

IoT Venture

Connected Bikes.

DATA-DRIVEN
E-BIKE MOBILITY

White Paper



WORDS FROM CEO & CO-FOUNDER

In the beginning,
we had a vision

**"Everything is
Connected"**

"In an era in which we are witnesses to a digital revolution, data and its importance for mobility have achieved unprecedented status. Advancing connectivity and the growing prevalence of e-bikes are opening up countless opportunities for improving cyclists' experience, increasing efficiency and shaping the future of mobility.

In this White Paper, we will shed light on the decisive role data plays for e-bikes and connectivity and explain how it is revolutionising our understanding of mobility.

We will reveal how data signatures can lay the groundwork for personalised, safe and efficient mobility solutions, and discuss the added value that they offer overall to cyclists, manufacturers and society at large.

Immerse yourself in the fascinating world of data-driven e-bike mobility and let's push the boundaries together.

Jürgen Veith

CEO & Co-Founder

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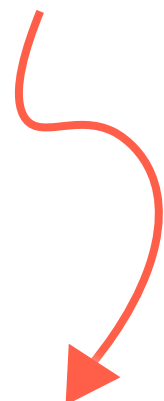
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E-BIKES, IOT AND DATA

The future of
mobility

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A full-page background image showing a delivery person wearing a black helmet, a dark jacket, and a yellow backpack, riding a black bicycle on a city street. The person is leaning forward, and the bicycle has a bright headlight. In the background, there are modern buildings with large glass windows. A semi-transparent dark purple rectangle is overlaid on the right side of the image, containing white and orange text.

WE CONNECT LIFE TO THE WEB

WHAT DRIVES US

At IoT Venture, our enthusiasm for the mobility transition and the bike industry runs deep. As pioneers in the sector, we are firmly convinced that the bicycle will play a pivotal role in the sustainable mobility of the future. With the possibilities afforded by the Internet of Things (IoT), we recognised early on the exceptional potential that e-bike connectivity and the real-time integration of data have to offer.

THE STATUS QUO IN THE E-BIKE MARKET

9.8 million

e-bikes sold
by the end of 2022

GROWTH AND DIGITALISATION

E-bikes have greatly increased in popularity in recent years, evolving from a niche product to a common means of transport. Where there were 1.3 million e-bikes on German roads in 2012, this figure rose to 9.8 million in 2022 – an enormous increase.

12%

**rise in
turnover** in the
bike and
e-bike market

This meteoric rise is also reflected in German e-bike production, which has grown almost six-fold since 2014, from 310,000 to 1.72 million bikes. The remarkable expansion of the bike market is also evident in the turnover generated by the sale of bicycles and e-bikes. This grew to 7.36 billion euros in 2022, a rise of 12%.

MORE E-BIKES THAN CARS

A driving factor behind this growth is the increasing demand for e-bikes and other high-quality products, such as cargo bikes. As the importance of e-bikes continues to grow, in 2022 their sales were virtually equivalent to those of conventional bikes: of a total of 4.6 million bikes sold, 48% were e-bikes and 52% were bicycles.

48%

**of bikes
sold** in 2022
were e-bikes

Source of data: Press Conference on 15/03/2023, ZIV
Presentation "Market figures for bikes and e-bikes in
2022"

According to forecasts by the German Bicycle Industry Association (ZIV), the sale of e-bikes is expected to overtake that of bicycles in Germany for the first time in 2023. This would represent a significant milestone for the industry.

The reason is that, to an ever greater extent, e-bikes are used as a practical means of getting around – for transporting shopping, for example.

CONNECTED BIKES

Conventional bikes are being joined by growing numbers of connected bikes. IoT solutions enable easy integration, so that every e-bike can be transformed into a connected bike. The integrated IoT product makes the bike smart and enables seamless data transmission.

Safety features, anti-theft protection and direct communication with cyclists create an individual user experience. What's more, manufacturers and retailers benefit from improved customer relations and commercial opportunities.

CAN SOLUTIONS PROVIDE REAL-TIME DATA

CAN-based solutions offer an effective method of collecting and transferring data in real time. The controller area network (CAN) enables bike usage data to be read and managed precisely and reliably. For example, information about various aspects of the e-bike, such as speed, battery status and mileage, can be gathered continuously.

DIGITALISATION IN THE BIKE SECTOR

More and more start-ups are working on further innovative solutions for the digitalisation of bicycles and e-bikes. Intelligent locking systems or helmets with emergency call feature are just some examples of the new technologies. In future, the digitalisation of bike components will be even more intense. The bikes of the future will be able to detect problems or repairs themselves. The digitalisation trend in the bike sector is set to continue in the years to come.

In future, the digitalisation of bike components will be even more intense.

THE E-BIKE REVOLUTION

How IoT is changing
cycling

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E-BIKE REVOLUTION: ON THE PATH TO 100% E-MOBILITY

WHY E-MOBILITY MAKES SENSE

- **An attractive alternative in city traffic**

In view of hyperurbanisation and traffic problems, e-bikes are turning out to be a good alternative that improves journey time, cost, health and parking opportunities.

