



Fraunhofer-Institut for Integrated Circuits IIS

Director
Prof. Dr.-Ing. Albert Heuberger

Am Wolfsmantel 33
91058 Erlangen, Germany

Fraunhofer Center for Applied Re- search on Supply Chain Services SCS

Managing Director
Dr.-Ing. Roland Fischer

Visitor address:
Nordostpark 93
90411 Nürnberg, Germany

Contact
Andreas Hölzli
Phone +49 911 58061-9556
info-technologien@scs.fraunhofer.de

www.iis.fraunhofer.de
www.scs.fraunhofer.de

PICK-BY-LOCAL-LIGHT

SELF-ORGANIZING WIRELESS NETWORKS FOR ORDER PICKING

Pick-by-Light (PbL) is a widely-used manual order picking system that supports warehouse logistics employees. In meeting the need for flexible and streamlined order picking, wired and wireless PbL systems have certain limitations. The goal of the Pick-by-Local-Light (PbLL) research project, which is being funded by the German Federation of Industrial Research Associations (AiF), is the development of an innovative order picking system based on wireless sensor networks. PbLL is designed to exploit the advantages of conventional PbL systems while eliminating the disadvantages that pertain to the installation effort and the limited flexibility.

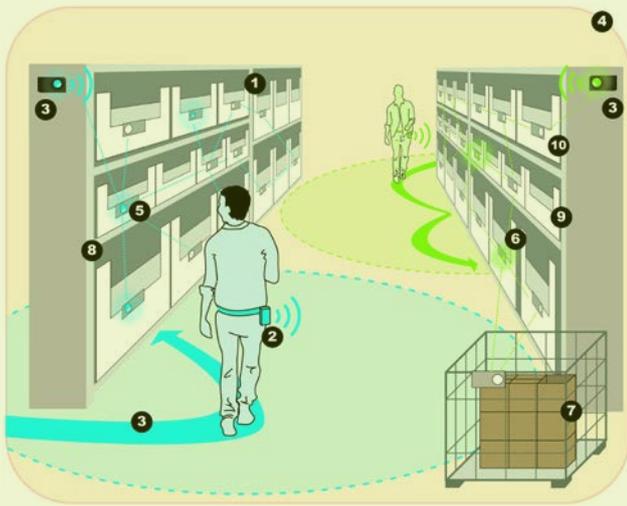
Disadvantages of current pick-by-Light systems

To date, PbL systems have been divided into two categories – wired and wireless – with the former being deployed more frequently. Wired systems are connected via cables to a central control and power supply system, which provides a reliable and low-maintenance solution. However, these advantages are offset by limited flexibility and complex installation procedures. Changing the storage shelf displays and article assignments is a time-consuming process. While wireless systems offer more flexibility, they create additional effort that results from the need to replace batteries and perform maintenance activities.

For this reason, to date these systems have been deployed only in distinct use cases.

More flexibility for order-picker processes

With this in mind, an order picking system based on wireless sensor networks is being developed under the framework of the Pick-by-Local-Light PbLL research project. This approach capitalizes on the advantages of current pick-by-light systems while vastly mitigating the disadvantages. The system is designed to provide the flexibility to place, add or remove the storage shelf displays as needed. This reduces the installation effort and improves flexibility and scalability.



- 1 Sensor nodes communicate status, warehouse and order-picking events via multihop nodes
- 2 Order pickers wear a sensor node on their belt
- 3 Positioning and guiding the order pickers with a control system
- 4 Multiple order pickers work in the same area Sensorknoten
- 5 & 6 Coloured LEDs on the sensor nodes light up as soon as the right order picker is in range
- 7 Flexible way to mark pallets, skeleton containers and portable
- 8 Various and variable pick location heights
- 9 & 10 Containers with and without sensor nodes can be combined

s-net® wireless sensor network technology

The new approach is based on the Fraunhofer IIS s-net® technology, which can be used to design self-organizing, multihop-capable wireless networks that are extremely energy-efficient. It also allows the integration of other innovative functions such as tracking and coordinating the activities of the pickers within the warehouse. In this case the pickers are equipped with wearable devices that act as s-net® nodes.

Better energy-efficiency, less maintenance effort

The improved energy efficiency of the PbLL system is achieved by activating the LEDs for the pick locations only when the pickers are in the immediate vicinity. This significantly improves battery-life compared to the wireless PbL systems used to date, thus enabling a cost-effective operation.

Application-oriented research for the logistics industry

The two-year AiF funding program for the PbLL research project will conclude at the end of June 2016. Helping effect the technology transfer to industry is a diverse project consortium that includes: ACD Elektronik GmbH, Bosch Siemens Hausgeräte BSH GmbH, CIM GmbH, Dr. Schaab + Partner GmbH, KBS Industrielektronik GmbH, Kühne + Nagel (AG & Co.) KG, Nanotron Technologies GmbH, SAFELOG GmbH, Salt Solutions GmbH, Seuffer GmbH & Co. KG, SSI Schäfer Noell GmbH, trilogIQa, viastore systems GmbH and Vierling Produktions GmbH.

Fraunhofer SCS – 20 Years

Since 1995, the Fraunhofer Center for Applied Research on Supply Chain Services SCS has been examining how companies can increase their added value. Our customers want to know how they can optimize their market position, how best to utilize their resources, what kind of potential is hidden in their daily work flows and new services or how state-of-the-art technology can be put to good use. As a neutral research institute, we always offer manufacturer-independent advice and solutions.

AiF Research Project 18139

The IGF research project 18139 N/2, initiated by the German Logistics Association (BVL) in Bremen, was funded by the German Federal Ministry for Economic Affairs and Energy through the AiF under the framework of a program benefitting Germany's small and medium-sized businesses.

Gefördert durch:
 Bundesministerium
für Wirtschaft
und Energie

aufgrund eines Beschlusses
des Deutschen Bundestages

 ALLIANZ
INDUSTRIE
FORSCHUNG