

T-DAB.AI

Gold
Microsoft Partner



WHAT WE DO



T-DAB.AI uses **Edge AI** to enable industry to access new markets, customers, and revenues.

CUSTOMER BENEFITS OF AI

Operators of machines, where production or generation is tightly correlated to revenue, want devices that intelligently and autonomously prevent critical events, diagnose malfunction, improve outputs, and optimise control.

INCREASED PRODUCTIVITY

Intelligent connected machines and devices have increased uptime and optimal performance

ACCESS NEW BUSINESS MODELS

Recurring revenue streams enabled by insights for Hardware as a Service (HaaS/PaaS)

OPERATE IN CHALLENGING ENVIRONMENTS

Access and intelligently operate in previously inaccessible environments



Industry 4.0



Energy



Smart Utilities



Connected Vehicles



Connected shipping



Smart Cities & Buildings

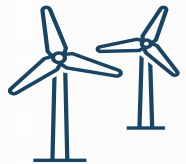
CUSTOMER PROBLEM

The problem: IoT data applied to AI is very valuable but cursed by device abundance and decentralisation. Traditionally data is moved from devices & centralised for AI, but this creates barriers for customers to exploit it.

Customer



Industry 4.0



Energy



Smart Utilities

Opportunity

Sell intelligent Hardware as a Service

Access greater offshore wind resources

Autonomously predict and detect water leakage in remote locations

Barrier



Privacy – customers don't want to share data



Cost – data transfer and cloud compute uneconomical



Connectivity resilience – Over dependence on unreliable cloud and network for intelligence

THE AEROSPACE PROBLEM



Data Bottleneck in Aviation

The lack of speed and capacity of data transfer at a cost that makes business sense. By 2026, the total amount of data generated by aircraft is estimated to grow to 98bn gigabytes each year.

The Royal Aeronautical Society – Aero Space May 2022

OUR SOLUTION

To Rethink Conventional AI Systems Design for IoT: *An Elegant Idea*

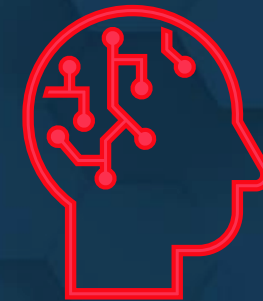
Don't move the data to the model...
move the models to the data



Scalable platform
spanning and connecting
the edge and the cloud



Mechanisms to minimise
the movement of data
from source devices



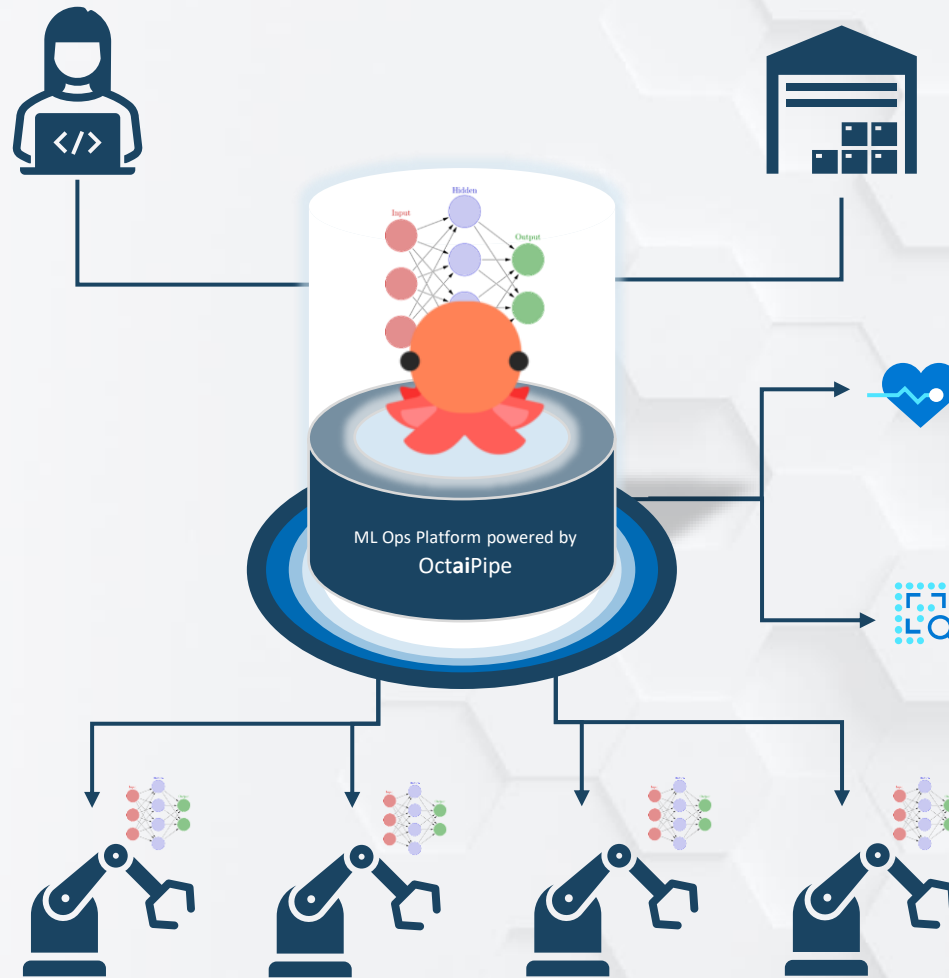
Automation the machine
learning process at the
Edge

