TELTONIKA | Telematics

TELEMATICS JOURNAL

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FT platform

Meet the future of telematics

Teltonika in Brazil

Global experience with a local approach

Telematics in action

Let the race (and tracking) begin!

Dear reader,

In this edition, we invite you to meet the exciting future – our new Fleet Telematics platform. It is the 5th generation embedded software that we present in great detail through a series of interviews with people who were up-close involved in its creation. Get to know first-hand how the FT platform was developed and what possibilities it brings for you. Rest assured, we are never tired of pushing the boundaries in the telematics industry.

As you flip through the pages, you will find many more interesting articles that we have carefully selected for your attention. This time, ‘Telematics in Action’ takes you to the adrenaline-pumping boat races in New Zealand where the events became safer and better organised thanks to our trackers. Then continue to Brazil and Emile Reche, CEO of ‘Teltonika do Brasil’, will be your guide to our office in São Paulo and local market trends.

All the beloved regular sections, such as ‘Around the Globe’, ‘IoT Insights’, or the latest use cases, are also here. There is always something new to share, so I leave it to discover for yourself what stories are behind them in this edition. Once you are in the mood to predict the future of telematics, ‘Quiz’ is the right place to drop us a line and possibly win a Teltonika sweatshirt.

Thank you for choosing ‘Telematics Journal’ – we are delighted to have you among our readers!

Antanas Šegžda, CEO, Teltonika Telematics

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FT PLATFORM: MEET THE FUTURE OF TELEMATICS

The visionary FT platform is the latest innovation from Teltonika Telematics that sets new standards in telematics and redefines how our trackers are going to work for the years to come.

After proudly presenting it in September 2023, we focus on the FT platform in this issue to give you a 360-degree introduction from different angles and aspects: a first-hand account of developing the new platform, the insider's view on its ingenious yet simple architecture, a behind-the-scenes look at the FT platform-based device tests, the possibilities it brings to our clients and the industry as a whole, and, last but not least, insightful comments on pairing the FT platform with TCT – Telematics Configuration Tool.

Read on and let the future begin! ▶

TAKING IT UP TO THE NEXT LEVEL

First of all, how would you describe the FT platform? What is a platform after all?

For our trackers to work, the following main elements are needed: embedded software, hardware, and computer software used for the tracking device configuration. The same core of embedded software operates on different hardware models and is adapted to new devices – that's why we call it a platform.

We started developing the current platform's embedded software – as represented in the names of our trackers by letters FMB, FMC, and FMM – back in 2015. Since then, dozens of different device models were launched by reusing, updating, adapting, and developing new features on this platform.

Meanwhile, the new platform involves all-new elements. When it comes to embedded software, we have new code, methods, and tools of programming. The new architecture is more flexible and way better ready for changes, introducing new features, and long-term evolution in the future.

In terms of hardware, we have a new-generation microprocessor. Based on the 12-nanometre technology, it allows us to offer a revolutionary sleep mode power consumption, more accurate GNSS, and much more. Finally, there is a new configurator TCT, i.e., computer software, which we made as intuitive and easy as possible for setting-up our tracking devices.

How did the need for a new platform arise?

I can distinguish two main reasons behind it. The first was our willingness to take Teltonika Telematics products to the next technological level – by implementing the above-mentioned elements that all shape the FT platform.

The second reason was the global chip shortage that started in 2020 and made it difficult to manufacture some of our devices. Thanks to our dedicated efforts, we overcame the related issues and were able to deliver products to our customers. The lesson we learned was that we needed embedded telematics software with the main microprocessor that is independent and can be easily moved to another processor when (or if) the next chip shortage comes. This required a new embedded software architecture.

What was the development process like?

We began with a small group of the most experienced engineers to build a strong foundation for the core. Once we had the first working prototypes and tested them in a field with positive results, we enlarged our team. After starting to use Agile and Scrum methodologies, we understood that we needed to deliver the software in stages, launching the most popular functions first.

We divided the whole program into phases and focused on a scheduled delivery, quarter by quarter. We progressed until we were ready to enter the market with the new FT platform-based products FTC921, FTC961, and FTC881. Each quarter we are going to deliver additional features by releasing new firmware versions that can be updated using our FOTA WEB solution.

Speaking of the future, can you give us any details about the FT platform development?

I will give you a hint that I am also very excited about. Some of our future devices will be able to track in the underground parking lots without reaching GNSS satellites.

What is your personal most memorable part of developing the FT platform?

My goal was to make the best GNSS track precision in class. I tested the prototypes and samples of our products on my own car – checking how they perform, comparing them with other trackers, analysing tracks with satellite view maps. When I finally saw that my test result of the prototype delivered a stunningly accurate track outperforming other trackers, I felt very proud of our engineering team that achieved this.

> The new platform involves all-new elements.

Kšyštof Korbutovič, Chief of Innovations group, Teltonika Telematics

FINDING BRILLIANCE IN SIMPLICITY

To start with, could you please describe what is the architecture of the FT platform?

Imagine a three-layer cake. At the bottom, we have the base – a simple, plain sponge cake. The middle layer is filled with cream, chocolate, and caramel. Meanwhile, the top layer has a crumb coat and icing with all the toppings, such as fruit, candy, and nuts. Similarly, we developed the FT platform architecture to look like a layered cake. With this design, we have a base layer and by changing the middle and top ingredients we can bake a cake according to a customer's needs.

What is so special about it and why it is important?

As Bruce Lee said, 'simplicity is the key to brilliance'. FT architecture is unique in its simplicity and simple things are far easier to explain, understand, and maintain. It facilitates implementing changes and allows us to adapt our solution to evolving business demands.

How was it created?

The FT platform architecture is simple but effective, being inspired by one of my favourite authors Robert Cecil Martin and his book 'Clean Architecture'. Robert emphasised five design principles that make software more understandable, flexible, and maintainable. These principles have also been applied in the creation and development of Teltonika Telematics FT platform embedded devices.

Antanas Stankevičius, Firmware solutions architect, Teltonika Telematics

What were the main challenges?

Developing a solution that would be platform-agnostic was the main matter in question that we wanted to address with the FT platform. This means that the same solution would work on different devices with different purposes. FT architecture solves platform-agnostic challenges by dividing the system into layers and assigning to them specific responsibilities, while at the same time removing any knowledge from the upper layers about the implementation details of the lower layers. For example, the base layer fully covers the manufacturer's MCU support, the middle layer contains drivers and underlying services, and the top one addresses specific business needs.

Considering the complexity of the project, what were the key factors that allowed to reach a successful result?

A combination of two factors was the absolute key to creating a successful product: a brilliant, highly talented, and motivated team as well as the complete trust of management to make design decisions that would probably have an effect on Teltonika Telematics devices over the next decade or so.

Was the new architecture designed with our software solutions in mind?

Definitely. We designed a new way of communicating between devices and software, enabling us to change things flexibly, easily, and quickly. Innovative ways of communication will open up new possibilities never seen before in the history of Teltonika Telematics.

