Chapter 9

MICA: A Mobile Support System for Warehouse Workers

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ABSTRACT

Thousands of small and medium-sized companies worldwide have non-automated warehouses. Picking orders are manually processed by blue-collar workers; however, this process is highly error-prone. There are various kinds of picking errors that can occur, which cause immense costs and aggravate customers. Even experienced workers are not immune to this problem. In turn, this puts a high pressure on the warehouse personnel. In this paper, the authors present a mobile assistance system for warehouse workers that realize the new Interaction-by-Doing principle. MICA unobtrusively navigates the worker through the warehouse and effectively prevents picking errors using RFID. In a pilot project at a medium-sized enterprise the authors evaluate the usability, efficiency, and sales potential of MICA. Findings show that MICA effectively reduces picking times and error rates. Consequentially, job training periods are shortened, while at the same time pressure put on the individual worker is reduced. This leads to lower costs for warehouse operators and an increased customer satisfaction.

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INTRODUCTION

The four fundamental processes of a warehouse are (Tompkins & Smith, 1998):

1. To receive incoming goods for storing.
2. To store goods until they are required.
3. To prepare requested goods for shipping (picking).
4. To ship the picked goods (sometimes called packing).

Among all the processes of logistics, picking is the most problematic one because it is highly error-prone (Miller, 2004). Many different types of errors are known (Lolling, 2003): picking of wrong types or quantities of articles, complete omission of a type, and insufficient quality of delivered articles (see Figure 1). All these errors cause high costs for manufacturers and warehouse operators, either because extra shipments and returns are necessary, or, in the worst case, because contract penalties have to be paid.

In today’s lean production, where only small resource reserves are kept at the manufacturing site, the resources necessary for production are usually delivered to a customer just when he needs them. The orders are possibly known to the ware-

Figure 1. Picking errors