OCTAIIPIPE: EDGE AI

Octai-Lab: Data scientists are more efficient in creating and deploying ML solutions between the edge and cloud on OctaiPipe

OctaiPipe is a distributed Edge AI platform, the operating system (ML-Ops) to automate the entire lifecycle management of machine learning applications between the Edge and the Cloud.

Customers can buy pre-built applications, build their own, or commission bespoke applications.



Octai-Store: Customers can rapidly deploy ML Pipelines pre-packaged for high value industry use cases focusing on PdM

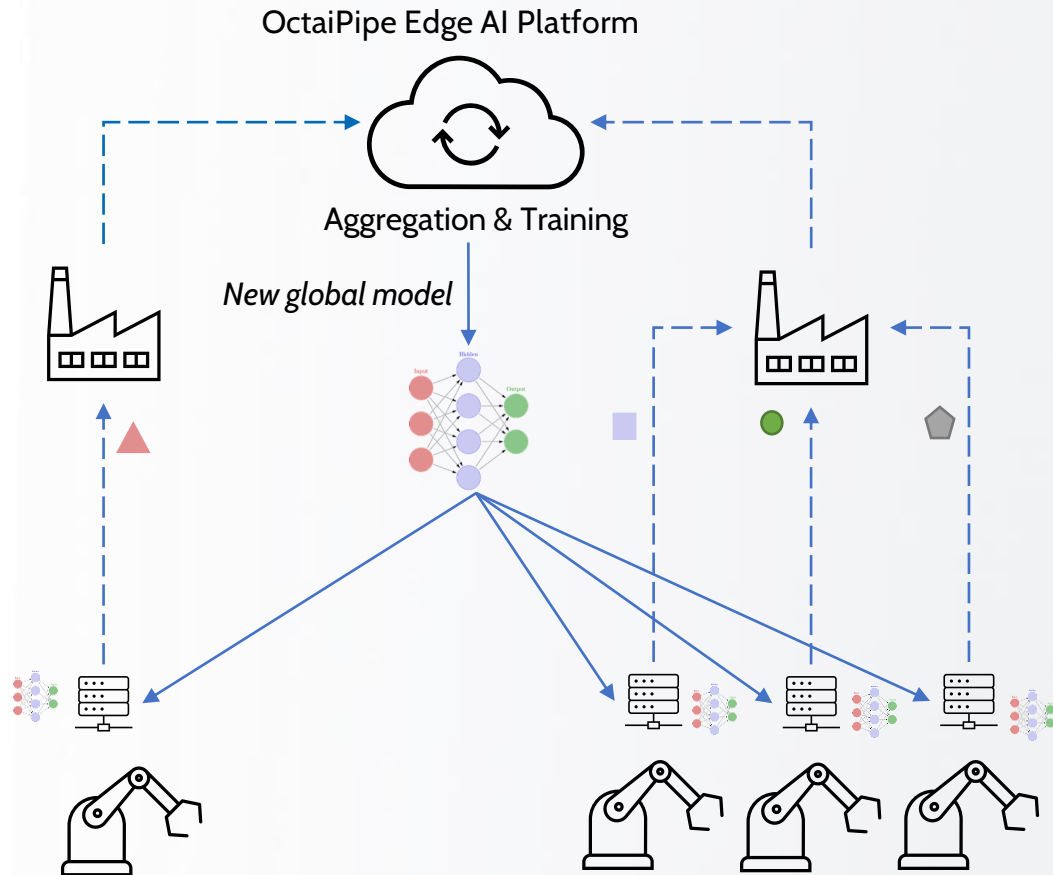
Octai-Doc: System health monitoring

Octai-Sight: Historical insights and real time predictive insights



OCTAPIPE USP: FEDERATED LEARNING

OctaiPipe Delivers Federated Learning for IoT : A New Paradigm For Decentralised AI



