

# EDGE MACHINE LEARNING FOR INDUSTRIAL AND MANUFACTURING ENVIRONMENTS

EDGE IMPULSE: ART OF THE POSSIBLE SERIES

FEATURING

## **JIM BRUGES** | Edge Impulse Staff Solutions Engineer

Jim is a graduate of the Dyson Institute of Engineering and Technology and an edge AI expert, helping customers achieve efficiencies and cost savings through the use of Edge Impulse's edge AI platform.



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“AI and machine learning have the potential to transform manufacturing by improving productivity, quality, and operational efficiency. By leveraging data and advanced analytics, manufacturers can gain valuable insights, optimize processes, and make better decisions in real-time.”

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WORLD ECONOMIC FORUM

# INDUSTRIAL AND MANUFACTURING TRANSFORMATION WITH EDGE AI

For the past few decades manufacturing tech leads have been collecting huge amounts of data from equipment and production lines. This data is stored in the cloud for business analytics and data science teams to catalog and analyze for insights and business value. With the latest deep learning and hardware advancements, these same teams can now use their goldmine of data to add edge AI to most locations across a manufacturing site. In addition, new tools are further reducing the edge AI technical barrier of entry, adding intelligence where data happens, ultimately resulting in increased process efficiencies and substantial cost savings.

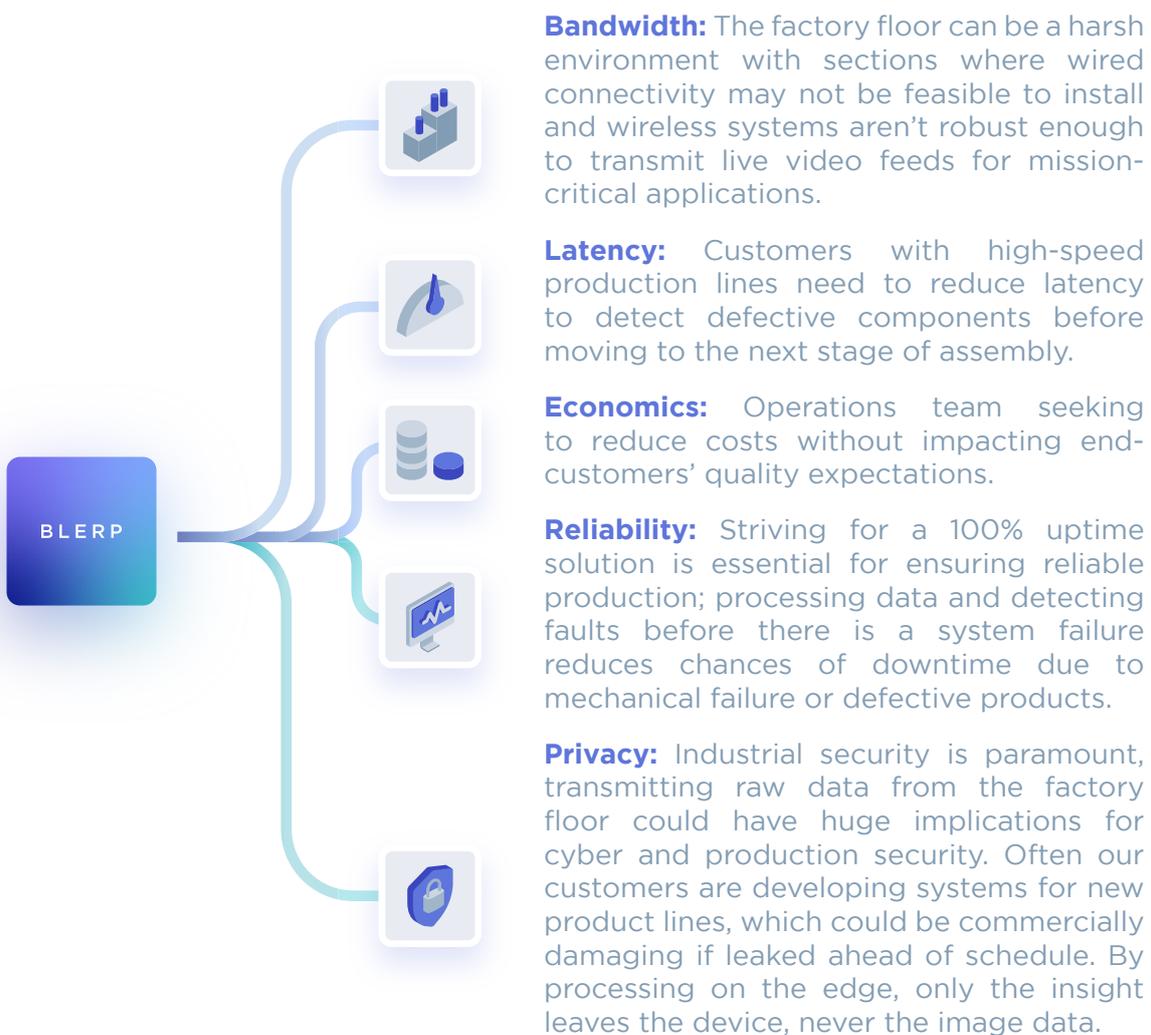
When working with industrial customers, I see data imported onto our platform in every form, including sound, vibration, temperature, images, and video. It is critical that their manufacturing processes achieve minimal downtime, which can be optimized through the automated monitoring of data, either individually or in multi-modal approaches, to detect anomalies and generate predictive maintenance alerts. This is now made possible via sensors loaded with machine learning models, optimized to fit on even the world's tiniest of processors, running powerful AI to enable action and insight directly on-device, without the challenges of the cloud or requirement of connectivity.