What is your personal most memorable part of developing the FT platform?

One of the most memorable moments was at the beginning of the FT project development. It was late 2020 and early 2021 when my colleague and I were bouncing multiple ideas off to each other and drawing architectural designs. We finally came up with the design that just clicked like the last piece of a puzzle. At the time, we did not understand or know what a journey we had started. Over several years of developing the FT platform, we have introduced plenty of quality and product management changes, such as the definition of 'ready', the definition of 'done', static analysis, unit testing, automated testing, system component maintainers, quarterly project planning, and many more. Ultimately, all these changes will make the FT platform products stand out from previous generations and make them the best Teltonika Telematics tracking devices.

> FT platform is designed to adapt to evolving business demands. ”

TESTING FT DEVICES: A CLOSER LOOK

How were the new FT platform devices tested?

The testing of any new tracking device starts with GNSS tests. We perform test drives in different areas and zones such as city centre, old town, outside the city, forest areas, streets in between tall buildings, traffic jams, empty roads, during the day, during the night, and in all seasons. Counting all test rides related to FT devices, we have covered more than 10,000 km, which makes a quarter of the distance around the globe!

How did the tests look in reality?

In our testing car, we removed the front passenger seat to be able to test more devices at the same time. This saved us time and resources, eliminating the need for a number of separate test drives.

How are the accuracy and reliability of tests ensured?

After each test, we discuss lessons learned and renew testing scenarios in order to improve our job and be more effective. We hold regular meetings to review our testing strategies and test cases, brainstorm new scenarios, analyse results, and try to ensure the best performance for every functionality.

Can you share an example of a particularly challenging situation?

One rainy day, a colleague was doing a test drive in the woods and got stuck in the mud. So, another colleague went to help and pulled the test car out. Teamwork helps to overcome any challenge!

What device feature are you most excited about personally?

It is still in progress, but it will definitely be Dead Reckoning. This is an incredible feature that allows tracking one's device in underground parking areas, tunnels, or between skyscrapers – places where there is no clear view of the sky.

Did we carry out tests outside the HQ as well?

Our FT platform devices FTC881, FTC961, and FTC921 travelled to more than 10 countries, including the United Arab Emirates, Morocco, Germany, Italy, Czech Republic, Hungary, Poland, Estonia, and others. Big thanks to our colleagues at Teltonika for going the extra mile and mounting our new devices to perform tests in their own cars!

Dovydas Ivanauskas, Testing team manager, Teltonika Telematics

UNLOCKING NEW POSSIBILITIES

What does the FT platform mean to our clients and telematics industry as a whole?

The FT platform can be described in one word – the future. For us, a company operating in the telematics industry, it is crucial to stay up-to-date with the latest technologies so that we can offer our customers the best hardware solutions and let them be leaders in their respective businesses. Accordingly, the FT platform brings new possibilities for all our forward-looking customers.

Could you mention the new platform's main benefits that set us apart in the market?

To put it briefly, it is all about 'doing better'. Our current product portfolio works considerably well, but our goal is to improve it further. An excellent example is positioning accuracy, which we have increased by 40 per cent.

By means of this, we provide a significant value when tracking near high buildings or in areas where the GNSS signal is poor. We focus on the challenges that our clients face and find solutions to overcome them. I believe it is the main benefit of developing the FT platform and the devices based on it.

How about the most notable features of the new FT platform tracking devices?

This is where we can really boast of such achievements as the previously mentioned highly accurate GNSS, low power consumption, and the ultimate IP69K-rated casing resistance. Dead Reckoning is a particularly important functionality, which will allow vehicle tracking in underground car parks and in other areas where the GNSS signal is weak or completely blocked. Best of all, this is just the beginning. Thanks to the FT platform, our new trackers will 'think' in a different way, helping to bring client expectations into reality.

What can we expect in the future in terms of the FT platform-based devices and their functionalities?

Our aim is to enable the entire current product range to perform better by optimising device functionalities and tailoring them to customer needs. We start with our bestsellers and plan to move gradually the whole FMB platform product portfolio to the FT platform. This does not mean that we will create identical products. Instead, we are focusing on our customers and identifying what they need. Some products will be discontinued, some will be merged, while others will be enhanced. As a result, all products will be created on the basis of demand.

Reading all this, our clients and business partners surely feel excited about the FT platform. Can they already order the new trackers?

Staying in touch is something that we look for. We develop products not for ourselves but for our clients, thus, understanding their needs is vital to us. The first FT platform-based devices have already undergone testing, and we greatly appreciate the feedback provided by our clients. Thanks to their input, we can ensure that these devices function effectively in any region all over the globe.

As for those clients, who read this and consider testing FT devices, we invite them to reach out to their dedicated sales managers. FT devices will be introduced gradually, with different models becoming available at different stages – starting with our bestsellers and culminating with our professional devices. Sales managers are the ones who will have up-to-date information and know the latest advancements in the FT evolution. This is an exciting path that leads us to the future of telematics, so let's embark on this journey and grow together!

> Positioning accuracy increased by 40 per cent. ”

Laura Kondratienė, Head of BASE product development department, Teltonika Telematics

FT & TCT MAKE A PERFECT TEAM: 5 REASONS WHY

Let's take a tracking device – in terms of technology, it holds everything what is needed. However, it would be hard to use it properly and achieve the required goals if it is not set correctly. That's why for an IoT project to be successfully implemented, tracking devices and their configurator should seamlessly work together. We kept this mind all the time while developing TCT – Telematics Configuration Tool should fittingly complement FT platform devices. Here are 5 ways TCT and FT platform work together as a perfect team.

1 TCT is the first Teltonika configurator that supports multiple device types and two generations of tracking devices to simplify the FT platform adoption.

Remigijus Pankevičius, Software developers team lead: "When working on TCT, we had our fair number of challenges and supporting two device generations with two different communication protocols – our existing devices and new FT platform-based ones – was definitely one of them. We had to make sure that implementing one does not 'break' anything in the other. At the same time, supporting both device platforms was a strategic choice to simplify the transition process for our clients."

2 Like the FT feature roadmap, TCT functionality was designed by taking into account customer feedback to make sure we duly address client needs.

Kseniya Dolia, Project development manager: "Before defining TCT development roadmap, we conducted a customer survey identifying client pain points, configuration challenges, and potential new features. Combined with Teltonika Telematics expertise, this feedback allowed us to build the first TCT beta version that was presented to our technical support engineers. After processing internal feedback, we revealed the new solution to a selected group of clients that shared unfiltered opinions and helped us to build TCT the way it is today. What is more, we do not stop there by staying open to communication with clients and improving TCT further."

3 TCT was created with user experience in mind to make device configuration easy for both newbies and IoT professionals.

Matej Puljic, UX/UI designer: "Software as complex as TCT is not something most UX/UI designers face very often. After studying thoroughly how Teltonika Telematics devices are set up and communicate with configuration software, we decided not to focus on 'flashy' design. Instead, we aimed to have a simple, clean, and modern user interface. By focusing on first-time users, we followed the rule 'if it takes more than 10 seconds to understand a feature, its design should be simplified'. At the same time, more advanced options had to be available too. I'd say the introduction of presets for certain configurations is one of the best examples how we managed to keep this balance."

