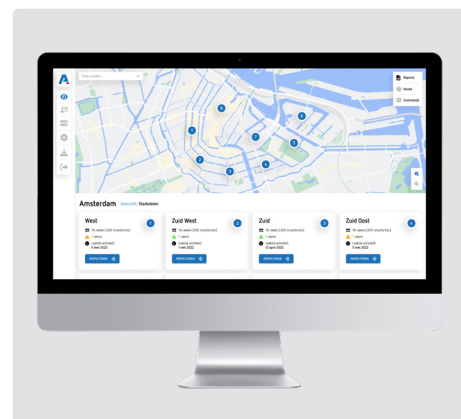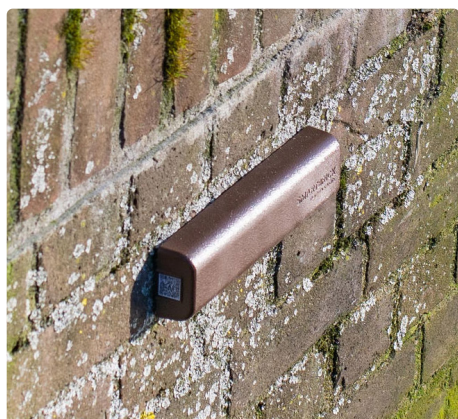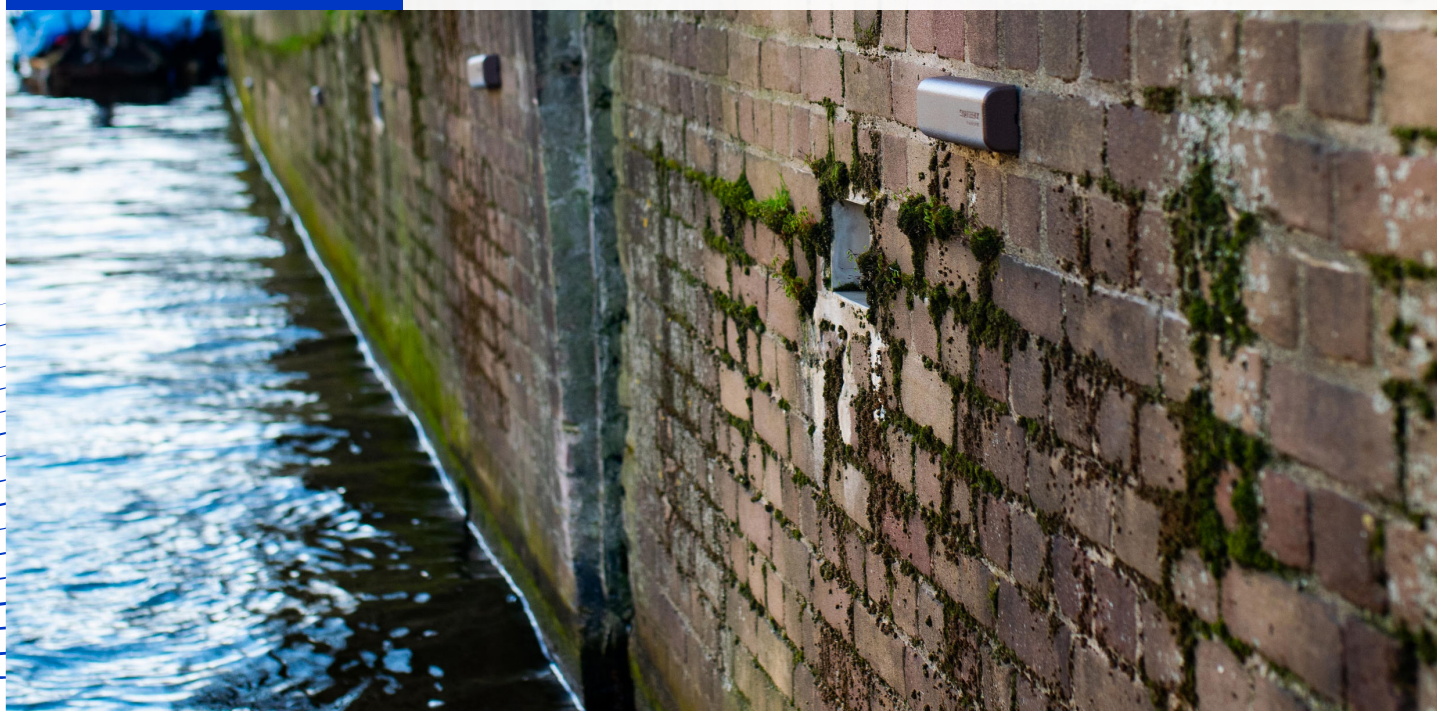# SmartBrick

