Intelligent containers and sensor networks Approaches to apply autonomous cooperation on systems with limited resources

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Abstract: New emerging technologies like RFIDs, mobile networks and sensors for product quality monitoring are on their way to a broad application in logistics. In contrast to common approaches based on central evaluation of telemetric data, we pursue a concept that shifts the processing of sensor information into means of transport and miniaturized sensor nodes. In the first step, we present our implementation of an 'intelligent container' that makes use of these technologies to form a supervision system for the transport of perishable products. The key feature of the 'intelligent container' is a local perception system that automatically adapts to the requirements of different products. The sensor information is interpreted on the basis of dynamic models to predict changes in freight quality over time and temperature. The detection of emerging risks is crucial for intelligent transport planning and warehouse keeping. In the second step we consider the control of distributed sensor systems. Standard self-configuration mechanisms for wireless sensor networks are put into the context of autonomous cooperation. The main design task is to handle the limited resources in batteries, calculation power and communication range, which are a common characteristic of these applied new technologies. We discuss how further autonomous decision processes could be realized on miniaturised systems to improve their handling of those limited resources.