Rokas Šimkus, Front-end developer: "Front-end developers and UX/UI designers always collaborate closely, as we are the ones who take components and layouts created by the designers and translate them into code. Their insights into user behaviour and design aesthetics greatly influenced the final version of TCT. The iterative feedback process ensured that we were always aligned with the project's goals, resulting in a more user-friendly and intuitive interface. By testing TCT on various devices and screen sizes, we ensured the application's compatibility and adaptability."

4 Both TCT and FT platform teams put an emphasis on improving and automating product testing to provide a high-quality solution for our clients.

Rytis Mačiulis, QA engineer: "Unlike manual testing, automated tests swiftly and reliably execute a diverse range of scenarios, minimising human error and promptly identifying software bugs. Additionally, automated tests enhance productivity by eliminating monotonous tasks and can be scheduled during non-working hours, optimising time usage. It's a win-win outcome for both us and our clients, as we can deliver high-quality software solutions in a shorter period of time."

5 Both TCT and FT are future-proof solutions that will evolve further based on customer feedback and technological progress.

Valdemaras Čelkis, Product owner: "Our vision is to ensure that TCT is not limited to a single operating system of Windows, but rather is available and optimised for a wide array of platforms and interfaces. This expansion will broaden the accessibility of the current user base as well as provide a consistent and user-friendly experience across the dynamic digital ecosystem. Also, we will continue making TCT easy to use. For example, we plan to expand the device set-up guide by creating more interactive tutorials that assist new users in familiarising themselves with the device features."

The success of TCT and FT platform is not a matter of chance. The following words by Valdemaras serve as a perfect conclusion: "The key success factors are teamwork and cross-department cooperation. It is the collaboration among development, design, quality assurance, and project management departments what brought and continues to bring together a range of expertise and viewpoints. In turn, this diversity encourages innovation and problem-solving by considering various angles and options."

LET THE NUMBERS DO THE TALKING

Here are some of the fascinating facts and figures that you may not have known about the latest FT Platform from Teltonika Telematics – the core element in the development of our next generation of GPS trackers.

1.4x

Unmatched accuracy:

Benefit from up to 1.4 times greater GNSS positioning accuracy, so you know where your fleet assets are at all times.*

4x

Efficiency redefined:

Experience longer performance with slower drain thanks to a more than 4 times reduction in power consumption in Ultra Deep Sleep mode.*

2x

Breaking barriers:

Get the most out of satellites data with their average number in use increased by up to 2 times.

IP69K

Ultimate durability and protection:

Count on the IP69K-rated waterproof casing for robust protection in even the harshest environments (available only on selected models).

360,000+

Man-hours of combined embedded programmer time:

Yes, it is a mammoth task but that is the way we stand out from the crowd, succeed, and stay competitive in a global market.

*The results presented are based on the thorough testing carried out by Teltonika Telematics R&D team.

LET THE RACE (AND TRACKING) BEGIN!

Boat racing in New Zealand is an event to behold! From April to July, every year there are six weekly races of varied styles and locations that include marathons to river and open water circuit racing. However, it is as thrilling as challenging, and telematics gives a much-needed helping hand here, making the whole experience more convenient and safer for both organisers and participants alike.

Traditionally, race officials watched from towers, timed the races, and filled the documents manually. Being prone to human errors, this way of handling racing data was not always accurate. Also, there were safety concerns due to remote race locations. It was hard to spot accidents or technical faults unless they happened within direct sight of watch towers.

The potential risks did not end with races. After the events, patrol boats faced collision risks, and stuck boats remained unnoticed, posing risks to the drivers. Our client saw these challenges in the racing industry and identified an opportunity to address them effectively.

The telematics way of racing

A tracking solution was introduced to change things for the better. At the beginning of the race season, registered vessels receive pre-configured FMC130 trackers for installation. These devices help keep track of boat locations, providing live visibility and making races safer.

That is not all – the tracker interface was modified to automate race reporting. Here is how it works: the system references the API (Application Programming Interface), pulls data into a usable format, and organises boats within geofenced racetracks with checkpoints and automatic leaderboards. Now you know who's on top!

With our GPS tracking devices employed, boat races in New Zealand have undergone a remarkable transformation. There are virtual marine racetracks, automated checkpoints, leaderboards, and precise winner tracking.

The solution also acts as a safety net by providing real-time location visibility for all registered boats throughout the race.

A clear winner

Teltonika Telematics GPS trackers were chosen for this project because of their robust design and advanced features. Competitor devices were tested too but they appeared to be either too slow or too expensive for the organisers. Another key factor in this case was the easy configuration and installation of our tracking devices.

That's how we make waves in the boat racing industry!

> That's how we make waves in the boat racing industry!

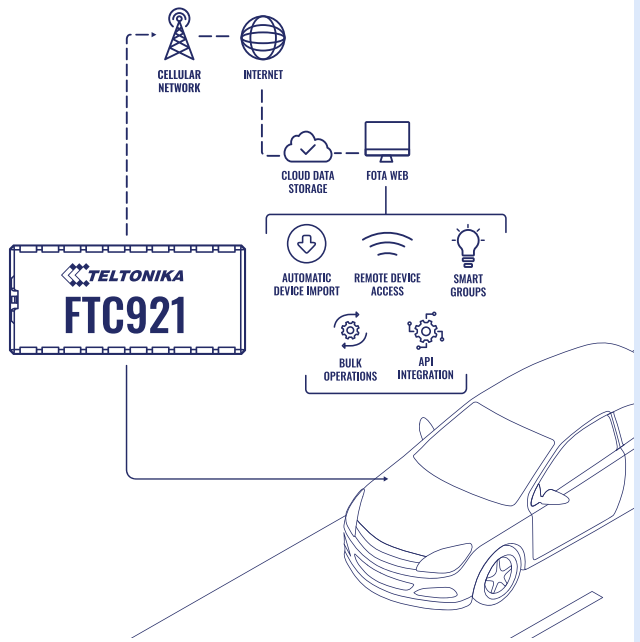
MAXIMISE FLEET BENEFITS WITH FOTA WEB, TAT240 & TFT100

Expand the possibilities and gain the competitive advantage of your IoT projects with the latest telematics use cases. These range from the deployment and maintenance of Teltonika GPS trackers with the sophisticated FOTA WEB tool to rental equipment tracking with the newly launched tamper-proof TAT240* model and smart electric battery swapping monitoring solution.

These use cases have been specially designed to improve the operations of your telematics business. We are confident that you will find them not only captivating and practical but also beneficial in broadening your corporate potential and fostering new ideas for future IoT projects and business success.