Smart structural health monitoring solution for civil infrastructures such as buildings, quay walls and bridges

Real-time awareness by data driven solutions

SmartBrick

Smart structural health monitoring solution for civil infrastructures

SmartBrick is an IoT sensor designed for precise, affordable monitoring of civil infrastructure. It detects inclination and other physical parameters with high accuracy, transmitting data wirelessly to an online platform. With its combination of daily measurements, intelligent algorithms, and ultra-low power consumption, SmartBrick offers a scalable, battery-driven, low-cost solution.

The system continuously monitors changes, damage, and collapse risks, enabling accurate predictions and proactive maintenance. This eliminates uncertainty, panic, and emergency fixes, allowing for better

prioritization of maintenance activities. Powered by intelligent algorithms and machine learning, SmartBrick continuously improves its performance. It easily attaches to any surface with epoxy (Stick & Play) and immediately begins monitoring. Data is visualized in a user-friendly dashboard, offering both manual and analysis.

MONITORING, PREDICTIONS, AND NO MORE SUPRISES
SmartBrick ensures proactive infrastructure management by predicting and preventing issues before they arise, helping you stay ahead with no more surprises.

SmartBrick sensor

SmartBrick is an IoT sensor that detects plus monitors inclination and enables to make solid predictions about the state and condition of civil infrastructure. A more reliable and effective solution for smart automation.

- The best accuracy in the market is achieved by combining tilt, temperature and vibration measurement
- IP67 protection
- Two ways remotely, wireless, programmable communications
- Connectivity Multimode LTE-M / NB IoT modem
- Installation: on surface glue or screws
- Almost zero maintenance needed
- Wireless detection of shifts parking spot occupancy

YOUR BENEFITS

- Easy to install
- Monitors large-scale structures
- Improves maintenance and safety
- Usable with interactive dashboards
- Low-cost, high-tech, stick-and-play sensor system

Real-time data visualization, comprehensive analysis tools, and a user-friendly interface, along with remote access, customizable alerts, and robust security features, making it ideal for scalable and secure monitoring solutions.

ADDITIONAL INFORMATION
althensolutions.com/solutions/structural-health-monitoring-for-civil-infrastructure/

Technical specifications

GENERAL SPECIFICATIONS

Processor	64MHz, Arm Cortex-M33 Arm Cryptocell 310	
Battery life	Two readings per day > 5 years (up to 10 yrs)	
Power source	Battery	3.6V / 3200mAh
Memory	CPU Flash	1MB
	RAM	256kB
Enclosure	Material	PC Kingfa JH850 UV
	Dimensions	211mm x 50mm x 36mm (wall brick size)
	Mounting	Glue or Screws
	Protection	IP67
Environmental	Operating range -20°C to +50°C	
	Max humidity 10% to 95%, non condensing	
Storage temperature:	-40°C to +85°C	

CONNECTIVITY MULTIMODE LTE-M/NB-IOT MODEM

Bands	Certified LTE bands activated: B1, B2, B3, B4, B5, B8, B12, B13, B14, B17, B18, B19, B20, B25, B26, B28 and B66
Security	Arm Cryptocell 310 security and authentication
Antenna	Internal ceramic PCB
Power	Max. 23dBm @ 700-2200MHz
RS sensitivity	LTE-M: -108 dBm
Device management	Remotely wireless programmable (two way communication)

TILT MEASUREMENT

Range	±50°
Accuracy	≤±0.1°
Resolution	≤0.003°
Linearity	≤1% (within ±20° range) ≤5% (within ±20....±50° range)
Drift	≤0.01° Long Term

TEMPERATURE

Range Temperature	-20°C to +50°C
Accuracy	±0,2°C
Resolution	±0,2°C
Drift	≤0.05° Long Term

EMBEDDED FUNCTIONS

Measurement	Battery	Low Battery Level
	Network	RSSI
	Sensors	Temp / RH
Inclination	2 axis inclination, X+Y axis	
Reed contact	Initiates measurement and cloud synchronization	
Lightning	Reasonable Surge protection due indirect lightning strike	

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Our solution

A unique approach and tailored IoT solution for
seamless integration, scalibility & security

Structural health monitoring of civil infrastructure

How tilt measurement helps to prioritize predictive maintenance

PROVIDING VALUE

Results guaranteed

RETURN ON INVESTMENT:	OWN AND CONTROL YOUR DATA AND IP:	REDUCE MAINTENANCE COSTS UP TO:
350%	**100%**	**40%**
SmartBrick saves costs in maintenance	Manage sensor data in one control room	Reduce issues, automate repetitive tasks

USING TILT MEASUREMENT TO OPTIMIZE PREDICTIVE MAINTENANCE
We face significant challenges in the measurement and management of civil infrastructure, including issues of durability, maintenance, and performance. Advanced sensor-based technologies and data analytics can profoundly enhance the resilience of infrastructure systems, improving safety, efficiency, and sustainability for communities.

