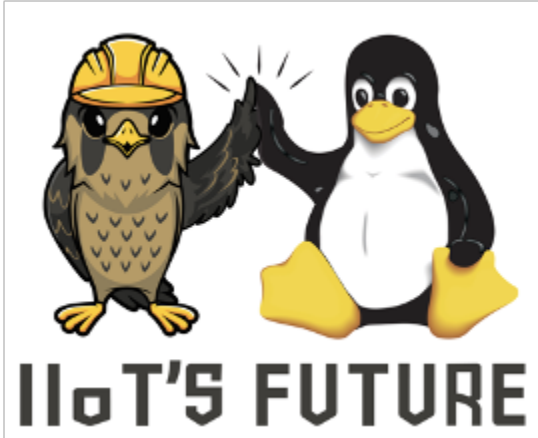


# Fledge Home



# FLEDGE

## Overview - Delivering Industry 4.0 Together



The **Industrial Edge** has unique distributed computing, protocol, data, ML, security and integration challenges not found in retail, consumer or other edge markets.

Fledge is the Linux Foundation's Industrial Internet of Things (IIoT) edge platform and community architected for and built by industrial users, machine builders, smart industrial sensor suppliers, industrial software suppliers, system integrators and cloud operators. The Fledge project was seeded by [Dianomic](#), [Google](#), [AVEVA/OSisoft](#), [Teledyne/FLIR](#) and [JEA](#) (8th largest utility in the U.S.). Our community is growing fast with over 60 contributors. Fledge is also adopted by [LF Energy](#) (Fledge Power Project), [OS DU](#) and is being evaluated by [CESMII](#).

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### Some quick links:

For Machine Builders, System Integrators, Smart Sensor Suppliers, Industrial Software Suppliers and Contributors

- [Architecture](#)
- [User Documentation](#)
- [Developer Documentation](#)
- [Get the Code](#)

For Users and No Code Application Developers

- [User Documentation](#)
- [Fledge - Edge Application Development.pdf](#)

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## Back To The Overview

Fledge has been deployed in industrial operations since 2019! Some of our public use cases include:

- [JEA](#) - Energy substation monitoring and automation
- [RTE](#) - [Energy RTU server gateway \(IEC104, IEC61850, TASE 2, OpenADR\)](#)
- [General Atomics](#) - Military drone manufacturing
- [Neuman Aluminum](#) - Aluminum part manufacturing
- [Honda Racing](#) - Digital Twin machine optimizations
- [Opus One/UC Davis](#) - Wine production and safety

Some of our private use cases include:

- Large gas pipeline operator - Remote monitoring stations where SCADA doesn't reach
- Pharmaceutical company - Redundant PLC connections and data transformations to historians with HA for compliance
- Major chemical company - Multi-protocol gateway in the cloud connecting 200,000 LoRaWan sensors and API gateway connecting cloud services to historians
- Midwest electric generator - Replace route based monitoring in gas turbine plants
- Large food processor - Centrifuge optimization using ML with vibration and PLC data
- Small engine manufacturer - Monitor robot and CNC process for real-time part quality inspection with track and trace integrated with MS Azure and historian
- Amusement park solar farm - solar tracker monitoring

Strategic Collaborations

- [AVEVA](#) - Integrates data with PI, AVEVA Data Hub, pulls data from PI

- ACDP - MS Azure Integration
- Beckhoff - Collects data from PLCs
- Cisco - Operates in Cisco containers
- FLIR - Connects, collects and integrates FLIR cameras, Spinnaker for Computer Vision applications, REST for data feeds
- Google - Integrates Google's IoT Core, GC Pub/Sub, TensorFlow, Tensorflow Lite, AutoML, ML Edge
- HarperDB - Integrates data with DB
- Nexcom - J1939 and J1708 integrations, Coral integration
- Nokia - Integrates NDAC private LTE and 5G
- ThinkIQ - Integrates
- Wago - Collects data from PLCs, operates in container
- In Progress
  - AWS Sitewise Integration

We invite you to use Fledge and contribute to the Fledge Project. And, we look forward to delivering the Industrial 4.0 vision together.

## Collect, Transform, Integrate - Industrial IoT Fundamentals

Fledge connects to all OT data sources (PLCs, DCS, CNC, robots, sensors, etc) supporting the many legacy, current and emerging protocols, networks and methods found in industrial use. The data types from these machines goes beyond time-series data including image, vibration, radio metric and more.