GPS tracker deployment and maintenance with FOTA WEB

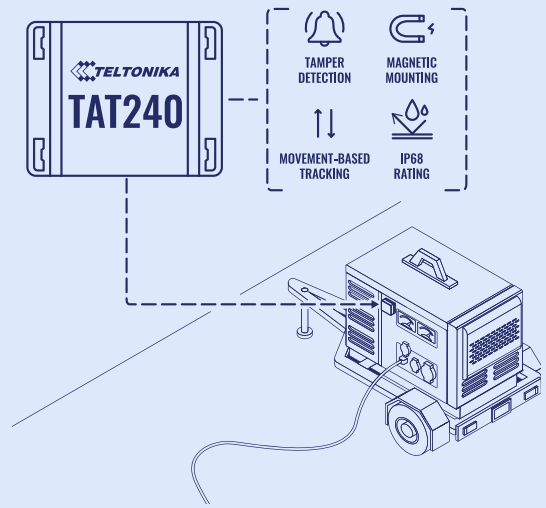
Did you know that the average service provider manages around 5.6 thousand IoT devices belonging to multiple end customers? Vehicle telematics is a fast-growing industry, with a global market size estimated to reach $280.78 billion by 2030. The way to reduce operational costs is to implement a GPS tracking device management solution that offers scalability and remote access to the hardware installed in a customer's fleet. Handily, Teltonika Telematics offers all of its GPS trackers with FOTA WEB – a versatile cloud-based device management platform.



Tracking rental equipment with tamper-proof TAT240*

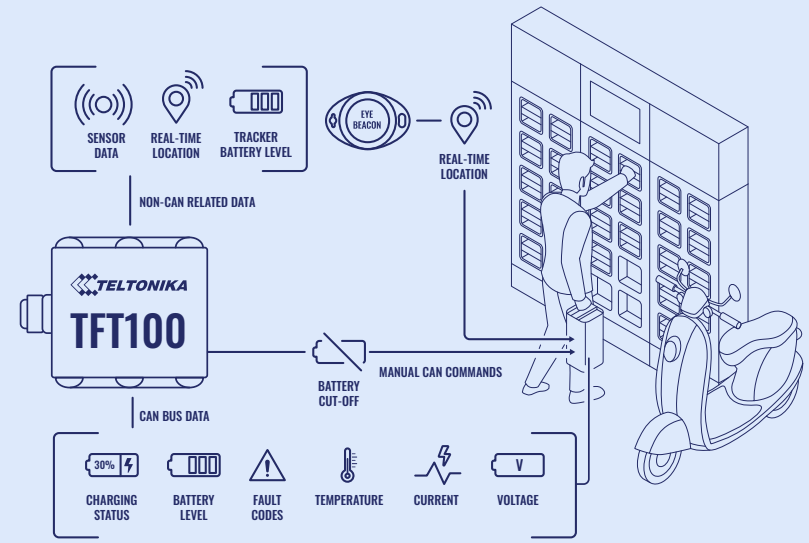
Sadly, companies involved in the growing equipment rental business are faced with the increased risk of equipment theft. There are many reasons why it is relatively easy for thieves to target these assets, including a considerable time in transit, rental under false identities, and not sufficient effort by the renter to secure the equipment. This can lead to project delays, missed deadlines, reputational damage, lost revenue, cancelled contracts and/or downtime.

Teltonika Telematics has developed a tamper-proof wireless tracker TAT240, which can provide maximum security for this type of equipment.



Monitoring of the electric battery swapping

Are you aware of the battery swapping feature, which allows electric two-wheeler (E2W in short) users to replace quickly a discharged battery pack with a fully charged one? It is designed to help E2W riders avoid downtime, eliminate restrictions, and prevent battery degradation. The concept is for the battery swapping stations to be fully automated, safe, and monitored, and Teltonika Telematics has a solution to help with this.



*Coming soon

IMPROVING YOUR EXPERIENCE

Did you know that there are over 90 use case articles published on the Teltonika Telematics website and counting? As we are constantly (and quite rapidly) expanding our product portfolio, we have revised and updated our use case categories to reflect these changes. The new ones conveniently correspond to the most popular industries we work with and help you better navigate our website and find what you are looking for – the right use case for your next project.

Fleet telematics

Combining the best of telecommunications and information technology, telematics offers unique ways to monitor vehicles. From motorcycles to heavy trucks and lorries, from a single car to large fleets, there is a solution for every customer. Telematics is the key to effective resource management, cost optimisation, and safety in a wide range of industries.

Logistics & delivery services

Modern logistics requires a considerable amount of information to optimise business. It is not enough to know the GPS coordinates of a vehicle's current location. With fuel consumption, mileage, and many other parameters at your fingertips, you can effectively manage your fleet resources. No expense will go unaccounted for.

Car sharing, rental & leasing

Knowing the current location, status, and history of vehicles is critical for all car-sharing and rental companies. Gain full control of your fleet with our solutions – prevent theft with remote vehicle lock management, receive notifications of possible contract violations, and monitor driver behaviour and areas where vehicles are driven.

E-mobility management

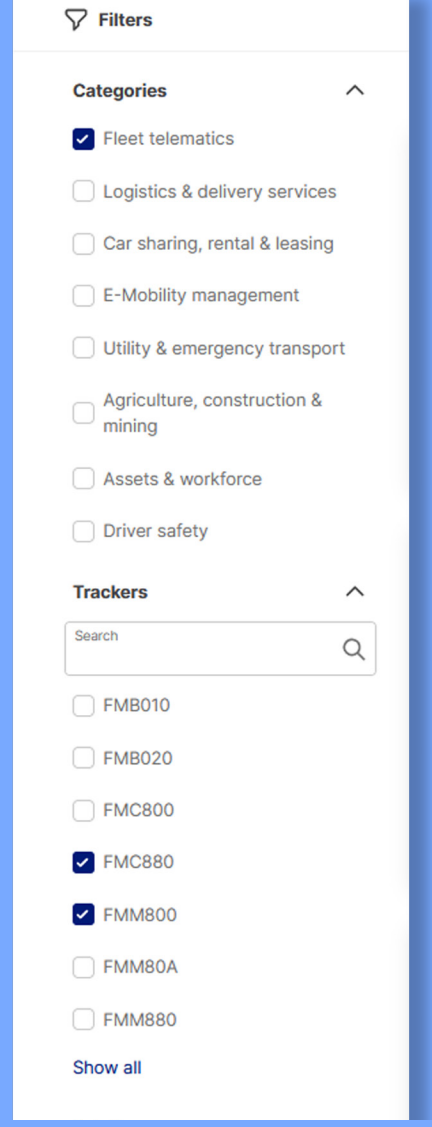
The GPS trackers that provide accurate location reporting, remote lock/unlock, battery level and status data, etc. From sharing services and fleet management to anti-theft and cargo delivery applications, these devices are ideal for e-scooters, e-bikes, e-forklifts, and other smart electric vehicles.