⊘ **Saving costs by preventive maintenance**
Accurate daily measurements, intelligent algorithms and ultra-low power consumption.

⊘ **Root cause analytics**
Discover the root causes of problems in order to identify appropriate solutions.
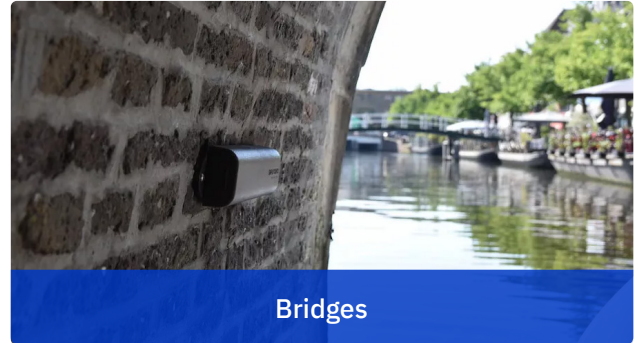
⊘ **Easy installation**
Can be attached to any surface using epoxy.

Optimization and automation in maintenance of civil infrastructure

Our Structural Health Monitoring (SHM) Solution continuously tracks the health of civil infrastructure, detecting early signs of wear or damage to enable proactive maintenance and improve safety. This end-to-end, scalable system is easy to install and reduces maintenance costs by up to 40%. By automating data collection and real-time analysis, it helps operators make informed decisions, prioritize resources, and ensure the long-term performance and safety of large-scale infrastructure.

(Historic) quay walls

Bridges

Buildings

Infrastructure

END-TO-END STRUCTURAL HEALTH MONITORING SOLUTION

The smart sensor hardware incorporates high-quality and accurate sensors, integrated algorithms for processing, and wireless connectivity, all housed in custom-designed, battery-powered enclosures.

This data is securely transmitted to a reliable back-end data storage system, boasting features such as highly secure data, redundant storage, and 99% uptime for stability.

The user-friendly dashboard offers customizable data views, enabling analytics integration, and supports scaling from small to big data, ensuring efficient monitoring and decision-making.

EXPERIENCE OUR SOLUTION

Our solution detects and monitors inclination and other physical parameters (temperature and vibration) and transmits this data wireless to an online platform.
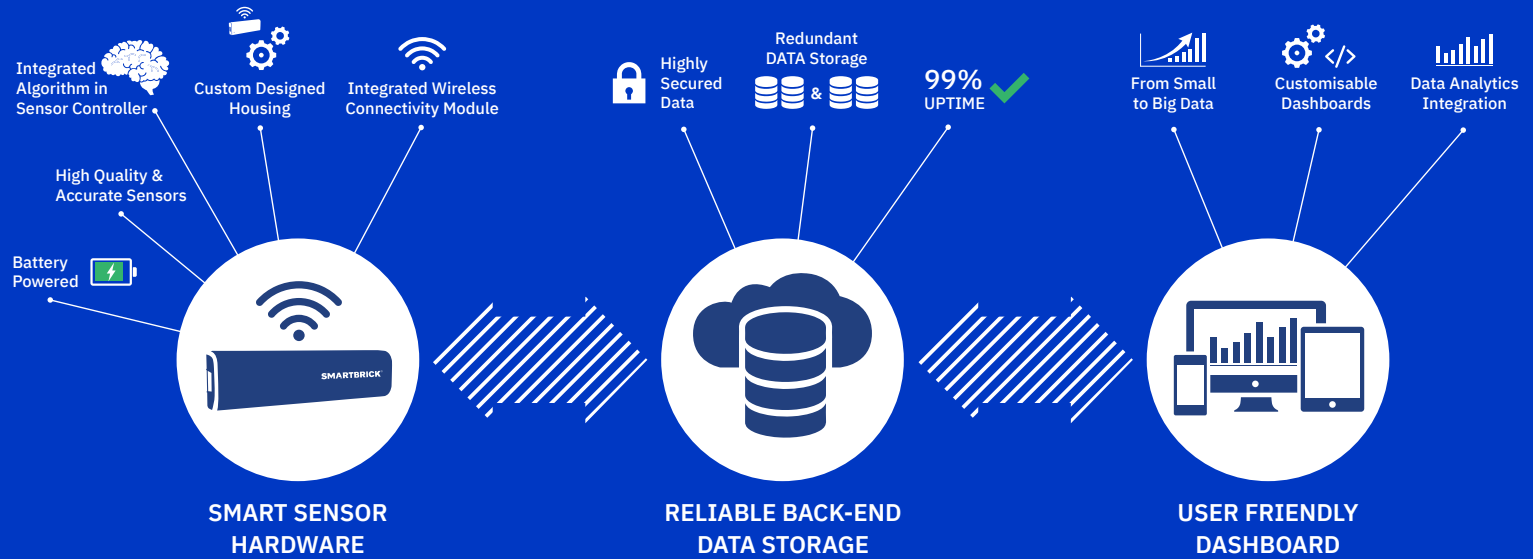
- Fully wireless
- Battery driven
- Accurate tilt measurement (≤±0.1°)

