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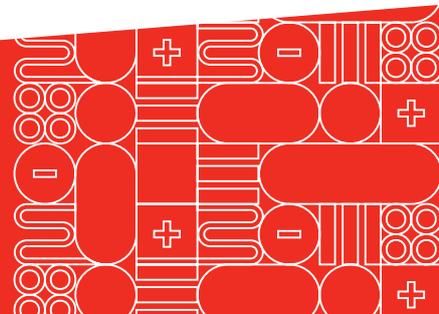
Case Study: How real-time tracking of vehicles is driving competitive edge at Bosch

Connected automated solutions ensure manufacturing transparency and efficiency as well as reliable operations. Read an interview with Industry 4.0 and digitalization engineer Tiago Moura from Bosch Termotecnologia on how their team delivered business results by adopting Eliko's Ultra-Wideband (UWB)-based tracking networks on their factory floor for tracking logistics vehicles.

Background

Bosch Termotecnologia, located in Portugal, is a world leader in water heaters. It is also the centre for competence of the Bosch Group for this product, being responsible for the design and development of new devices as well as production and marketing. In addition to innovative products, the company continuously improves its own processes with the strong support and participation of all its employees. The basis for the company's future growth lies in its innovative strength. *

* <https://www.bosch.pt/en/our-company/bosch-in-portugal/aveiro/>





GOAL

Please give a brief overview of what are you tracking and why?

We are using the location system to track logistics vehicles inside the plant. The vehicles are used to transport material and/or components from the warehouse to production or between production lines. We want to track both manually and automatically operated vehicles.

As our plant has many components, materials and finished goods as well as a large number of vehicles, it used to be hard to know what was happening on the shop floor and make plans in real time. For this reason, we decided to install this location system so that our internal logistics team can have more transparency over their processes. It enables them to be faster in planning, improve route definition and increase efficiency.

PROBLEM

What were the processes like before the real-time tracking of logistics vehicles?

Before the real-time tracking system, our colleagues from internal logistics always struggled to plan their days, improve efficiency and have a clear view of what was happening on the shop floor.

In order to define a new route or confirm the efficiency of an already defined route, they needed to go to the shop floor and follow the vehicle several times, measuring the operation and travelling times as well as confirming whether the path is correct. First, it was time-consuming. And second, in the case of a manually operated vehicle, the behaviour of the operator tends to change under observation.

We also had a system based on RFID cards that allowed the operator to confirm each route performed. It had two main issues:

Establish more transparency over processes on the factory floor to:

- Accelerate planning time
- Optimise route definition
- Decrease distance travelled
- Increase efficiency by avoiding bottlenecks

the first is that we only had two RFID reading points in the plant, so the operator needed to deviate from the actual route to go there, and second, it was a manual task so it was always possible that the operator forgot or missed the RFID reading, resulting in less reliable information.

Logistics uses this data not only to improve efficiency but also for external audits, so it is important to have accurate and reliable data. The real-time tracking system which we have now gives us more confidence to use the data, as the information is now recorded automatically.

What other solutions did you try before implementing UWB RTLS?

We have mainly tested solutions based on Bluetooth and UWB. Bluetooth was discarded due to an internal directive.



CHALLENGE

What is the tracking area like? What challenges were you trying to solve by implementing a real-time tracking system?

We installed the real-time tracking system in our main production building, which has around 10,000 m² to cover. It is also full of manufacturing machinery, from heavy presses and conforming machines full of metal to assembly lines with high aluminium profiles. The first big challenge was to get an accurate system in these conditions.

Even after selecting the technology we still faced challenges in some areas that have more metal density and a reduced line of sight. So, we needed to place the antennas (anchors) strategically in a way that avoids as many obstacles as possible to get the best results.

We studied several real-time tracking systems with different technologies and, in the end, we decided to implement the KIO RTLS from Eliko. For us, it had the best location tracking results, the easiest configuration and the best cost-efficiency ratio.



Tiago Moura

SOLUTION

What were the main technical requirements for the solution?