With this newly available technology, it is imperative that manufacturers prioritize using their data for intelligent process improvements to **maximize production capabilities and value**, especially leveraging real-time, edge-based capabilities that bring actionable insights to the forefront quickly and discreetly.

# WHEN IS EDGE AI NECESSARY?

The first question to ask when evaluating a new technology is: *When and where can I apply this to my situation with a meaningful result?* When I discuss use cases with our customers I often reach for **BLERP**. This acronym, coined by Jeff Bier, founder of the Edge AI and Vision Alliance, is a litmus test for whether edge AI is going to help. It consists of five areas of impact for Edge AI : **Bandwidth, Latency, Economics, Reliability, Privacy**.

There are endless industrial AI applications which BLERP can be applied to; here is how we can apply it to the **example of a parts production line** that needs to detect defective parts before they reach the next stage of assembly.



“Armed with BLERP, anyone can easily remember and explain the benefits of edge AI. It’s also useful as a filter to help decide whether edge AI is well suited for a particular application.”<sup>1</sup>

The use of edge AI creates the opportunity to react to data where it happens to prevent common manufacturing issues such as warranty repairs, recalls, failure to meet delivery as well as catastrophic customer issues such as their lost revenue, breach of contract, damage, and more. Our industrial customers are seeing how beneficial the application of edge AI can be for their business.

## INDUSTRIAL BENEFITS OF EDGE AI



With predictive maintenance and defect analysis done at the edge, factory operators have all they need at their fingertips to better organize maintenance cycles, focusing only on the assets that need to be serviced.

This more efficient approach results in the ability for maintenance teams to be better equipped to anticipate production issues and resolve them before they become a problem and result in production downtime.

Additionally, this higher efficiency enables maintenance teams to be more optimized and streamlined, as they can now focus only on the assets that need their attention the most.



<sup>1</sup> Situnayake, Daniel, and Jenny Plunkett. **AI at the Edge: Solving Real-World Problems with Embedded Machine Learning.** O'Reilly Media, Inc, 2023.

# EDGE AI USE CASES FOR INDUSTRIAL ENVIRONMENTS

Our costumers have a wide range use-cases for Edge-AI. We have brainstormed a few here to spark ideas. Successful use-cases aim to take some kind of physical phenomenon and turn it into an actionable insight. If you have an idea which fits the BLERP framework noted above head to the next page to get in touch with our team.