The combination of accurate daily measurements, intelligent algorithms, and ultra-low power consumption makes SmartBrick a unique scalable measurement IoT sensor.

NO MORE SURPRISES

Our Structural Health Monitoring solution continuously tracks changes, damage, and risks of collapse in infrastructure. This enables accurate predictions, reduces uncertainty, and prevents emergency interventions. Plan and prioritize maintenance with confidence.

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Your end-to-end Industrial IoT solution partner

Integrated Algorithm in Sensor Controller

Custom Designed Housing

Integrated Wireless Connectivity Module

High Quality & Accurate Sensors

Battery Powered

Highly Secured Data

Redundant DATA Storage

99% UPTIME

From Small to Big Data

Customisable Dashboards

Data Analytics Integration

SMART SENSOR HARDWARE

RELIABLE BACK-END DATA STORAGE

USER FRIENDLY DASHBOARD

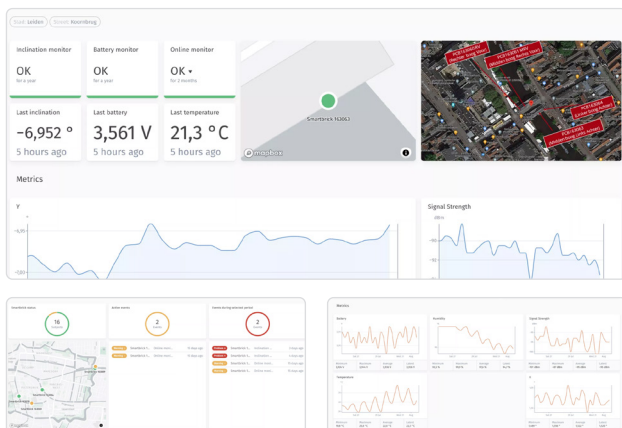## Connectivity and communication

Our solution uses a multimode LTE-M/NB-IoT modem, supporting various certified LTE bands for reliable global connectivity.

Security is ensured with Arm Cryptocell 310 for robust authentication. The SmartBrick features an internal ceramic PCB antenna for strong signal reception and a 23dBm output over 700-2200MHz. Remote wireless programmability allows for easy updates and efficient device management.

Visualization

The solution's dashboard offers several unique selling points, including real-time data visualization and comprehensive analysis tools that allow users to monitor conditions and interpret data trends effortlessly.

Its user-friendly interface ensures easy navigation, with customizable alerts for timely notifications. The dashboard supports remote access, enabling monitoring from anywhere, and integrates smoothly into larger systems. Its scalable design suits both small and large networks, while robust security protects data and communication.

Easy installation of SmartBrick

Thanks to its compact and discreet design, SmartBrick can be installed on bridges without affecting their appearance. Its advanced sensors continuously measure small changes in inclination, enabling early detection of structural shifts.

With approval from the Leiden City Council, Althen Sensors installed SmartBrick on four strategically chosen bridges. The installation was quick and efficient, causing minimal disruption to residents and visitors.

Predictive capabilities

As SmartBrick collects more data, it improves its predictions through self-learning algorithms. This makes early warnings more reliable and helps detect potential issues before they become problems.

In the city of Leiden, SmartBrick has transformed bridge monitoring—enabling proactive maintenance, preventing structural damage, and enhancing public safety.
The system not only monitors but actively protects the bridges with advanced, adaptive technology.

