

PICK-BY-VISION TECHNOLOGY AS AN ADVANCEMENT IN LOGISTICS PROCESS SOLUTIONS

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Abstract: The aim of this article is to describe pick-by-vision technology as an effective tool for solving logistics process problems. The technology is the result of the work of TeamViewer Germany GmbH and is already in use in German companies. The introduction of this technology helps companies in several aspects and brings several benefits. It is not a complex technology that would need complex and therefore expensive software and hardware. The technology is because up to 80% of all information is perceived by sight. This gives the operator a free hand. Several advantages are described in the article below. The technology works with a pick-by-light device that is attached to the employee's hand. By scanning, the glasses display all the information the operator needs. No paper or other order tracking system or logistics processes are required.

Keywords: Pick-by-light, Pick-by-vision, Picavi, logistics systems, Real-Wear

1. INTRODUCTION

The rapid development of logistics is constantly forcing companies to adapt to new trends. Logistics is becoming a key and moving factor in the context of changing conditions in production and other processes. Companies must adapt to the growing trend of increased production, expanding product range, and other challenges. Automated logistics systems (AGVs) are a standard solution in in-house operations. Although AGVs are not new, their development began in the middle of the last century. Since then, they have undergone significant evolution to become modern computerized systems. Therefore, the issue of AGVs has become an important topic in current logistics research. It is a complex and multifaceted topic that touches different disciplines [1].

The development of logistics systems consists of the progressive development and implementation of new technologies, concepts, and processes to improve the management of the flow of materials, goods, and information through the supply chain. This evolution is historically divided into several phases, with each phase bringing new innovations and approaches. The manual phase, which represents the first phase of logistics systems, processes were predominantly manual and based on human labour [1, 2]. The company relied on manual processing and tracking of materials, which often led to errors and delays. Subsequently, as companies began to introduce computer systems and software applications, logistics began to be automated. In the 1970s and 1980s, early warehouse, order, and inventory management systems began to be used.

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In the 1990s, integrated enterprise systems (ERP) were developed, which included logistics components. These systems enabled better coordination of different processes and departments within the company.

The advent of the Internet and e-commerce brought new challenges. Logistics systems had to adapt to the increasing volume of online orders and deliveries [3].

In the 21st century, technologies such as RFID (Radio-Frequency Identification) and IoT (Internet of Things) have become widely used, enabling more accurate tracking of goods in real-time.

With advances in robotics, automated logistics systems (AGVs), autonomous vehicles and robots have emerged to handle materials in warehouses and distribution centres [4].

Today's logistics systems use powerful data analytics and artificial intelligence to predict demand, optimize routes, minimize inventory, and improve the performance of the entire supply chain.

The latest development is Picavi glasses, which help to make logistics handling easier when that worker always has both hands free. The glasses themselves work with pick-by-light technology.

Pick-to-light systems also referred to as pick-by-light, are primarily known in the logistics industry. It is a paperless method of order processing and picking, where the appropriate shelf positions are lit up based on data from the company's system. The reverse task, i.e. sorting items back to the correct shelf position (put-to-light system), can also be handled in a similar way. Similar problems have to be solved not only in large logistics warehouses but also in the case of production and assembly lines and in other areas of industrial automation [5, 6].

2. PICAVI PICK-BY-VISION

80% of the information we receive comes through our eyes. This fact is the key to one of the most significant developments in intralogistics.

Picavi pick-by-vision is the perfect symbiosis of modern technology and natural movements. The system uses smart glasses for visual guidance, enabling highly flexible work free of fatigue. It has proven itself in both intralogistics and industry.

TeamViewer Germany GmbH has created smart logistics glasses. Smart pick-by-vision glasses and individually tailored accessories create the perfect logistics process. Whether you need an external power supply for the smart glasses via Picavi Power Control or additional hardware such as Bluetooth scanners, we are your partner for a complete pick-by-vision solution. Such a solution is shown in Figure 1.

The company quotes statistics of operator time savings of up to 40%. The operator is thus exposed to less time pressure and is expected to make fewer errors. Another important factor for the implementation of pick-by-vision is the acceptance by the employees themselves. A possible reason for non-acceptance of the equipment could be the fear of losing the job position. With pick-by-vision technology, the operator is still needed, so there is no need to replace the operator; on the contrary, the technology will make the operator a more desirable employee. The acceptance factor is 100% [7].

Another advantage is the freedom of both hands. With this technology, the operator just scans the QR code or barcode, and all the information is displayed on the glasses where they can check it, add a comment, or cancel the download and scan again.

Training for employees is by demonstration, so another advantage of this technology is the speed of training. Handling is simple, easy to understand, and practically immediately implementable. The training time is given by the manufacturer as 15 minutes, but it all depends on the size of the data the operator encounters. The implementation time of the technology in logistics processes is quoted at 6 to 12 months [15].



