

PRESS RELEASE

Logistics 4.0 – Trustworthy Product Tracking with Cognitive Sensors and Blockchain Technology

In order to maintain leading global market positions amid increasing networking and digitization, industries nowadays need internet systems with cognitive capabilities and highly secure shared data spaces. At the Hannover Messe 2019, the Fraunhofer Cluster of Excellence »Cognitive Internet Technologies« CCIT will be presenting these key technologies by demonstrating an example from the field of logistics: seamless, trustworthy product tracking by means of cognitive sensor and blockchain technology.

Logistics can present some of the trickiest challenges in the value chain. Only a smooth and error-free transport of goods ensures an uninterrupted production. In particular, the transport of sensitive products such as glass, food, dangerous goods or sensitive electronic parts requires special safeguarding and documentation measures – especially when it involves small quantities or challenging legal requirements. The continuous recording, secure sharing and storage of data throughout the entire process is essential in this field. In this respect, logistics is a model case for networked production in Industry 4.0.

Smart Secure Data instead of Big Data – making complexity manageable

Temperature, storage, position and movement patterns – modern sensor technology can record a wide range of data regarding the state of sensitive goods during transport. However, the amount of data that has to be collected, aggregated and evaluated leads to enormous complexity. CCIT has developed the »Cognitive Sensor Connector« to make this complexity manageable: As an edge device, it preprocesses the raw data locally. This reduces the volume of data to be transmitted. In addition, and more important, they are refined into Smart Data at the point of collection, i.e. analyzed and preprocessed. Processing is protected against manipulation in specially isolated, secured applications (on the connector) that have various functions. All sensors communicate with the connector via encrypted, authenticated and integrity-based radio links. When data about the status of the cargo is being transmitted out of the connector to the actors involved, this is subject to strict data flow and data usage control, which clearly regulates who may use which data for how long, where and for what purpose. The trustworthiness of the sensor data can always be checked.

Editorial Notes

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If anomalies occur in the logistics process, they are detected in real time and forwarded to the relevant stakeholders. The driver of a truck, for example, can be notified in realtime if the goods that are being transported are exposed to excessive vibrations on a damaged road. Manufacturers and recipients can keep an eye on the condition of the goods. In the event of damage, information about excessive deviations from the norm during transportation and about the point of origin is of great importance for the insurer.

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Using blockchain technologies in a data-efficient and data-protection-compliant manner

By storing the collected data in a »Trackchain«, a secure blockchain that preserves data protection, supply and production chains can be tracked both company and worldwide and recorded in a traceable (compliance) history. The use of advanced cryptographic approaches such as »Attribute-Based Encryption« ensures that only those parties with the required authorization have access to information. The trackchain creates the prerequisite for data to be shared and processed in accordance with defined procedures between the sender and the recipient of the goods, between the driver and security personnel, and between the logistics company and the insurance company.

New value chains through sovereign data exchange

The ability to share real-time information in a controlled, i.e. data sovereign and secure manner is a prerequisite for new business models and sustainable new value chains. Guaranteed security and data protection are a competitive advantage. International Data Space is a trustworthy, distributed infrastructure for cross-company data exchange. This permits control over one's own data and the economical and cooperative usage of data in a trustworthy, secure, decently managed data space.

Shaping digital change together

The Fraunhofer Cluster of Excellence »Cognitive Internet Technologies« CCIT offers a single point of contact to the united technological competence of a total of thirteen Fraunhofer Institutes. The complexity, which is significantly increasing due to digitization and networking of companies, is becoming more manageable, and the digital structural change in companies can be made sustainable, secure and efficient. Three additional exhibits provide further insight into the current state of research.

At the Hannover Messe 2019, CCIT will also offer a comprehensive range of consulting services to enable companies to improve their products, processes and services and to develop new business models on this basis.

The spectrum ranges from the analysis of partial approaches that have already been implemented to the development of new business models and processes up to the planning of a sustainable corporate strategy and agile cooperative technology development according to the current state of research.

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About the Research Cluster CCIT

The Fraunhofer Cluster of Excellence »Cognitive Internet Technologies« CCIT researches cognitive technologies for the industrial Internet along the value chains from the sensor to intelligent learning processes in data processing to the cloud. It bundles the joint research and development work of a total of thirteen Fraunhofer Institutes, organized in the research centers IOT-Comms, Data Spaces and Machine Learning. The aim is to support digital sovereignty for companies and to provide trustworthy technologies for innovative forms of industrial data economy. CCIT enables companies to shape their businesses in a future-proof way by opening up market access with cognitive solutions and products. In this way, the digital sovereignty of companies is to be preserved, their competitiveness secured and their innovative capabilities strengthened.

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70 Years of Fraunhofer

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Picture:



The »Trackchain«: Blockchain-technology for seamless, trustworthy product tracking.
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