- **Decarbonisation of traffic**

E-bikes help to cut CO2 emissions and therefore to lessen traffic's environmental impact.

- **Accessibility and convenience**

Compared with other means of transport, e-bikes are easily accessible in the city and are a convenient option for short and medium distances, increasing traffic flexibility.

- **Diversity and technological advances**

The wide choice of e-bike models available is driving increasing acceptance of bikes as a means of transport. Advances in battery and component technology give e-bikes a longer life, increasing the attractiveness and cost effectiveness of e-bike use.

CONCLUSION

e-bikes offer an efficient and eco-friendly mobility solution, which appeals to a heterogeneous user base and will significantly shape the future of urban mobility.

CONNECTED E-BIKES

OPPORTUNITIES AND RISKS

- **ANTI-THEFT SERVICE**

The integration of IoT technology in e-bikes provides opportunities to improve anti-theft protection. E-bike owners can track their bike in real-time using GPS trackers and intelligent alarm systems. If movement is suspected, they are notified immediately. In addition, the integration of smart lock features enable the bike to be locked remotely.

- **PREDICTIVE MAINTENANCE**

Predictive maintenance systems enable proactive monitoring and early detection of required maintenance and potential problems. This leads to improved reliability and reduced repair costs.

- **MOBILITY TRANSITION**

Increasing demand for environmentally friendly mobility solutions offers opportunities to develop a better infrastructure for e-bikes, by increasing the number of e-bike charging stations, safe cycle paths and bike parking facilities, for example.

- **THEFT RISK**

E-bikes are at greater risk of theft because of their higher value compared to conventional bikes.

- **HIGHER COSTS**

Additional maintenance and repair costs are incurred. It is advisable to calculate potential costs in comparison with a conventional bike.

- **INFRASTRUCTURE**

Roads and cities that are not designed for e-bike use are challenging to e-bikers.



IOT IN THE BIKE SECTOR

GPS TRACKING MADE BY IOT VENTURE

ONE-STOP SHOP FOR SOLUTIONS

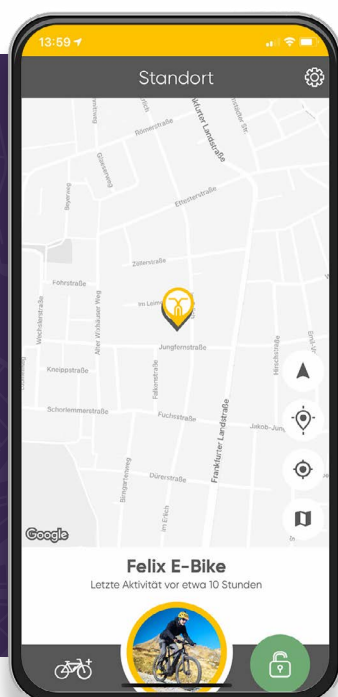
IoT Venture GmbH connects valuable assets such as e-bikes to the internet, making products and data smarter and capable of delivering a better experience. Our solution enables our customers to expand their data-based business models.

Our IoT solution is based on GPS and the common LTE-M and NB-IoT cellular network standards. Precise geolocation enables stolen e-bikes to be retrieved with the help of our Bike Hunter Team.

Our services include the development of hardware and software (embedded systems), provision of the required data platform (cloud solution), the development of a (white label) app and assistance with data handling – all from a single supplier.

3 out of 4

stolen bikes are
retrieved



IT'S MY BIKE APP

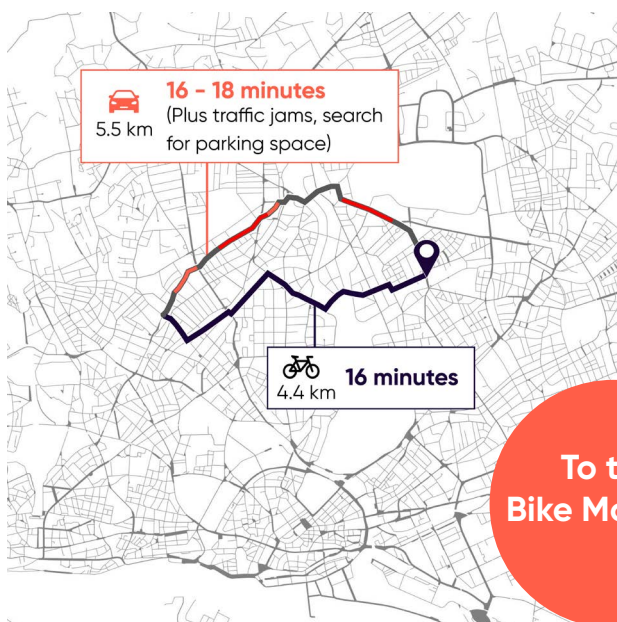
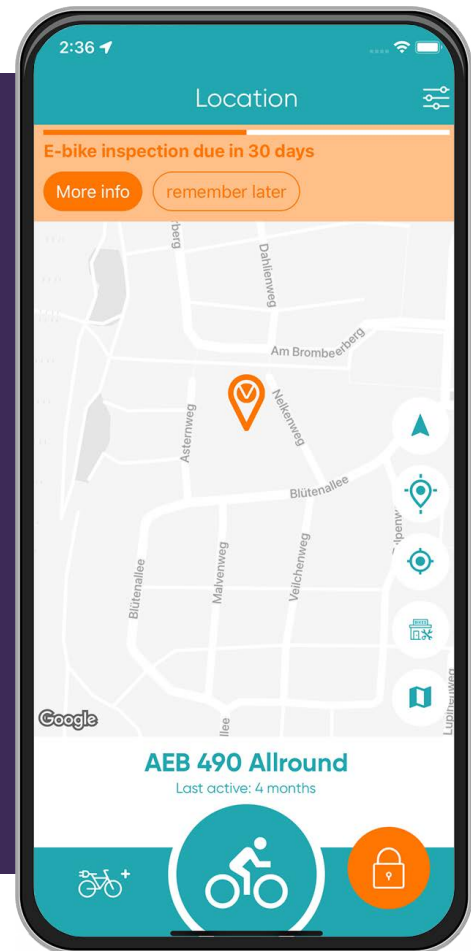
Using the IT'S MY BIKE app, users can locate their e-bike whenever and wherever they want. As well as anti-theft protection, the app offers access to other services. Recovery, ride statistics, a digital accident assistant and an insurance service complete this range of functions.