We wanted a solution where we could track the vehicles not only by points of passage but continuously. As we only want to track vehicles, the accuracy was not the most critical factor, so a deviation inferior to 50 cm should work fine. We verified that the Eliko system retrieves data with to an accuracy better than 50 cm.

Among the UWB solutions, we tested several in lab conditions and selected the two with better results. One of them was the Eliko system. We also tested these two in the production environment. As the results did not differ much in terms of performance and accuracy between the two solutions, the main criteria for choosing Eliko's solution was the ease of configuration and the cost benefit.



Other technical requirements:

- Localise the position of a vehicle in 2D space on a production/warehouse site of 10,000 m².
- The localisation system must have a minimum accuracy of 50 cm, and it should detect the vehicle in low line-of-sight conditions.
- The system must be able to locate several vehicles (>20) simultaneously with no loss in performance.
- The position update rate must be a minimum of 1 Hz, and the system must publish the data through an API accessible via the Bosch internal network.
- It is mandatory that the data is collected and processed on the Bosch network, not on an external cloud or server.
- The system hardware must be connected to the Bosch network using an Ethernet cable.

- The system must be scalable and flexible in order to be able to modify it with as few configurations as possible.
- The system devices must have as few connections as possible (for example, use PoE for supply and Ethernet connection) or, in the case of moving, devices should have a battery with a long lifetime (a charging need of >1 year).

Output data was defined as follows:

- How long it takes to follow the whole path
- How often each vehicle follows the route the way it was designed
- How long it takes each vehicle at each delivery point
- Heat maps for traffic analysis

Could you introduce the kind of solution you have developed?

We have developed a web-based application that consumes the position data from the KIO system. In our application, we can see the vehicles in real time inside our plant and also see historical data. It is possible to associate a vehicle with a tag and define a route with clear operation points for that vehicle. Each operation point defines the time the operator should spend there, and the application automatically calculates the actual time spent based on the position retrieved by the KIO system. It also calculates some metrics and generates some reports for the supervisors indicating the time spent at the operation points, the total route time, adherence to the route, etc.

Have you learned any useful lessons to share with others?

With a system like this, it is essential to plan and design the solution by taking into account the primary goal. We also realised that it is even more critical to prepare the installation and configuration effort needed. Permanent installation requires cabling, network configuration and well-defined anchor positions and installation. Measuring the position of each antenna (anchor) and configuring it accordingly in the system delivers the expected results for accurate location data. If you plan the effort all of this takes, the project will run smoothly.



RESULTS

What are you most proud of?

Investing in a system like this is a challenge, especially with the kind of use cases where it is not so easy to predict return on investment. So, our approach was to start with a pilot, composed only of six antennas, inside the plant where we could track the full route of a vehicle.

By now we have extended the tracking area and covered it with 60 anchors. The system has created transparency that the engineers didn't have – it was previously very hard for them to optimise and improve efficiency.

Our approach was to start with a pilot. With this low investment, we were able to obtain some data and, with the help of industrial engineers, we identified a potential optimisation of one operator per shift based on the data.

Next steps

The fundamental part of the solution is the newly obtained digital real-time overview of movement in the hall. What are your next steps and what other development plans do you have with KIO RTLS?

We already have a useful tool for planning and continuously improving our internal logistics. However, we are still planning

to implement some features on top of what we have right now. We are planning to implement some data analytics and machine learning tools in order to obtain some information from the history data, which give us additional information compared with what we have right now.

About Eliko

Eliko provides UWB-based positioning networks and services for tracking vehicles, people and assets indoors and outdoors. Eliko's mission is to bring game-changing tracking networks to industrial organisations for higher visibility, security and productivity. We empower industrial system integrators who need a reliable location tracking solution partner. Together, we offer end-to-end digitalisation solutions. Eliko is a trusted name in the industry, validated by global leaders such as Bosch, Ericsson, e-Infochips and many others. We grow together with our partners and continuously innovate to offer the most reliable positioning networks for fulling business-critical needs..

Contact us at sales@kiortls.com to discuss your tracking needs.