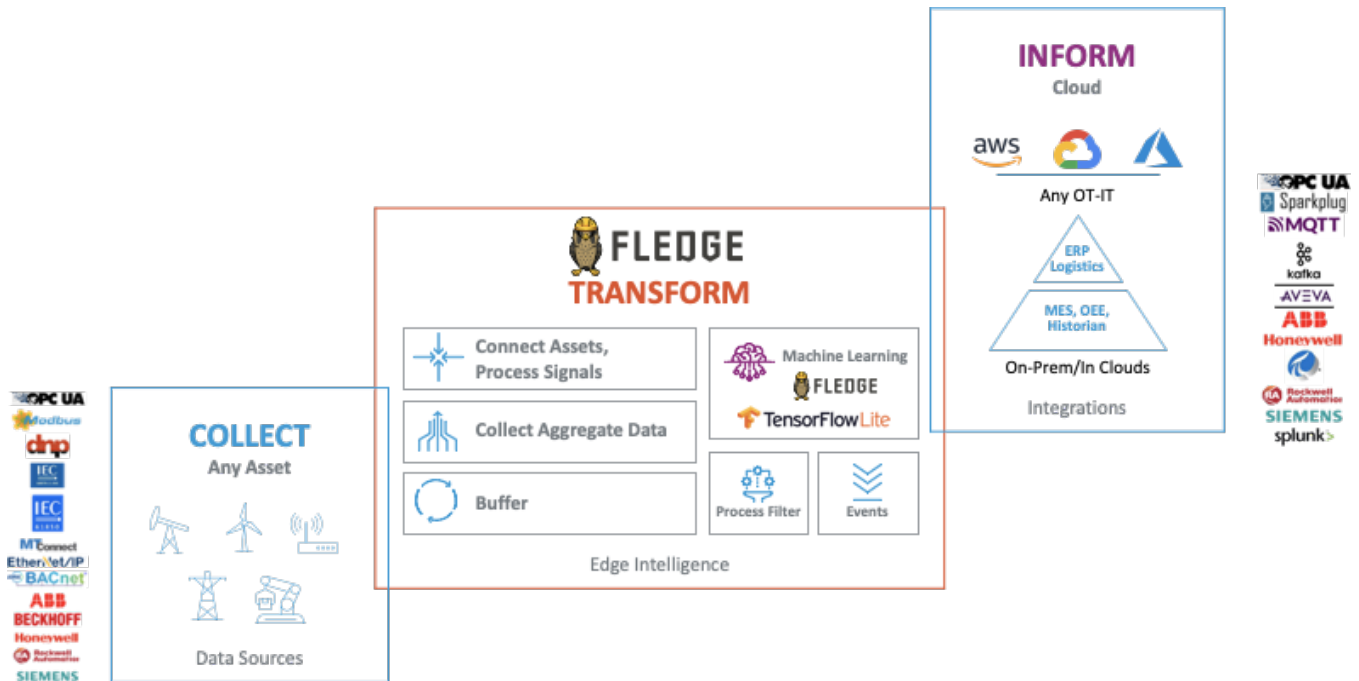
Second, Fledge collects and aggregates this data on the edge.

Third, Fledge transforms, processes, filters, stores, analyzes, alerts and notifies on the edge. Applications may be as simple as converting celsius to Fahrenheit or multi-protocol gateway transformations that map data from different schemas/protocols or as complex as ML/AL and computer vision detecting anomalies or optimizing operations from the edge.

Fourth, Fledge has bi-directional write capability for set-point control. Using Linux, this control function is not intended for RTOS applications. However, it is suitable for writing PLC instructions or sub-second control functions.

Last, Fledge Integrates the data to any and multiple destinations simultaneously creating a smart secure and scalable OT data fabric from sensors and machines to industrial systems and clouds.

## Industry 4.0 Requires a 4.0 Edge



**Fledge - The Open Source Industry 4.0 Edge Governed by the Linux Foundation**

Features	Benefits
Universal Data Acquisition (Any sensor, machine, system)	Connect Everything
Universal Data Integration (ISA95, Any Cloud)	No Data Silos – IT/OT Convergence
Setpoint Control (Bi-directional write, example MES to PLC)	Automation
Extract Once – Use Many - Source Truth	No Data Silos, Trust Data, Cost, Manage
Edge Analytics – Data Transformations & ML	Solves Latency, Data Volume
Event Detection and Notification	Alert Organization (faults, optimizations, actions, safety)
No/Low/Source Code Application Dev	Enables All Organizations (Ops, Engineering, IT, DevOps, Maint...)
Edge Buffer/HA	Compliance, Reliability
Compliment-Integrate w/ Control System	Supports All Organizations
Multiple Data Types (TS, image, Radiometric, Vibration)	No Data Silos, Consistent APIs, Scale, Management
Scale Up-Out	Security, Reliability, Usability (Delight ITops, Secops, Netops, Devops)
No Vendor Lock – Apache 2 – Open Governance	Support, Control, Flexibility, Cost
Intel, ARM, nVidia, Google Coral – Any Linux	Open - No Vendor Lock

Fledge developers and operators no longer face complexity and fragmentation issues when building their IIoT applications as they gather and process more machine and sensor data to automate and transform business. Fledge's modern pluggable architecture eliminates the data silos often found in plants, factories and mines. By using a consistent set of RESTful APIs to develop, manage and secure IIoT applications, Fledge creates a unified, scalable, manageable and secure converged OT-IT edge solution.

[Join Us](#) as our community delivers the benefits of a shared open source stack to OT users and suppliers sharing the Industry 4.0 Vision.

- [Quick Start Guide](#)
- [Architecture](#)
- [Community](#)
- [Use Cases](#)
- [Cross-LF Edge Collaboration](#)

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## Recent space activity



[Mark Riddoch](#)

[Technical Steering Committee \(TSC\)](#) updated Jun 23, 2022 • [view change](#)

[TSC Email Votes](#) updated Feb 18, 2022 • [view change](#)

[Daniel Lazaro](#)

[Collaboration](#) updated Feb 10, 2022 • [view change](#)



[Mark Riddoch](#)

[Adding Control to Fledge](#) updated Feb 07, 2022 • [view change](#)

[Daniel Lazaro](#)

[Technical Steering Committee \(TSC\)](#) updated Jan 03, 2022 • [view change](#)

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## Links

- [Join LF Edge](#)
- [Join Fledge Slack Channel](#)
- [Join Fledge TSC Meetings](#)

