

Infinitas Algorithms is an R&D-driven company specializing in advanced algorithms, data platforms, and cybersecurity for energy systems and industrial intelligence. We design, train, and deploy machine-learning and optimization models that transform complex, high-volume industrial data into actionable insights.

Our work spans the full spectrum of **green and digital transitions**:

- **Reliable renewable generation** through advanced hydrology forecasting, snow-water digital twins, and renewable (wind & solar) analytics.
- **Resilient critical infrastructure** supported by IT/OT convergence, real-time data platforms, and OT/IoT/ICS cybersecurity solutions.
- **Efficient operations** powered by operations research and optimization models that maximize energy production, minimize inefficiencies, and improve decision-making.

By combining expertise in **AI, operations research, big data infrastructures, and industrial cybersecurity**, Infinitas Algorithms empowers utilities, operators, and infrastructure owners to modernize operations, strengthen resilience, and achieve sustainable growth.

Our Value Propositions and Services

(i) IT/OT Convergence Consultancy
We provide expert consultancy to bridge the traditionally separate domains of Information Technology (IT) and Operational Technology (OT). This includes mapping existing systems, designing secure integration architectures, and guiding organizations through the transition to unified, resilient infrastructures. Our approach ensures interoperability between enterprise IT systems and industrial control networks, while addressing cybersecurity, regulatory compliance (e.g., IEC 62443), and long-term maintainability. This enables organizations to achieve operational visibility, streamlined decision-making, and higher resilience against cyber-physical risks.

(ii) Real-Time Data Infrastructure & Time-Series Analytics
We design and implement enterprise-grade data infrastructures capable of handling millions of events per second. Our solutions include secure pipelines for ingesting, storing, and managing high-frequency time-series data from sensors, SCADA/DCS, and IoT devices. On top of this, we

provide tailored analytics: what-if simulations, advanced forecasting, and performance benchmarking dashboards. By enabling digital twin architectures, we help organizations move from reactive monitoring to proactive, data-driven decision-making, unlocking operational efficiency and predictive maintenance at scale.

(iii) Snow-Water Digital Twins & Satellite-Based Hydrology

Our snow-water digital twin technology combines satellite imagery, meteorological data, and AI-based analysis to provide real-time and predictive insights into water resources. These models deliver short-term forecasts and long-term seasonal outlooks, supporting hydropower companies and water authorities in optimizing reservoir operations. The integration of historical data with AI-enhanced Snow Water Equivalent (SWE) estimates allows for more reliable planning, improved water security, and enhanced resilience against the impacts of climate variability.

(iv) OT/IoT/ICS Cybersecurity

We deliver comprehensive cybersecurity programs tailored to industrial environments:

- **Consultancy & Implementation Support:** From risk assessment and architecture design to full deployment and integration of OT/IoT security platforms, ensuring critical systems remain operational under cyber stress.
- **Cybersecurity Awareness Programs:** Practical workshops for IT staff, OT operators, and executives, ensuring all stakeholders can recognize, report, and respond effectively to cyber threats.
- **Continuous Education:** Periodic update sessions to keep teams aligned with the evolving threat landscape, regulatory changes, and industry best practices.
  This holistic approach strengthens defense-in-depth strategies and builds cyber resilience for critical infrastructures.

(v) Operations Research & Optimization

We develop advanced optimization algorithms tailored to the complexities of modern energy systems. Our solutions cover day-ahead hydropower scheduling, cascade reservoir management, renewable integration, and long-term capacity planning. By combining operations research methods (linear, nonlinear, and stochastic optimization) with machine learning forecasts, we enable utilities and operators to maximize production revenues, minimize imbalance penalties, and ensure ecological flow compliance. The outcome is a measurable increase in profitability and system reliability, while supporting the broader goals of sustainability and grid stability.

Selected Projects & Use Cases

Real-Time Data Infrastructure & Time-Series Analytics — Aydem Renewables (Wind & Solar)

- Processing **220+ million data points per day**
- **~13,000 signals per second** from over 100 wind turbines across three locations

- Delivery of **custom analytics, what-if simulations, performance comparisons, and interactive dashboards**

Snow-Water Digital Twins & Satellite-Based Hydrology — Aydem Renewables

- **AI-enhanced Snow Water Equivalent (SWE)** and precipitation datasets
- **Historical trend analysis** of water resources
- **Short-term and seasonal forecasting** powered by SWE models and historical satellite data (Ongoing)
- **HydroPower Scheduling Optimization (Ongoing)**

OT/IoT/ICS Cybersecurity Projects

- **Mersin International Port** — Consultancy, engineering, training, and implementation of OT security solutions
- **ACWA CCPP (Natural Gas Combined Cycle Plant)** — Full-scope OT security program: consultancy, engineering, training, implementation, and ongoing support
- **TANAP (Oil & Gas Pipeline)** — OT security design, engineering, implementation, and support for critical energy infrastructure

Energy Infrastructure Projects

- **Smart Substations (I-SS) (Northern Cyprus)** — MV/LV Distribution Infrastructure Modernization
  Package Details:
  - 24 kV RMU (21 kA / 3 sec)
  - LV Distribution / Control Panel
  - RTU / SCADA & Communication
    - (IEC 61850-101, IEC 61850-104)
  - UPS / Rectifier
  - Design / Engineering / Commissioning