



THE INTERNET OF THINGS IS GOING TO CHANGE THE WORLD ...

The rise of the internet and the associated boom in e-commerce has multiplied streams of goods and data in recent years. Today's systems will soon find themselves unable to cope with this flood. That is why scientists from the Fraunhofer Institute for Material Flow and Logistics IML created the vision of a pioneering logistics system: intelligent devices were to learn to think and goods organise their own way to their destination. The Internet of Things for logistics was born.

The Basic Principle for Logistics

Every container, every pallet and every package will be equipped with a digital memory. This will provide objects with target information and priorities which will allow them independently to make simple on-the-spot decisions so that things find their own way to their destinations. This form of the Internet of Things is an answer to a growing complexity and demand for more flexibility. Customers' requirements have been drastically altered by the internet. They order individual deliveries by mouse click. And they want them immediately – or at least within the next 24 hours. At the moment we are using the same infrastructure we had twenty years ago to deal with this. We urgently need to do something.

The solution lies in the intelligent self-controlling of things. And this intelligence goes far beyond mere navigation. RFID tags enable packages to collect environmental information such as temperature, air humidity or vibrations. They can independently activate alarms, form local networks with other packages or delivery personnel and can order transport to a specific destination with complete autonomy.

The end of this process is a development into decentralised, autonomous and interactive entities. In the end all devices, packages and goods will automatically mesh with each other from order to delivery – and the vision of the Internet of Things in logistics will become a reality.

Current Projects

Together with national and international industry and research partners, Fraunhofer IML is working on the conception and creation of an Internet of Things that spans that spans all sectors and subjects. This is an overview of our current research projects.



"InBin" – The Intelligent Container

The first really intelligent container communicates with people and machines, makes its own decisions, monitors its environmental conditions and controls logistical processes. The separation of goods information from real goods is now lifted – and the Internet of Things is becoming reality.



DyCoNet

Tons of fresh food are distributed all over the globe by air freight every year, making ever-increasing demands on logistical processes. DyCoNet therefore tests the borderless networking of air freight containers by means of universally accessible technologies such as GSM/UMTS and GPS, the aim being comprehensive availability of logistical data and an autonomous material flow.



smaRTI – Smart Reuseable Transport Items

Global trade and its associated goods streams are growing continuously, and load carriers are one of the most important resources in logistics. The smaRTI project is therefore developing an approach that covers all sectors and supply chains for an intelligent material flow, taking all important transport paths into account, be they air, road, rail or water. At the end this will create a multimodal overall concept with intelligent reusable load carriers so as to optimise the entire supply chain.



IoT-A – Internet of Things Architecture

A global network of intelligent devices and objects that communicate with each other and their environment – research around the Internet of Things is all-pervasive. The IoT-A project creates an architectural reference model for this and establishes a series of key components to move away from isolated solutions towards a common framework for the Internet of Things.



Swarm Intelligence for Logistics – Cellular Transportation Systems

»If things know where to go, they can go there straight away.« With this simple but evolutionary sentence you can understand the idea of Cellular Facility Logistics as the logical consequence of the »Internet of Things«. The decentralized control of material flow and logistics systems is the essential characteristic of this new concept. The aim of our experiment with swarm intelligence is to design supply chains in a more energy-efficient way and be able to react more flexibly to unforeseen occurrences. Therefore cellular transport systems are revolutionising intralogistics. Massively constructed and

inflexible continuous conveyor technology is replaced by numerous small autonomous vehicles which guarantee a clearly more flexible material flow.

Our Facilities for Research on the Internet of Things

Autonomous Identification: openID Center

The openID-center at Fraunhofer IML is a 1,500 m² platform with the aim of researching logistics software and auto-identification systems. Since 2005 we have been working in pioneering projects together with partner organisations from industry and commerce. The conclusion of each project conducted in this experimental field provides a fully functional, expandable solution.

LivingLab Cellular Transport Systems

With LivingLab cellular transport systems we implement swarm intelligence following the example of the animal kingdom. The lab is built similar to a high-rise store with workstations. Intelligent, interlinked transport vehicles carry out transports in this test environment. They coordinate with each other independently without any central control.

