SEMTECH CASE STUDY



MOKO SMART

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Turning Foot Traffic into City Intelligence: How LoRaWAN Enabled Crowd Flow Analytics

MOKO Smart's LW003 Ultra powered by Semtech's LoRa technology, equips a German city with privacy-safe crowd flow monitoring, giving traffic planners the continuous, data-driven visibility they need to make faster and more informed decisions across the urban network.

QUICKFACTS

Company

MOKO SMART
www.mokosmart.com

Customer Profile

MOKO SMART is a leading IoT device manufacturer specializing in LoRaWAN-based sensors, trackers, and gateways. With over a decade of wireless expertise, MOKO SMART develops end-to-end IoT hardware solutions for logistics, smart cities, industrial monitoring, personnel safety, and asset tracking, serving enterprise customers across global markets.

Objectives

- Replace manual, personnel-intensive traffic monitoring across a German city
- Achieve continuous crowd flow visibility at high-traffic urban locations
- Generate actionable traffic pattern data for city planners and traffic personnel
- Protect pedestrian privacy while capturing meaningful movement trends
- Deploy a scalable, low-maintenance solution suitable for diverse outdoor environments

Results

- Continuous crowd flow monitoring established across railway stations, public facilities, and key intersections
- Visual crowd movement trend data delivered to city planners and traffic managers in real time
- Privacy of pedestrians is fully preserved as the system detects BLE signals rather than identifying individuals
- Traffic personnel able to make faster, more informed decisions based on city-wide pattern data
- Solar-powered and weatherproof deployment enables year-round operation with minimal maintenance

Products and Services

- Semtech's LoRa Connect™ SX1262



INTRODUCTION

Modern cities are growing more dynamic and complex with every passing year. The rapid rise of urban populations, combined with the increasing density of vehicles and pedestrians on city streets, places mounting pressure on traditional city management systems. These systems, built around manual observation and human presence at key locations, were effective at modest scales but were never designed for the volume and pace of movement that characterizes today's urban environments.



LW003 Ultra

MOKO Smart, a Shenzhen-based IoT device manufacturer with deep expertise in LoRaWAN-based hardware, developed a crowd flow monitoring solution built around the LW003 Ultra Outdoor Bluetooth Bridge. The solution was implemented together with dataMatters GmbH, a company developing a leading platform for AI models and AI applications for the real-world economy. By combining MOKO Smart's IoT hardware with dataMatters' intelligent software platform, the solution enables advanced analysis of urban crowd movement patterns and infrastructure usage. Deployed in a German city at high-traffic public locations including railway stations, trash bin clusters, and public toilets, the solution captures anonymous crowd presence data and transmits it wirelessly to a cloud platform for analysis. City planners and traffic personnel gain a clear, continuously updated view of crowd movement trends across the urban network, without any risk to pedestrian privacy.

CHALLENGE

In a busy German city, managing road and pedestrian traffic had long depended on the physical presence of traffic personnel stationed at key intersections. These personnel carried the essential responsibility of making real-time judgments about traffic conditions, responding to incidents, and ensuring the smooth flow of vehicles and crowds. In calmer times, this approach worked reliably. However, as the city's traffic volumes grew and urban patterns became increasingly unpredictable, the limitations of human observation became impossible to ignore.

The most significant constraint was the narrow observation range of any individual stationed at a single crossing. A traffic officer could monitor only the immediate area within direct line of sight. High-probability events such as congestion build-up, pedestrian crowd accumulation, or minor accidents occurring just beyond their view could go undetected for valuable minutes. The information would eventually reach them through delayed communication channels, but by that point the situation had often already escalated.

Beyond individual blind spots, the manual model offered no systematic way to study crowd movement patterns over time. There was no data infrastructure to identify which locations experienced peak congestion, at what times of day, or how crowd flows shifted across different parts of the city. Without this intelligence, city planners and traffic managers were forced to rely on anecdotal evidence and periodic surveys rather than continuous, objective data.



> LoRa® technology has enabled MOKO SMART to deliver reliable, low-power, and long-range IoT hardware solutions across various industries such as asset tracking, personnel safety, and environmental monitoring. By leveraging LoRaWAN®, our customers are able to deploy scalable IoT networks with lower maintenance costs and improved operational efficiency, even in challenging environments.
>
> **Jerry Li,**
> *Co-founder at MOKO SMART*

SOLUTION

MOKO Smart deployed the LW003 Ultra Outdoor Bluetooth Bridge at strategically selected locations throughout the city, including railway stations, public toilet facilities, and trash collection points, all areas that naturally attract high volumes of foot traffic. Each bridge continuously scans for Bluetooth Low Energy signals broadcast passively by smartphones and wearable devices carried by passers-by. The presence of these signals allows the bridge to detect and log human movement without capturing any personally identifiable information, fully protecting pedestrian privacy.

The collected data is integrated into the dataMatters GmbH software platform, where AI-powered models and applications analyze crowd flow trends, location activity, and movement patterns across the city. This combination of MOKO Smart's LoRaWAN hardware and dataMatters' intelligent analytics platform provides municipalities with actionable insights for smarter urban planning and operational decision-making.