Utility & emergency transport

The safety and quality of life of our society depends to a large extent on the ability to manage properly the transport of utility and emergency services. Thanks to our solutions, operators always know the current location and status of all vehicles, including maintenance machines, ambulances, police fleets, etc. With the help of advanced tracking technology, timely responses to unforeseen situations and efficient routine operations can be effectively ensured.

Agriculture, construction & mining

Our innovative telematics solutions give you full control of agricultural machinery by knowing its current location, driver activity, and other vital information. Similarly, managing construction and mining equipment is a complex task that can lead to huge costs if not managed properly. The benefits of using GPS trackers include protecting your equipment from theft, reducing fuel costs, and improving safety. ▶



Find the right use case for your next project.

Assets & workforce

There are countless fleet assets around the world that are difficult to track and locate manually. Teltonika asset GPS trackers are designed to monitor effectively such items and provide additional protection against theft. Besides, autonomous workforce tracking devices ensure the personal safety of vulnerable people and those who carry out activities without close supervision by others, such as healthcare, maintenance, social, and lone workers.

Driver safety

In the dynamic landscape of vehicle telematics, ensuring driver safety is paramount. It underlines our commitment to making journeys safer, smarter, and more efficient. By harnessing the power of telematics, Teltonika GPS trackers and accessories help monitor driver behaviour, predict potential hazards, and ultimately protect the most valuable asset of all – people.

Latest use cases

NAVIGATE USE CASES IN SECONDS

For the convenience of our website visitors and customers, we introduced use case filtering feature. There are almost a hundred such articles published and more are coming. Readers now can quickly filter them by relevant categories (or industries), GPS tracker models, solutions, and accessories, helping them to navigate our website more easily and quickly. Happy browsing!

EXPLORING THE CUTTING-EDGE NAVIGATION

Welcome to the world of advanced navigation, where precision and reliability meet innovation. Below, we unfold the fascinating technology behind dual-band GNSS and the sophisticated Dead Reckoning feature. Fasten your seatbelt as we dive into these game-changing advances that will revolutionise the way we navigate.

Dual-band GNSS

Dual-band refers to two different frequency bands, L1 and L5, used in Global Navigation Satellite Systems (GNSS) that include GPS (United States), GLONASS (Russia), Galileo (European Union), and BeiDou (China).

L1 Band: This is the original GPS frequency utilised since the system was made available for civilian purposes. It operates at 1575.42 MHz and is used by a wide range of civilian GPS receivers around the world.

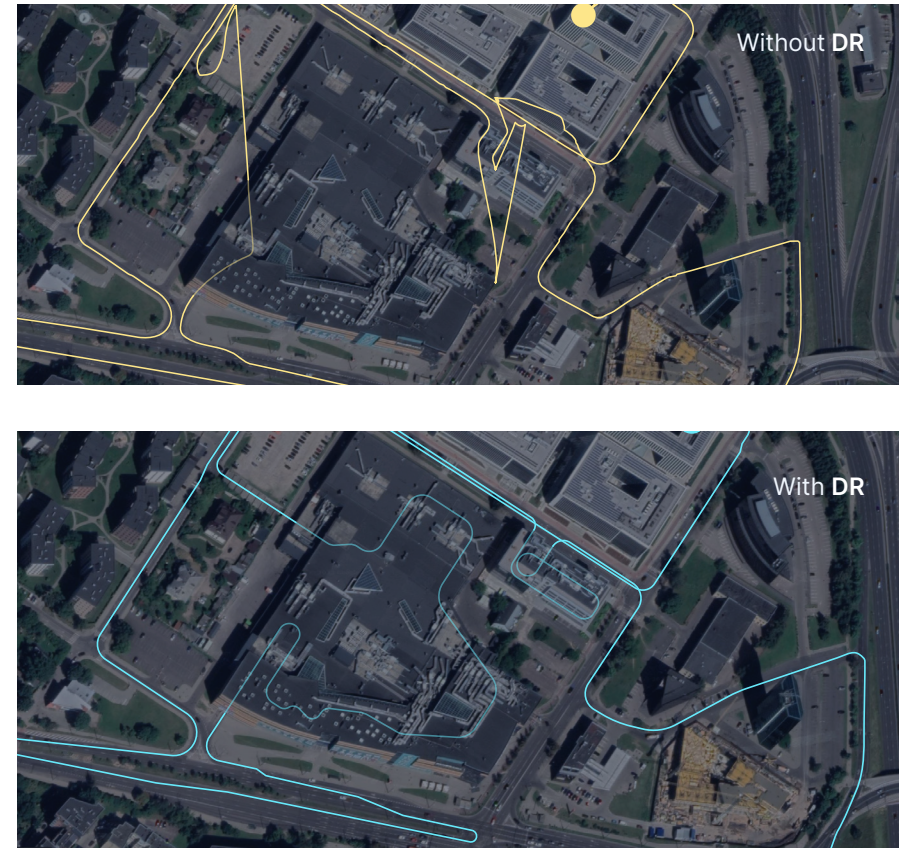
L5 Band: This is a newer frequency band added to enhance the GPS, operating at 1176.45 MHz. It is intended for use by more advanced systems and is designed to be more resistant to multipath interference, where signals bounce off surfaces before reaching the receiver, causing errors. The L5 frequency is also transmitted at a higher power, making it more resistant to both interference and jamming.

As the GNSS infrastructure continues to be modernised with satellites broadcasting on multiple frequencies, dual-band receivers are becoming more common in high-precision navigation equipment.

Even more, the dual-band GNSS is increasingly being employed in mobile phones to provide more accurate positioning. The use of both L1 and L5 signals can help reduce multipath errors, which are common in single-frequency systems and can lead to inaccuracies of up to 5 metres. By applying dual-frequency GNSS, the accuracy of position determination can be significantly improved, potentially down to a tenth of a metre.

Where do we stand on this?

Despite the proven success of our existing solutions, we believe there is always room to push boundaries and elevate performance. Teltonika GPS devices that come with L1 and L5 dual-band GNSS receiver (e.g., FMx880 and FMx650 series) offer higher accuracy and precision in tracking, enhanced reliability, faster fix times, and better coverage.



FT platform prototype tracker with Dead Reckoning feature, compared to FMB tracker.

By incorporating the L1 and L5 GNSS receiver into the FMx880 series, we aimed not only to meet but to exceed industry standards. Our dedication to progress ensures that our customers consistently benefit from the latest advancements. Why is this precision so crucial? Consider scenarios where vehicles are parked near towering buildings, which can significantly impact the quality of tracking.

In such instances, the receiver ensures that the vehicle's exact location remains reliably traceable, despite potential interference caused by tall structures. One of the most compelling use cases for this technology is in car-sharing services. Imagine a vehicle parked next to a skyscraper. Thanks to the enhanced satellite connectivity of our devices, the precise location of the vehicle is consistently maintained.

Moreover, in insurance telematics, the accuracy of crash trace data is vital in determining fault. The reliability of the L1 and L5 GNSS receiver ensures that the data relating to the incident is captured correctly, allowing a fair assessment of the events.