- ▮ Where appropriate, rather than move data, we move models to the data - train models locally at nodes, then aggregate the models
- ▮ Maximises privacy and security
- ▮ Minimizes data transfer and compute costs
- ▮ Relies less on network or cloud connectivity
- ▮ Immutable properties of dockerised pipelines ensure replicability and portability between devices and locations



KEY FEATURES OF OCTAIIPIPE

OctaiPipe is a cross-platform, end-to-end distributed Edge AI platform optimized for training, deploying and managing models in any IoT environment

Key Features:

- Seamless edge-cloud connectivity
- Experimentation and model management tools
- Seamless model deployment to the cloud or the edge
- Automated ML-Ops for massively scalable model lifecycle management
- Federated learning capabilities
- Learning and inference optimized for micro computers

Built on gold standards:



kubernetes



GitHub Actions



Kubeflow



influxdb



docker



HashiCorp

Terraform



WHY DOES OCTAIIPIPE MATTER?

OctaiPipe enables customers and partners to access new markets, customers, and revenues by delivering and scaling Edge AI more **privately**, **cost-efficiently**, and **resiliently**.

ACCELERATED AI

Deploy models and infrastructure in less than a day

FEDERATED INTELLIGENCE

Learn across thousands of devices without centralising data

PRIVATE AI

Intelligence without compromising privacy

REDUCED DATA COST

Hybridisation and federation between Edge and Cloud optimises data transfer, compute, and storage costs

AUTOMATED ML-OPS

Overcome engineering challenges and skills shortages



WHO CAN BENEFIT FROM OCTAIPipe?

End Users

Deploy and use OctaiPipe to deliver, operational ROI, new market opportunities, and intelligence across the organisation.

Software Companies & Consultancies

Bolt on OctaiPipe to delivery new services and expand market opportunities.

Edge Equipment Providers

Embed OctaiPipe in your Edge devices to render them intelligent and deliver added value.

OEMs

Embed OctaiPipe in your OEM equipment to deliver HaaS/PaaS business models.

AI/ML Developers & Researchers

Use OctaiPipe to develop your own AI/ML Pipelines and support research.

SOLUTION DELIVERY

We deliver AI at the Edge, Fog, and Cloud using OctaiPipe.

Discover.IO: Insights and Opportunities



Explore the art of the possible with AI & IoT with Discover.IO

- ROI powered use case selection
- Data & Architecture Optimisation
- Insights Extraction & ML Analysis
- Opportunities & Scaling Roadmap

Build, Buy or Bespoke: OctaiPipe Edge AI Solutions



Build intelligent connected devices with our OctaiPipe Edge AI and a catalogue of ML applications

Increase productivity, access new revenue models, and operate in novel challenging environments with Edge AI

