CASE STUDY

Harnessing the Wind:
DIGITAL TWINS HELP RENEWABLE ENERGY COMPANY SLASH REPAIR COSTS BY $8M

HIGHLIGHTS

- Saved up to **8M USD** in repair costs
- **Enabled remote monitoring** of all wind turbines
- **Leveraged data analysis** to forecast downtime and schedule maintenance proactively
- **Enhanced energy production efficiency** by centralizing the data from all wind turbines into a single platform

OUR CLIENT

Our client is a multinational conglomerate headquartered in the United States with a long history dating back to the 19th century. The company has a workforce of over **120,000 employees** across **170 countries** and specializes in renewable energy, power, and additive manufacturing. Committed to advancing the future of energy, the client has developed innovative technologies transforming the energy industry. In recognition of their dedication, the company was ranked among the top 100 in the Forbes Global 2000 in 2023.

BUSINESS CONTEXT

The power generation industry is moving towards cleaner energy options, with wind power being one of the most promising sources. As per industry reports, the global wind energy market was valued at US$81.31 billion in 2022 and is forecasted to grow to around US$211.85 billion by 2032, registering a CAGR of 10.10% from 2023 to 2032 [1]. However, despite its potential, the growth of the industry is hindered by the high cost of maintenance, which accounts for nearly 30% of the total wind turbine costs [2].

Maintaining wind turbines is crucial to ensure their smooth operation and longevity. Neglecting maintenance can cause power breakdowns, disruptions, defects, and eventually higher maintenance costs. Our client recognized the significance of leveraging technology applications and data analysis to address these issues, particularly through preventive measures. Specifically, the client aimed to implement automated preventive maintenance measures that can collect real-time data from their wind farm's turbines to monitor their quality and apply necessary measures when needed.

To achieve this objective, our client approached FPT to identify and implement the most suitable preventive maintenance measures for their wind farm.

FPT'S SOLUTIONS

FPT proposed **Digital Twins** as a solution for the client's business needs. Digital Twins are precise digital replicas of wind turbines that provide real-time representations of the physical machine and generate data on the turbine's condition. This solution helps clients receive real-time alerts on the state of the turbines and be informed beforehand when maintenance is required, thus avoiding any potential breakdowns.

[1] https://www.precedenceresearch.com/wind-energy-market
[2] https://www.fortunebusinessinsights.com/wind-turbine-operation-and-maintenance-market-102757

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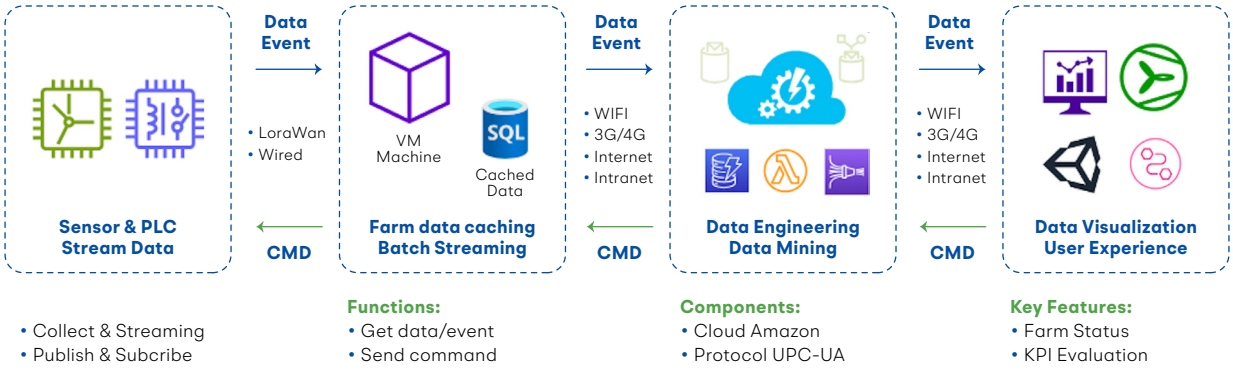
FPT'S SOLUTIONS

FPT deployed **the Digital Twins** solution over 18 months with an offshore team of 16 experts:



- Collect & Streaming
- Publish & Subcribe

Functions:
- Get data/event
- Send command

Components:
- Cloud Amazon
- Protocol UPC-UA

Key Features:
- Farm Status
- KPI Evaluation

1. The wind turbines are equipped with physical sensors that are utilized for data collection. The collected data is further sampled and processed using Kepware software.
2. Upon processing, it is then transmitted to the AWS IoT agent system for storage at the data server located at the wind farm's factory site.
3. Once the data reaches the AWS Cloud service, it is subjected to processing and analysis using AWS IoT rules.
4. The analyzed data is then stored and classified using AWS services such as DynamoDB, Kinesis Data FireHose, and Lambda. The resulting data types, including visualization, analytics, and report data, are employed to serve advanced analysis systems.
5. The Unity application is employed to create a digital replica of the turbines and visualize simulation data based on physical data collected from actual turbines and sensors. The interactive interface of the application enables users to obtain real-time updated information on physical devices.

VALUES

The Digital Twins solution enabled our client to achieve the following tangible results.

Saved Up to 8 Million USD
in repair costs through timely interventions and maintenancestrategies

Enhanced energy production efficiency
by centralizing the data from all wind turbines into a single platform

Leveraged data analysis
to forecast downtime and schedule maintenance proactively

Enabled remote monitoring
of all wind turbines through computer and mobile devices

ABOUT US

FPT Corporation (FPT) is a globally leading technology and IT services provider headquartered in Vietnam and operates in three core sectors: Technology, Telecommunications, and Education. Over more than three decades, FPT has consistently delivered impactful solutions to millions of individuals and tens of thousands of organizations worldwide. Committed to elevating Vietnam's position on the global tech map and delivering world-class solutions for global enterprises, the Corporation focuses on five strategic areas: Artificial Intelligence, Automotive, Semiconductor, Digital Transformation, and Green Transformation. In 2024, FPT reported a total revenue of USD 2.47 billion and a workforce of over 54,000 employees across its core businesses.
For more information about FPT's global IT services, please visit https://www.fptsoftware.com