This dual-band component is very promising. Comparing the FMx880 series with their 2G analogue counterparts, we have achieved twice the GNSS accuracy. This higher accuracy significantly improves the route

quality, which is particularly noticeable at lower speeds, especially in city centres or old towns with dense infrastructure.

What's more, the devices received initial fixes more quickly in different environments. The tests also verified the ability to use up to four different satellite systems simultaneously.

Dead Reckoning feature

Dead Reckoning is a fundamental navigational feature used in a variety of fields, including aviation, marine navigation, and robotics. It involves estimating your speed and course over the ground and then using this information to assess your position along your course at any given time based on how long you have been travelling.

The future position of a tracking device is calculated by extrapolating information about past positions, travel speed, and intended destinations. This enables more accurate positioning in environments where GPS signals are partially or completely blocked.

In the automotive industry, this feature allows GPS trackers to estimate their location even when signals from satellites are unavailable or too weak. Dead Reckoning is intended to be used in tunnels, underground car parks, or dense urban environments. This is how Dead Reckoning works with vehicle trackers.

Starting position: The system starts with a known position, typically provided by a GPS fix.

Sensors: To maintain an updated position, the device uses various sensors (e.g., gyroscopes, accelerometers, and the like).

Data fusion: The information from these sensors is fused, often using a Kalman filter or other algorithm, to estimate the current position. This process compensates for when the vehicle is out of GPS range.

Continuous updates: The Dead Reckoning system continuously updates the estimated position at short intervals using changes in direction and speed.

GPS correction: When the GPS signal is re-established, the system corrects any accumulated error in the Dead Reckoning estimate by re-aligning the estimated position with the actual GPS position.

Furthermore, Dead Reckoning is a valuable technology for enhancing the location capabilities of mobile phones. However, it is typically used in conjunction with GPS to provide the most accurate and reliable location services.

Where do we stand on this?

The clever and innovative Dead Reckoning feature is now in development and will be available to our customers and business partners on Teltonika FT platform GPS trackers in the second half of 2024. When launched, it will provide consistent navigation and tracking regardless of terrain.

This feature on our new FT platform GPS trackers is highly important, especially for businesses that want to keep an eye on their vehicles wherever they are. It is particularly useful for car sharing, where it can be difficult to find a vehicle parked in tricky locations, such as underground garages or near large buildings. Dead Reckoning also comes in handy when continuous tracking is required. If a vehicle enters a tunnel or other location where GPS signals can be interrupted, Dead Reckoning continues to work.

GLOBAL EXPERIENCE WITH A LOCAL APPROACH

For a big country – a local team of people with big ambitions and big achievements. Meet our office in Brazil, the largest country of South America, in the company of Emile Reche, CEO of 'Teltonika do Brasil'. We go all the way since the very beginning in São Paulo four years ago till the latest telematics trends in the country nowadays.

Could you start with the establishment of Teltonika office in Brazil and briefly introduce its development until today?

'Teltonika do Brasil' was founded back in December 2019. We started with 6 brave employees who faced the great challenge of conquering the biggest market in South America! Not long after opening the office, we were overwhelmed by the global pandemic that had an undeniable impact on businesses worldwide. It changed the course of plans and expectations for Brazil office too, but we remained focused and motivated to continue working safely from home.

Despite the challenging start, shortly after the things settled down, we were back together at the workplace. Our efforts during the pandemic paid off as we expanded the team and moved into a brand-new office in 2021, marking our significant progress in sales. 'Teltonika do Brasil' was well-positioned to keep succeeding in the market.

Since then, we have established a strong presence in the country, built a large customer base, strengthened relationships with clients across Brazil, developed a local product portfolio, explored the most relevant use cases, and enriched knowledge of our talented team. We are really excited to contribute to Teltonika growth in the coming years, by harnessing the vast potential of Brazil market.

How about the main challenges and achievements?

Being such a big and populous country, Brazil surely brings challenges along too. Here, we face some obstacles related to the ▶

Emile Reche, CEO, Teltonika do Brasil

complex taxation system, bureaucratic customs processes, and certifications. Besides, there are certain challenges related to hiring as well as rather common business issues, such as dealing with intense competition, the lack of awareness of IoT solutions in some regions, and meeting the unique needs of customers in Brazil.

Nevertheless, we managed to build strong relationships with partners, which allowed us to facilitate most of the procedures locally. I must say that the most important factors in overcoming any obstacles are a talented sales team that is close to clients, great technical support assisting in local language, and a constantly evolving HRD team.

Also, challenges keep us driven towards reaching achievements, which in these 4 years of existence are numerous and we are proud to share: a strong technical support team, the growth and diversity of our sales and back office teams, internal career jumps, the expansion of our product portfolio with locally certified devices, and, of course, the accomplishment of efficiently helping our clients – with many more to come in the future.

What are the recent telematics trends in Brazil market?

The market in Brazil is very oriented towards basic tracking and car recovery for insurance and rental companies, which accordingly leads to the needs of workforce fleet management, motorcycle tracking, and secure engine blocking.

At the same time, we recently see that clients look for solutions in video telematics as well as driver identification solutions via RS232 or 1-Wire. There is a vivid necessity to receive information in the platforms through a transparent mode with serial ports as well as to use keyboards in trucks. The trend is that our customers pursue more advanced solutions to offer to the end clients. For example, CAN data reading gives additional value by improving efficiency and lowering the end client's operations costs.

Could you tell us what are the key selling points of Teltonika Telematics in Brazil market?

Definitely. First of all, having a local office and technical support assisting in the local language are the key points that allow us to build real connections through client visits and taking part at various industry events. Furthermore, our robust trackers, remote device management solution FOTA WEB, local stock availability, and warranty conditions are those advantages that our customers appreciate the most.

What are our most popular tracking devices and their use cases in Brazil?

The choice is quite extensive here. Talking about FMx130 series trackers, they are mainly popular due to such features as 1-Wire driver identification, blocking engine, temperature measurement, opening/closing doors remotely, measuring fuel, and green driving. Meanwhile, those who require OBD data reading choose FMx003 tracking devices.

> Our customers increasingly pursue more advanced solutions. ”

As it was already mentioned, our bestseller FMB920 is widely used by insurance and car rental companies for stolen vehicle recovery. Other usage scenarios include workforce fleet management to ensure that routes are followed until completed, motorcycle tracking, and blocking engine. When it comes to more advanced applications, the favourite ones are FMx125 trackers and FMx130 series devices with CAN adapters.

Teltonika HQ is located in Lithuania, very far away from Brazil. How do you see the cross-cultural aspects of work?

We are well-adapted to such working conditions as we are a multicultural and diverse team in Brazil itself. It is actually very motivating to have colleagues from different cultures, backgrounds, and management styles. This way, we learn a lot from each other. Also, especially after the pandemic, we got used to communicating via conference calls, thus, we feel close as a team even when being apart physically.

To conclude, we share great collaborative environment, exchange experiences and ideas, engage in social initiatives, organise various activities, and truly enjoy what we do!