Run: Edge ML-Ops at Scale



Run ML at scale resiliently using OctaiPipe Edge ML-Ops

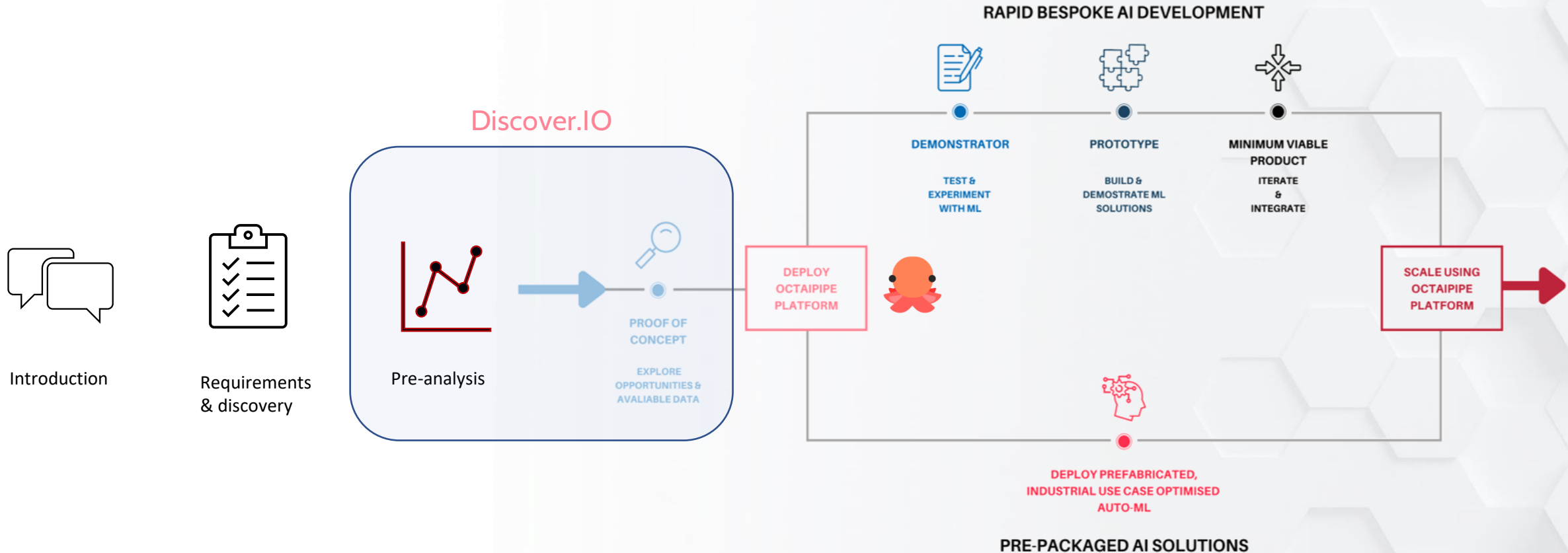
Increase performance and profitability through OctaiPipe's automated ML-Ops delivered at scale



OCTAIIPIPE: ENABLING THE CUSTOMER JOURNEY TO EDGE AI

Our delivery framework powered by OctaiPipe:

We deploy pre-fabricated ML applications or undertake accelerated bespoke development powered by OctaiPipe



OUR CUSTOMERS

Our track record of success...

T-DAB.AI is enabling industry to access new markets, customers, and revenues with **Edge AI** that is more private, cost-efficient, and resilient



CASE STUDY

Case Study: Predicting Future Failures and Detecting Anomalies With Edge AI

PROBLEM

Machine failure results in wasted material, increased downtime, and inefficient power use increasing carbon footprint



SOLUTION

Ready to consume ML applications deployed on OctaiPipe in order to predict time to critical failure events in real time



Innovate UK

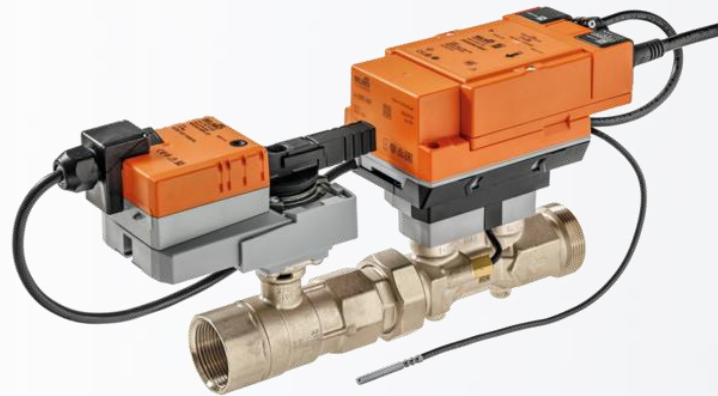
5% REDUCTION OF SPOILAGE EVENTS CAN INCREASE REVENUE PER LINE BY +£3M

Time-to-failure modular solution deployed and ROI positive: 3500 cans per prediction, 14,000,000 cans per day globally

CASE STUDY

Case Study: Energy Optimisation at the Edge for HVAC Device Manufacturer

Manufacturing: Edge AI to optimise the energy usage of HVAC devices



PROBLEM

Currently, heating, ventilation and air conditioning (HVAC) are very often just simple rule-based systems that require human intervention

SOLUTION

Embed an intelligent control system with an autonomous algorithm and use IoT enabled devices to optimally control energy transfer by energy valves in heat exchangers, providing balance between energy savings and comfort.