Once the BLE scan data is collected, each LW003 bridge transmits it through an outdoor LoRaWAN gateway to a cloud-based IoT platform. The platform processes the incoming data streams and generates visual crowd movement trends covering the deployment locations across the city. Through the dataMatters platform, traffic personnel and city planners can access this data in near real time through a connected application, giving them a city-wide perspective that no manually positioned observer could ever provide.

It is important to note that the system is designed to identify trends rather than report exact headcounts. Because the detection method relies on BLE signals, and not all pedestrians carry active Bluetooth devices, the data represents a consistent sample of crowd presence rather than a total count. This design choice reinforces the privacy-first approach while still delivering the pattern-level intelligence that matters most to city management. Powered by Semtech's LoRa SX1262 chip, the LW003 Ultra connects reliably over long distances with minimal power consumption, and is available in battery replaceable, battery rechargeable, and solar panel charging variants to suit any deployment environment.

BENEFITS

- **City-wide crowd visibility without manual presence**
  Fixed LW003 bridges at high-traffic locations deliver a continuous, objective picture of crowd movement across the city. Traffic managers gain the situational awareness that no single observer stationed at an intersection could ever provide, enabling faster and better-coordinated responses to evolving conditions.

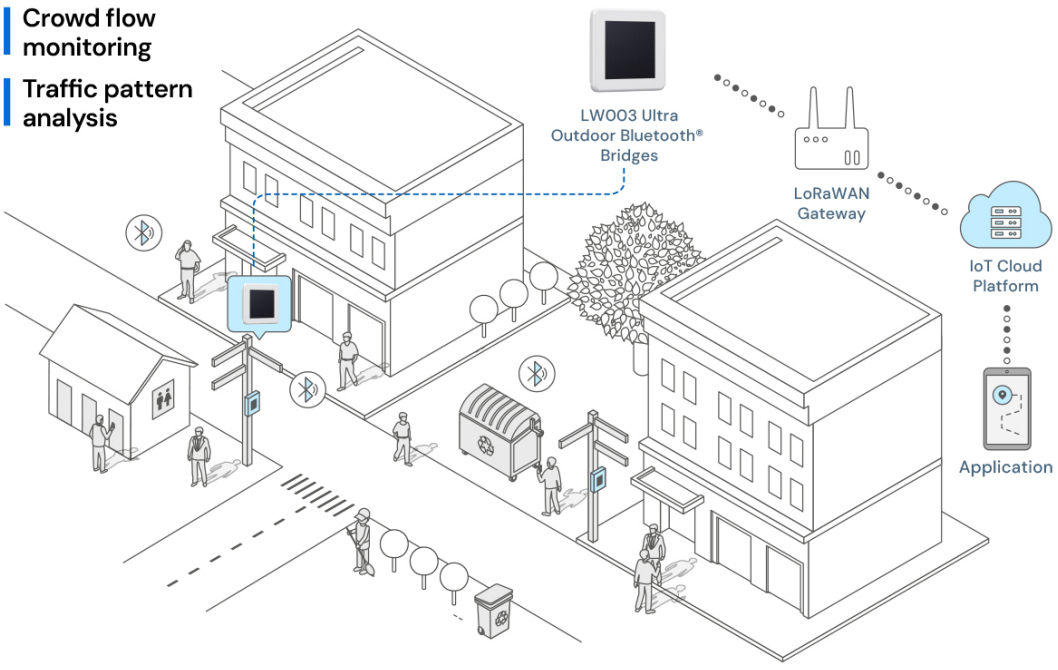
- **Privacy-safe by design**
  The system detects anonymous BLE signals from nearby devices rather than identifying individuals or capturing personal data. Pedestrians are never tracked,

profiled, or identified. This approach allows the city to collect meaningful crowd intelligence while fully respecting the privacy rights of residents and visitors.

- **Data-driven urban planning**
  The cloud platform transforms raw crowd detection data into visual movement trend reports that city planners can act on. Identifying where congestion concentrates, at what times, and how patterns shift across seasons gives planners objective evidence to guide infrastructure decisions, resource allocation, and emergency planning.

- **Resilient outdoor deployment with minimal maintenance**
  The LW003 Ultra's IP67-rated waterproof enclosure and robust metal shell make it suitable for permanent outdoor installation in demanding urban environments. With solar panel charging available as a deployment option, the bridges can operate year-round at remote or power-limited locations without regular servicing visits.

- **Scalable coverage through LoRaWAN architecture**
  LoRaWAN's long-range, low-power architecture means a small number of gateways can cover an entire city district. Adding more monitoring points requires only additional LW003 bridges at new locations, with no changes to the network or cloud infrastructure, making the solution straightforward to extend as the city's needs grow.



About Semtech
Semtech Corporation (Nasdaq: SMTC) is a leading provider of high-performance semiconductors powering AI data center networking, IoT connectivity and intelligent connected devices worldwide. Our global teams are committed to empowering solution architects and application developers to develop breakthrough products for the infrastructure, industrial and consumer markets.

To learn more about Semtech technology, visit us at Semtech.com or follow us on LinkedIn or X.

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