Figure 1. Pick-by-vision technology

Picavi Cockpit (Figure 2) is the business intelligence solution within our Picavi ecosystem. It allows pick-by-vision picking to reach its full potential. The software integrates mobile device management (MDM) and the comprehensive smart data Analytics function. In addition to managing and administrating your inventory of smart glasses, it transforms big data into smart data. Find out why Picavi Cockpit is valuable for your logistics in more ways than one [7].

Mobile device management in Picavi Cockpit lets you economically control and manage your smart glasses. This makes it easy to ensure they are working correctly. With our one-scan setup, we have made adding new glasses to the inventory even easier. You can start the configuration just by scanning a barcode. The glasses are then ready for use after just a few steps [8].



Figure 2. Picavi Cockpit

The advantage of using Picavi Cockpit is the possibility of wireless updating for smart glasses. This represents a reduction in support costs, and everything is done in compliance with security standards. Remote commissioning is also possible. Mobile device management allows the smart glasses to be set up remotely. The glasses are connected to the respective site via the Picavi Cockpit. For this purpose, there is a dedicated function in MDM that connects the smart glasses to the Picavi Cockpit and the WLAN network at the site [9].

The screencast function allows advanced training for your new employees. All the information the user sees on the smart glasses is projected on the screen in real-time. This makes it easy to illustrate all the necessary work steps to new colleagues.

Within analytics, pick-by-vision technology improves the performance of process data (Figure 3.). The smart data analytics function allows you to use process data generated during order picking. This gives you a constant overview of all important KPIs, which you can then use to find areas for improvement in your logistics. The solid database created by this process forms the basis for changes in the technical infrastructure and the arrangement of items in the warehouse [12].

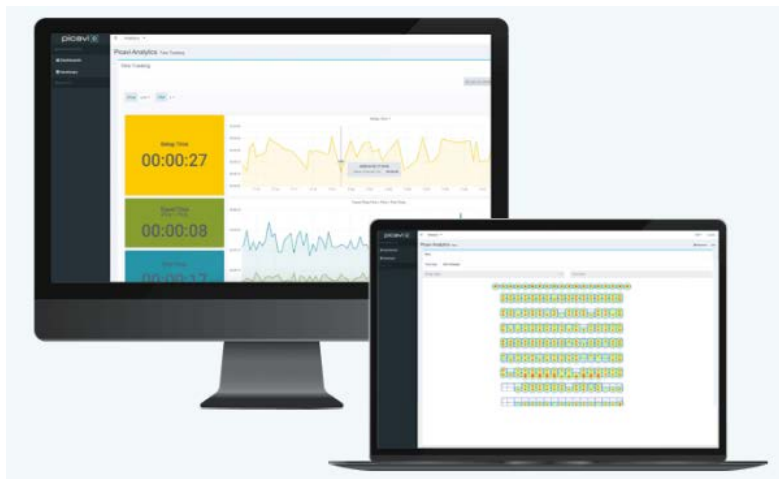


Figure 3. The analytics smart data

TeamViewer Germany GmbH was the first provider to extend voice messaging to pick-by-vision. Important messages can be exchanged between the control station and the worker directly during operation. The remote support feature allows your warehouse workers to communicate contactless, bi-directionally, and individually. In addition to text messages, users can also send voice messages directly to the control station via the microphone integrated into the smart glasses.

Picavi Pure enables instant integration of picking by vision into any warehouse. It is easily and directly connected to an on-site ERP or warehouse management system. No middleware, no proprietary server, and no hosting.

Picavi creates an interface between the smart glasses and the software environment in the warehouse using off-the-shelf communication modules (Figure 4). The software uses these modules to communicate in two steps. First, it requests subscription lists optimized

for the route and then sends feedback to the software after the subscription orders have been processed.

Picavi Pure is exceptional because it sets up so quickly. The order-picking system also remains flexible during operation, allowing you to restructure stock or change processes easily.

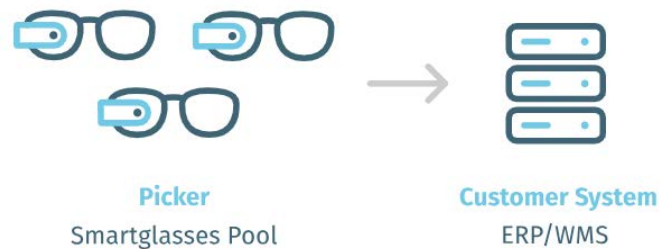


Figure 4. Warehouse connection system

Picavi exchanges data with the warehouse management system or ERP that manages inventory. The interface is set up to allow seamless data transfer between systems in real-time. Any existing interfaces to picking systems already implemented by the WMS manufacturer are typically compatible with Picavi pick-by-vision. We have already set up Picavi interfaces for many versions of leading warehouse management systems such as SAP WM/EW. These can be easily adapted to the specific application [10].