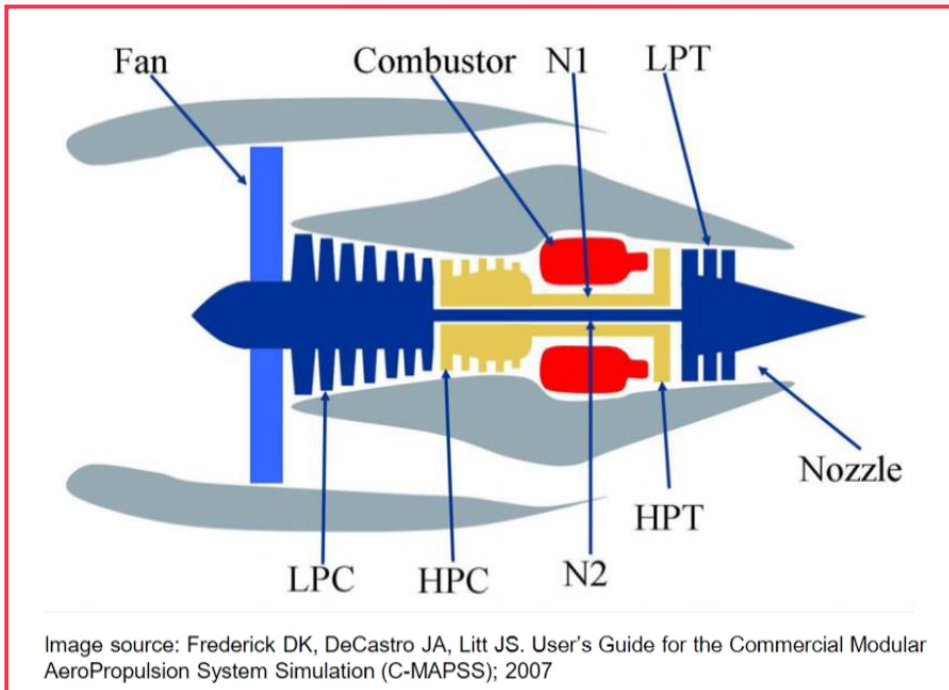
DEEP REINFORCEMENT LEARNING AND PREDICTIVE CONTROL TO **INCREASE ENERGY EFFICIENCY**

BELIMO[®]

CASE STUDY

Case Study: Federated Learning (FL) for Predictive Maintenance

- Tested FL for the classic RUL model on benchmark NASA Turbofan dataset
- FL showed performance comparable to the centralized models



Models	Test RMSE	Test MAE
External Benchmark Models		
Random Forest [44]	12.01	not available
Deep LSTM [46]	18.43	not available
Hybrid SVR/LSTM [47]	19.11	not available
Hybrid CNN/LSTM [53]	13.85	9.44
Fed. MLP (FedAvg/FedProx) [18]	20.90 - 23.92 ¹	16.41 - 18.70 ¹
Selected Centralised Models		
Kaplan-Meier	31.86	19.74
Cox PH	36.95	30.82
Random Forest	16.63	12.24
Neural Network	20.80	15.42
Selected Federated Model - 3 workers		
Fed. GBDT (imbalanced data split)	23.36	18.07
Fed. GBDT (balanced data split)	19.15	13.81
Fed. NN (imbalanced data split)	17.37	13.21
Fed. NN (balanced data split)	20.74	14.82
Selected Federated Model - 5 workers		
Fed. GBDT (imbalanced data split)	25.32	19.89
Fed. GBDT (balanced data split)	17.58	13.03
Fed. NN (imbalanced data split)	19.28	14.88
Fed. NN (balanced data split)	20.47	14.61

INDUSTRIAL TEST CASE

Industrial Test Case: Electro-Hydraulic pumps

An Innovate UK consortium comprising T-DAB.AI, Domin and the University of Bath



Innovate UK

WHAT

Integrating federated anomaly detection, remaining useful life estimation, and control optimization for intelligent electro-hydraulic pumps

HOW

Tens of thousands of devices with integrated sensors and OctaiPipe are to be delivered as new generation of products

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KEY METRICS

- Founded in 2016, commercially active since 2017
- 40+ projects with 30+ customers
- 4 PhDs and 7 MSc from Imperial, Oxford, Cambridge, and others

KEY PARTNERS

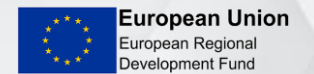


Google Cloud Platform



FUNDING PARTNERS

Innovate UK





T-DAB.AI

SMARTER DATA, BETTER DECISIONS