EAST EU

IS THE METER RUNNING?

In the taxi industry, a major challenge is maintaining fair and transparent operations. Many taxi fleet firms focus on securing a proper use of their vehicles and – at the same time – eligible and sustainable activities. To assist with this, a smart solution was implemented by connecting our FMB125 tracker with the vehicle's operating taximeter.

This setup allows for gathering essential information, such as vehicle's location, its speed, and whether the taximeter is activated during a journey. With FMB125 device, data is transmitted through RS232 interface to a server. Essentially, our GPS tracker acts as a router, relaying information from the taximeter to the server.

This way, companies can now track their taxi fleet mobility and sustainable operations, while enhancing reliability and efficiency in everyday use.

Mindaugas Ambrasiūnas, Sales manager, Teltonika Telematics

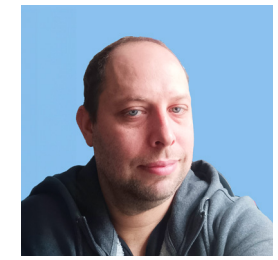
It is an example how combining advanced telematics with regular taxi equipment can make businesses run better, more transparently and productively.

CENTRAL EU

LOCALLY YOURS

Poland is one of the finest examples how Teltonika Telematics stays close to its clients. With increasing sales in the country, the number of support inquiries increased as well, so we welcomed two local technical support engineers in our team without any hesitation. Adam and Janusz, our Polish-speaking colleagues, started by focusing on the inquiries originating in Poland but soon expanded their expertise to assist business partners throughout Central Europe.

The roles are various – from addressing customer queries to conducting product tests and troubleshooting. Moreover, they play a crucial role in preparing and delivering training sessions for our Polish clients. Adam notes: "Keeping in mind our responsibilities, it is essential for us to possess both in-depth technical knowledge and strong communication skills. By speaking the local language and understanding the market's context, we build tighter, more meaningful connections with clients."



Janusz Kosko, IoT solutions engineer, Teltonika Telematics

> Every question we handle, every problem we solve, brings us closer to our clients.

The work of our team in Poland showcases the importance of matching technical expertise with a deep apprehension of regional needs. Janusz adds: "Every question we handle, every problem we solve, brings us closer to our clients. It is not just about technical support – at the same time, we foster a culture of responsiveness and innovation, helping our clients no matter where they are."

So, whenever you have any questions about our products or need assistance, please do not hesitate to reach out and say 'dzień dobry' to us. We are here to help you!

Adam Obstawski, IoT solutions engineer, Teltonika Telematics

MEA

A NEW BARISTA IN TOWN – FMC125

You might think GPS trackers are only used in vehicles, however, the field of telematics is constantly evolving. Every day we continue to be amazed by the creativity of Teltonika business partners who use our devices in a variety of ways – even for brewing a perfect cup of coffee.

One of our clients in the United Arab Emirates combined FMC125 tracker with coffee machines to overcome such challenges as manual maintenance issues, delays in reporting machine malfunctions, and quality complaints, all of which led to customer dissatisfaction.

With FMC125, it was made possible to monitor the water level in a machine, ensuring there is always an optimal amount of it. This is crucial for the quality of coffee as otherwise the drink can easily be ruined. Once the water level has to be adjusted, the device alerts staff to take an immediate action.

Another common complaint was running out of coffee beans. Now, whenever a refill is needed, Teltonika tracker sends a notification, making sure that the machine is always stocked and ready to serve customers.

Ramiz Katbani, Chief of sales, Teltonika Middle East

Coffee machines can present a range of error codes indicating various issues that, if ignored, might lead to breakdowns. FMC125 keeps track of these errors and provides diagnostics for preventive maintenance, while also helping to schedule the upkeep activities based on the collected error data and, thus, extending machine lifespan and usage.

Finally, it is vital to know the exact location of the equipment for its efficient servicing and maintenance. Thanks to our trackers, technicians can always locate the machines quickly and easily. Moreover, they can be tracked if moved from the designated spot without authorisation, which could indicate theft or misuse.

AUSTRALIA

A TRUSTY GUARDIAN FOR YOUR LOVED ONES

Supporting people with disabilities and improving their quality of life? This is exactly what telematics does in Australia, helping the National Disability Insurance Scheme, or NDIS, to enhance the independence and community engagement of individuals that need extra care.

Families and registered caregivers found it difficult to oversee the services delivered by support workers, particularly when disabled people were non-verbal and unable to communicate their experiences. There was no easy way to confirm the suspicions that some support workers were not performing their duties to the required standard, thus, leaving a gap in the safeguarding measures provided by the NDIS.

Letitia Scott - Gozman, Marketing manager, Teltonika Australia

To overcome this challenge, a tracking solution was introduced, so that families would know where their disabled relatives were and what they were up to. FMC230 tracker in combination with our partner telematics software proved to be a cost-effective and efficient solution to monitor the location and movements of electronic wheelchairs.

Our device is easily connected to the wheelchair's battery, requires no extensive configuration, and allows immediate use.

Also, it is durable, water-resistant, and works well with the battery systems in most electronic wheelchairs. Families can now ensure that their loved ones are safely transported while support workers are fulfilling their responsibilities. At the same time, the detailed reports from the tracker serve as a proof that the NDIS funds are being used right, promoting transparency and accountability.

No doubt – FMC230 made a considerable improvement in caring for people with disabilities, allowing families to feel more confident and secure about the services their relatives receive.

INDIA

NEED A TRACTOR? GET THE APP!

Car sharing is a well-known concept, but there is an idea of sharing tractors and it's gaining ground in the west of India. Here, farmers often face a shortage of the machinery they need – even when available, it is not always used to its full potential. This problem turned out to be an opportunity for one of our clients who came up with an innovative mobile application.

Many farmers in the area lacked access to tractors, some of which, at the same time, were not used effectively. This sparked an idea – an app inspired by car-sharing services but focused on agricultural vehicles. Tractor owners can list their equipment and farmers in need can reserve a time to use it. The best part? Farmers are charged for exactly how much they use the tractor.

To ensure the system worked well, Teltonika FMx920 trackers were chosen as the hardware solution. Standing out for its reliability and affordability, this device enabled accurate billing and effective monitoring of agricultural machinery.

Nishad Ali, CEO, Teltonika India

With this clever technology, agricultural tasks are completed more efficiently as farm vehicles are being employed more frequently and productively. Clear invoicing procedures have fostered trust in the service, while the ability to keep tabs on the machinery guarantees its proper use.

AFRICA

JOIN & LEARN – WORKSHOPS IN AFRICA!

At Teltonika, we believe in the power of knowledge sharing. How does it look in practice? In 2023, we held two workshops in Africa – namely, Kenya and Uganda – inviting our client engineers to attend.

The goal of these events was to give the participants all the needed skills to set up our devices themselves. Our IoT engineers showed how to connect different types of inputs and sensors with our advanced trackers. Live demo was one of the absolute highlights to see with one's own eyes how CAN data is received.