## Smart Manufacturing

- **Reliable production line:** Production line downtime is a profit killer for manufacturing companies; you need to both maximize uptime for your equipment and predict potential issues and downtime
- **Increased productivity:** Visual anomaly detection reduces manufacturing errors and catches them earlier in the process, allowing staff to monitor more sections
- **Improve safety:** Edge AI can check if employees are wearing PPE and adhering to safe practices, or send alerts of danger (over-stacked pallets, excessive loads, shelves aren't loaded well, etc.)

## Smart Logistics

- Enhanced cold chain monitoring
- Accurate delivery timelines
- Inventory control and monitoring

## Green Buildings

- Optimize power usage

## Smart Cities

- Traffic control
- Location analytics for traffic and usage patterns
- Resiliency modeling

## Intelligent Retail

- Location and traffic analytics
- Predictive inventory control based on store and third-party data

## I HAVE AN EDGE USE CASE, NOW WHAT?

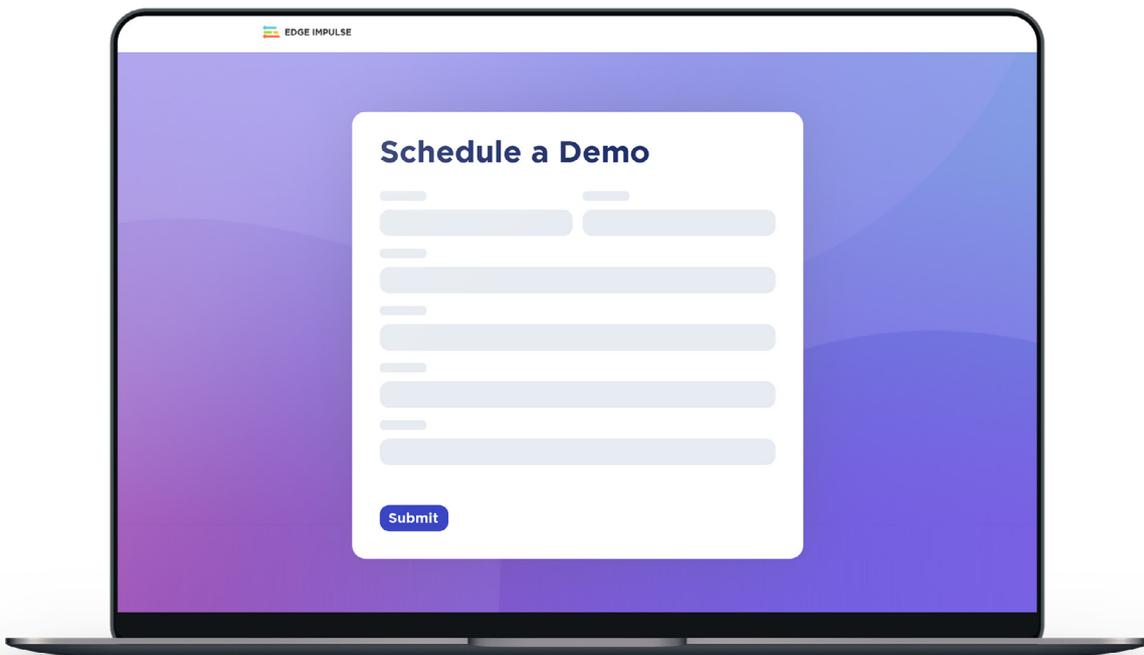
There are many points of entry to the world of Edge AI for industrial environments. Use cases can vary by type of sensors, data, and technical expertise. Each variation has a task and objective that can be supported by the right tools for the right job. Important to note, as every industrial setting is different and the desired outcomes change there is no “one size fits all” model, relevant data is always required. Edge Impulse is designed to make it as easy as possible for your teams to work with your data to bring insights into your environment.

The Edge Impulse platform offers multiple points of entry that can meet you where you are. We’ve helped everyone from system engineers working to create models on the shop floor, without any prior experience, using our approachable UI, to advanced data practitioners with access to years of IoT data creating advanced edge AI pipelines for production with our extensible custom blocks and API.

The application of edge AI in industrial and manufacturing environments offers tremendous value and exciting results. We are always happy to engage with companies to discuss the art of the possible for edge AI in your environment.

Take the next step and

**Request a Demo**





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