Other Althen Smart Solutions

Smart structural health monitoring solution for civil infrastructures

Vibration condition monitoring solution

With SmartMonitoring our customers can monitor any room or machine 24/7, without expensive wired equipment.
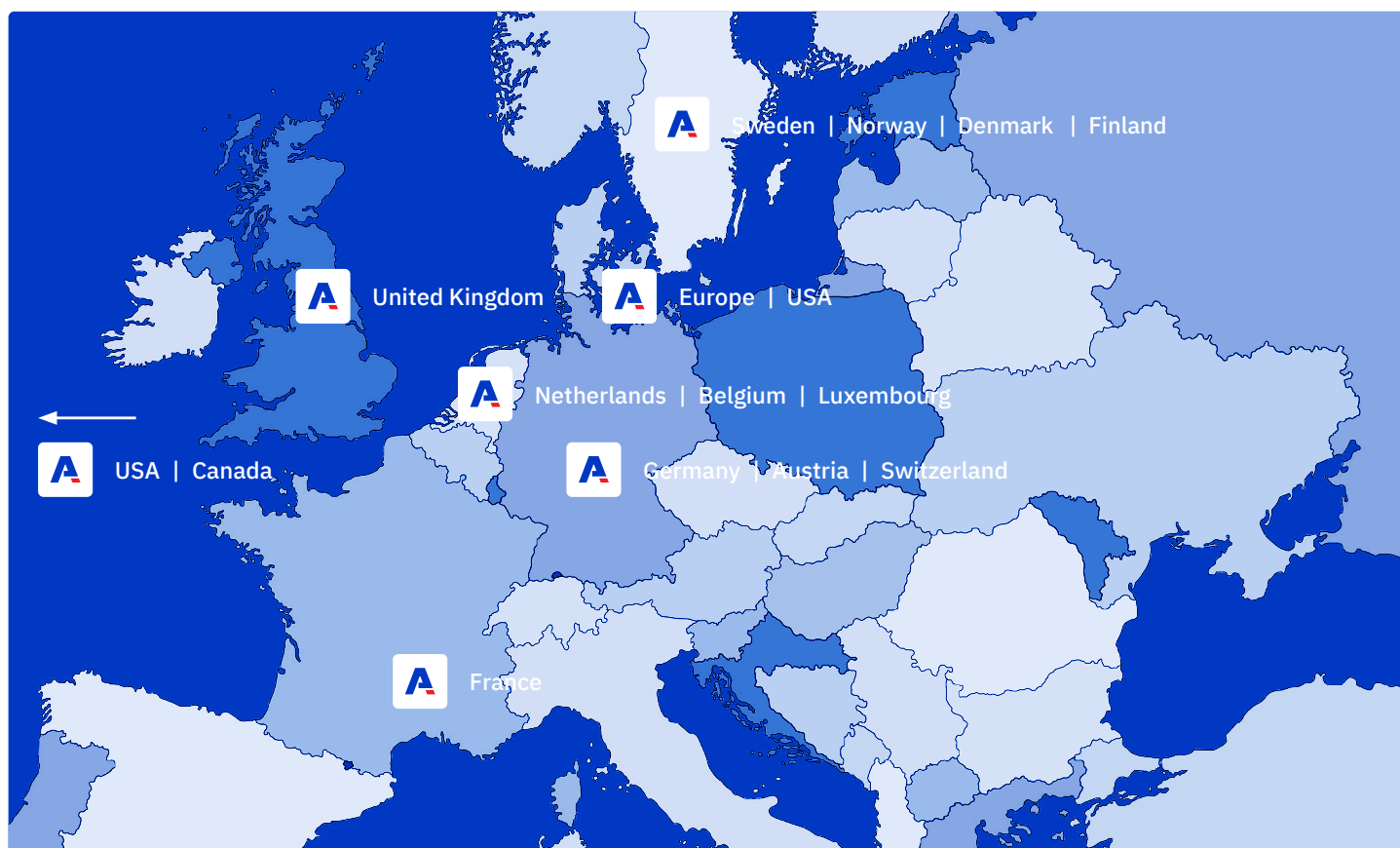
Smart building monitoring solution

Our solution monitors a possible crack in 3 directions, Accurate and reliable. Easy installation and online monitoring.

Need a custom IoT solution?

Let's explore together how our experts can support your custom IoT project. Contact us to find the right solution.

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United Kingdom

Europe | USA

Netherlands | Belgium | Luxembourg

USA | Canada

Germany | Austria | Switzerland

France

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