The agenda was based on our most popular devices in Africa and the most frequently asked questions about them. Although designed for engineers, these workshops welcomed all representatives from our clients who wished to join. Learning new things never hurts!

Given the encouraging feedback, we plan to extend these workshops to Nigeria and, considering their success in Africa, to other regions and countries as well. By offering this kind of know-how sharing, we aim to reach people in different places and help them to use our tracking devices to the fullest.

Elvis Mogaka, CEO, Teltonika Kenya

WEST EU

A SHORTCUT TO MOTORCYCLE SAFETY IN SPAIN

Based on the Catalan Traffic Service data, the year 2022 witnessed 18% of road accident victims in Catalonia, Spain to be motorcyclists. Moreover, the country faces a significant problem with motorcycle theft: a bike or a moped is stolen every 8 minutes as reported by Rastreator. A local family business took the initiative into their hands and, in collaboration with government institutions, came up with the idea of a phone app to track two-wheelers in real time.

However, realising such a vision required more than just software. This is where Teltonika Telematics entered the picture with a hardware solution. After trying out various GPS trackers, the client decided to choose FMB965. With a robust and reliable IP67-certified casing as well as a powerful internal

Justina Tumaitė, Sales manager, Teltonika Telematics

battery, this device was a game-changer for the business. Our client combined their software with our GPS tracker to create a live mapping system that significantly reduced motorcycle theft by enabling a quicker recovery of stolen motorcycles. Using this system, the police were able to stop thieves much more efficiently. The company believes that 50% more stolen motorcycles are now being recovered compared to the time before the tracking system was installed. Finally, it is important to note that the partnership with Teltonika Telematics has generated nearly 5 million Euros in revenue and led to about 2,000 device installations every month.

Our client's journey from a simple idea to a successful implementation shows how much can be achieved with the right partner and technology.

FMC00A & FMM00A

OBD tackers tailored for North America

NORTH AMERICA

PLUG, PLAY & SAVE COSTS!

Telematics in North America is taking a user-friendly turn – thanks to Teltonika Telematics. We are changing the game by focusing on easy-to-install trackers and the configurator tool with an intuitive over-the-air device management system. In a market where installation and operating costs are considerably high, we are taking big steps to help our clients save resources.

Teltonika stands out by offering Plug & Play trackers, which are easy to set up, simple to update, and adaptable to different situations. This means users can prepare their tracking systems quickly and without any hassle, right out of the box. It is a straightforward approach that saves time and money for businesses large and small.

In North America, many businesses choose telematics resellers who provide everything that a fleet owner needs in one package. This includes a ready-to-use tracker with a preinstalled SIM card and connected battery along with the tracking platform as an all-in-one solution. It is all about getting customers up and running fast.

By being committed to simplifying the telematics experience in the USA and Canada, we focus on providing tracking equipment that can be installed by almost anyone – no need for engineers or special tools. This way, a wide range of industries can have convenient access to advanced telematics.

Gediminas Leknickas, Development coordinator for North America region, Teltonika Telematics

> We focus on providing tracking equipment that can be installed by almost anyone.

PICTURE THIS

STEP IN BEHIND THE SCENES!

Looking back at the Fleet Telematics platform premiere in September 2023, it is obvious that the result of our hard work over the past two years needed a special launch. We were thrilled to deliver it, creating the event that fully matched the innovation and dedication behind our product.

During the meticulous preparation, we focused on every aspect and detail to ensure a pleasant experience. We revealed FT platform's development, advanced architecture, our latest devices, their innovative features, and user-friendly software solutions.

Did you miss the grand premiere? Scan the QR code and watch it now to discover our visionary FT platform.

FT platform video

BUILDING THE FUTURE

Teltonika High-Tech Hill technology park – the project of a total investment of EUR 3.7 billion by the year 2033 – is taking shape at full pace in Vilnius, Lithuania. In August 2023, the construction of the cutting-edge printed circuit board manufacturing plant began and the production facility is scheduled to go into production in early 2025. This is just one of the ten projects in the upcoming technology park envisaged and developed by Teltonika company group.

SMALL BUT VITAL

A printed circuit board, or PCB, is an essential part of the many modern electronic devices, including Teltonika company group products. It is the base on which various components, such as semiconductor chips, are placed. Despite the ever-increasing demand for electronic devices, there are few PCB plants in the region, thus, this project is crucial for Teltonika company group to develop further.

The PCB factory is going to be one of the most advanced of its kind in Europe. Covering an area of more than 33,000 square metres, it will ensure the highest level of automation and meet the strictest environmental standards. The lion's share of the EUR 143 million budget will be invested in specialised manufacturing equipment – negotiations with potential suppliers from Germany, Italy, and Japan as well as ordering the required machinery are already under way.

To be operational in early 2025, the new factory will house around 250 highly skilled specialists. This is how we will be able to reduce lead times, minimise supply chain risks, and become independent of third-party political decisions.

HIGHLY VALUABLE INVESTMENT

Encompassing a territory of 50 hectares, Teltonika High-Tech Hill technology park in Vilnius, Lithuania will include 10 new industrial and administrative buildings to be constructed in several phases over a five-year period. Besides the above-mentioned PCB factory and electronics assembly plant, there will also rise a data centre, plastic parts manufacturing facility, and semiconductor chip assembly, testing, and manufacturing facilities.

The construction of Teltonika High-Tech Hill technology park is expected to be completed by 2028 with additional equipment installed by 2033. At the estimated total investment of around EUR 3.7 billion, the entire complex will employ approximately 6,000 workers.

HAND IN HAND WITH ROBOTS

Teltonika High-Tech Hill technology park area is filling up fast with workers and construction cranes as another project is about to commence soon. A building permit is already granted for a new electronics assembly plant, which will add extra power to Teltonika manufacturing potential.

The investment of around EUR 75 million will create 700 jobs, meaning it's all about people and... robots. The new production facilities will include 10 electronic assembly lines, 20 testing lines, 4 packaging lines, a modern robotic warehouse, and laboratories, while the production capacity will reach more than 18 million products per year.

"We need a bigger factory in view of the planned expansion of the Teltonika company group, as we are growing at a rate of several tens of per cent every year. This project is also needed to meet the increased demand from other companies for contract manufacturing services," says Arvydas Paukštys, founder and president of Teltonika company group.

> We are growing at a rate of several tens of per cent every year.

QUIZ

CALLING ALL TELEMATICS VISIONARIES!

Win a Teltonika crewneck sweatshirt!

Ever wonder about the evolution of telematics in the years ahead? We are eager to hear your predictions! Envision the advancements in GPS devices, fleet management's transformation, the role of AI in telematics, or any innovative features you dream of in a tracker.

Let your imagination run wild and send your ideas to journal@teltonika.lt with the subject 'Future of Telematics' by 29 February, 2024. Tell us your visions that reach 5, 10, or maybe 50 years ahead and you might be one of the three lucky winners to receive a Teltonika sweatshirt. Let's innovate and shape the future together!

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