USE CASES

DATA SIGNATURES

SMART E-BIKES THANKS TO PREDICTIVE MAINTENANCE

So, you want to see when your next bike inspection is due, or how far away your nearest dealer workshop is? Predictive maintenance will help with this. Data transmission provides information on possible damage or necessary repairs, and can prevent consequential damages. Moreover, it can provide a digital chequebook for the e-bike and display maintenance intervals. We make this possible using the VELOMATE app from our customer VELO DE VILLE, for example.



BIKE MONITOR

What's more, IoT Venture uses data signatures to generate relevant findings for road traffic and mobility providers, which we make available on our website.

OPPORTUNITIES AND PARTNERSHIPS

How data-controlled innovations are empowering new business models



E-BIKES AND THE IOT SECTOR: OPPORTUNITIES AND PARTNERSHIPS

FOR RETAILERS

- IoT features offer differentiation from the competition
- Stronger customer loyalty and repeat purchases through personalised products and services
- Made-to-measure maintenance and repair services create additional sources of revenue
- Business is optimised by data-based findings on bike use and performance
 - Product ranges and marketing strategies are adapted in line with customer preferences



FOR MANUFACTURERS

- Access to extensive real-time data on bike performance, use behaviour and environmental factors
- Improved understanding of cyclists' requirements
- Identification of new trends and innovations in the bike sector
- Personalised customer service through continuous monitoring and analysis of data, resulting in tailor-made recommendations, repairs and provision of information
- Encouragement of partnerships and collaboration with other sectors to develop new technologies and solutions

FOR THE PUBLIC SECTOR

- Promotion of sustainable mobility through the use of emission-free, connected bikes
- Data-based decision-making to optimise the cycling infrastructure and targeted measures to boost bike traffic
- Anti-theft protection and increased safety thanks to GPS trackers and real-time information
- Promotion of bike-sharing schemes through the integration of IoT technology
- Public entities are promoting the use of e-bikes through subsidies and investment in the cycling infrastructure, to encourage more bike traffic



FOR INSURERS

- Improved risk management through a more precise evaluation of insurance risks
- More effective anti-theft protection and retrieval thanks to GPS tracking
- Stronger customer loyalty and differentiation through additional services with added value
- Data analysis for preventive measures and improved safety
- Positioning as an innovative insurance provider for the modern customer segment



Connected bikes are extremely important, because they offer the potential for revolutionising other sectors such as traffic, health, environment and technology.

SUMMARY

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IMPORTANT STATEMENTS ON THE DEVELOPMENT OF E-BIKES AND CONNECTED BIKES

1. E-BIKES ARE BECOMING MORE POPULAR

e-bikes are rapidly gaining in popularity. It is therefore crucial to grasp this trend with both hands, in order to benefit from growing market opportunities.

2. DIFFERENTIATION THROUGH INNOVATIVE FEATURES

Connected bikes enable an improved user experience and differentiation from the competition, by offering innovative features and seamless connectivity.

3. ADVANCED TECHNOLOGY

The integration of smart devices in e-bikes reveals valuable findings and optimises the cyclist's experience. Features such as GPS tracking, real-time data monitoring, theft prevention and accident detection are becoming increasingly important for e-bikes.

4. FINDINGS THROUGH DATA

Data plays a vital role, as it delivers invaluable insights and can be used to continually improve the e-bike experience.

5. INNOVATION IS DRIVING CHANGE

Continuous innovation and further development are necessary in order to satisfy the changing needs and expectations of e-bike enthusiasts and move the e-bike industry forwards into the future.

SO, WHAT ARE YOU WAITING FOR? GET IN TOUCH WITH US



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