3. USE OF TECHNOLOGY IN PRACTICE

Companies are constantly looking for ways to streamline their processes and improve work performance. In the era of digitalization, RealWear's innovative smart glasses technology is a key factor that is transforming the way logistics operations are carried out. The company worked directly with a leading server and data rack manufacturer on this project [13].

This globally operating company with a long history and offices all over the world has found a supporting force in our solution. This solution allowed employees to replace cumbersome and unwieldy mobile terminals with RealWear Navigator™ 500 smart glasses. This option greatly improved handling and speed of work when picking orders [14].

To make barcode scanning and handling easier, we incorporated wrist scanners from ProGlove, a company we are actively working with on several projects. By combining these technologies, we have increased work efficiency and allowed us to work with both hands without limitations.

The return on investment lies in a faster cart assembly process, with the new process taking 9 minutes less per cart compared to the previous solution using mobile terminals. This represents a significant increase in efficiency, especially given that 21 trolleys with 64 items are picked each day. Importantly, it has also been possible to eliminate the dropping of picked items during the process and the number of damaged mobile terminals has been reduced. This has led to an overall return on investment, with efficiency increased by up to 30% and the number of damaged mobile terminals reduced to zero.

The AYES company has created a comprehensive solution for Continental Automotive Czech Republic to digitize manuals using Microsoft HoloLens 2 smart glasses and

TeamViewer Frontline Spatial software. These technologies are currently helping in a pilot project to train operators on a new production line.

However, Continental was looking for a different solution to create augmented reality tutorials to train operators at two sites on the new production line. One that would not only display text and images but also more advanced animations and work with 3D models of the real components that the operator would be assembling at that station. The solution tested for the pilot operation ended up being a combination of Microsoft HoloLens 2 smart glasses and TeamViewer Frontline Spatial software.

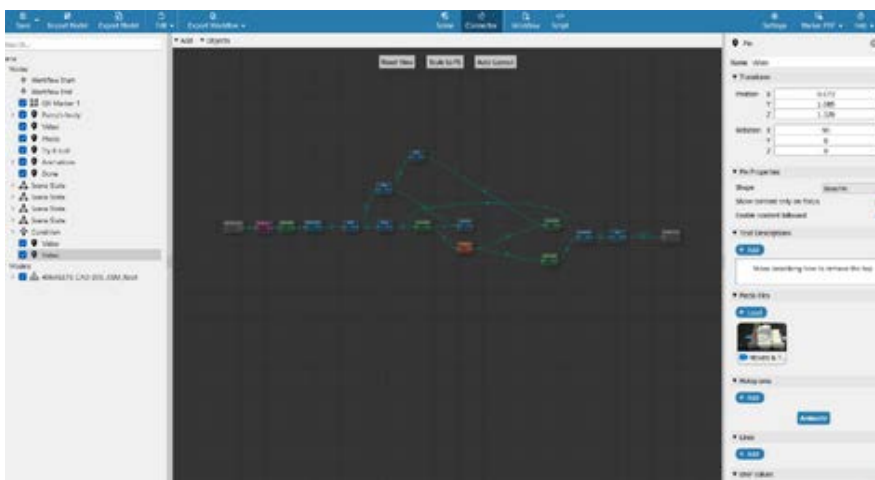


Figure 5. Preparing tutorials in the program [source: AYES]

TeamViewer Frontline Spatial extends the Frontline platform with 3D augmented reality capabilities. It is a very user-friendly tool with an attractive environment. Clear instructions and navigation make working in it intuitive and efficient. Even after a short introductory training, any employee can create high-quality 3D workflows without having advanced programming knowledge. The preparation of digital instructions can therefore be entrusted to less experienced staff, freeing up capacity for dedicated engineering teams [11].



Figure 6. TeamViewer Frontline Spatial allows you to work with 3D models and create animations [source: AYES]

4. CONCLUSIONS

In this article, we described pick-by-vision technology. It is a state-of-the-art technological advancement in the field of logistics processes. TeamViewer Germany GmbH offers a total solution for this technology, total delivery support, and training. This technology is already used in companies and reviews say it is easy to use.

The most notable benefits from businesses already using pick-by-vision technology are identifying areas for improvement using process data, analysing the steps of the pick-by-vision process in detail, shaving out disruptive factors in the warehouse, such as poor WiFi coverage, individually tracking all-important KPIs such as picking per hour, picking on site, etc., report data presented on an intuitive, user-friendly dashboard, tools to improve ergonomics when picking orders, productivity increases, time and cost savings.

In the last chapter, examples of linking pick-by-vision technology in enterprises are given. AYES reports on the return on resources and the efficiency of implementing this technology in the logistics process. Also, from the point of view that this technology is new in the world of logistics some companies are already implementing elements of pick-by-vision (Lear Corporation, Mondi, CEZ Group, LASCAM, HENEKEN Group, HF SLOVAKIA, and others).

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