Transfer project 'Intelligent Container'

Report for CCA Workshop, May 8th, Bonn

Reiner Jedermann, University Bremen, IMSAS / MCB

Definition of the intelligent container

- Monitoring of temperature
  - Main impact factor on quality
  - Additional sensors for humidity, air flow and gas
- Multiple sensors per truck or container
  - Spatial temperature supervision
  - Sensors at the walls or inside palettes / boxes
- Automated evaluation of temperature data
  - Warning on impending quality losses
  - Prediction of remaining shelf life
- RFID reader at container door (Option)
  - The scanning of incoming goods
  - Automated adaptation to different kind of goods

Project Goals 1

- Prove that the concept works under real-transport conditions
- Project time
  - 2 years
  - 2008 + 2009
- Field tests
  - Starting in autumn 2008

Partner companies

- Two institutes of the University Bremen (Electrical Engineering)
- Cooperation with four industrial partners
**Project Goals 2**
- Collect data about temperature deviations and quality

**Hardware for road transports**
- Alternate networks UMTS WLAN
- GPRS
- Server T-Systems
- Web-Interface

**Web-Interface**
- GPS position
- Currently only 2 sensors
  - Spatial supervision
  - Only quality warnings instead of continuous temperature data
Installation in test truck

Hardware for sea transports

First results
- Update on measurements from last year
  - Delivery trucks
  - Sea Containers
- Reading range of wireless sensors
- RFID data transfer rate

Deep freezer after 5 hours cool down
The application of UHF RFID

- Just identification
  - Knowing what has been loaded and where your goods are
- Link to sensor system
  - Configuration: The sensors automatically adapt to the kind of good (temperature thresholds, type of shelf life model)
- Writing back data to the tag
  - Write a corrected expiration date to the tag at the end of transport (recalculated according to actual transport conditions)
- RFID temperature loggers
  - Future UHF loggers and shelf life tag

Test of RFID range and data transfer rate

- Test at palette wrapper
  - 3 RFID Antennas
  - 10 RFID Tags
Tests results

- UHF has a low penetration into moisture containing goods → Access only to tags at surface
- Time window for access at 10 rotations per minute (0.6 m/s) → 1.3 seconds

- Each tag could be identified at least 29 times per turn → uncritical
- But reading and writing data is time critical
- Reading 700 temperature values (predicted) → 0.175 seconds
- Writing 28 byte user memory (quality index + transport info) → 0.2 seconds

Smart active tags / shelf life calculation by wireless sensors

- Integration of a shelf life model into a sensor node
- Avoid communication bottle neck
- Planned cooperation with Ambient Systems, Netherlands

Contact address
Dipl.-Ing. Reiner Jedermann
Universität Bremen, FB1 (IMSAS/MCB), Otto-Hahn-Allee NW1, D-28359 Bremen, GERMANY
Phone +49 421 218 4908, Fax +49 421 218 4774
rjedermann@imsas.uni-bremen.de

Thanks for your attention
www.intelligentcontainer.com