

WHITE PAPER

AI and the Business of Fashion



Accurate
Operation





Moving the world intelligently

Website: <https://www.GeekPlusRobotics.com/>
Email: Global.Sales@GeekPlus.com.cn



The return of tailoring

Artificial intelligence will bring mass customization to fashion

Many industry experts have predicted the coming era of what is called “mass customization”, when a much larger proportion of goods will be, in effect, tailor-made to suit individual customers.

The fashion industry is certainly one of the industries which lends itself to mass customization because so many consumers want to make a statement through their choice of clothes – whether it’s through T-shirts, trainers or more complex garments which could be classed as haute couture.

And while it is the big companies, such as Nike and Adidas which are making the headlines with offers of customized trainers, more traditional fashion houses may well be the ones that really propel the market forward.

Today, the high-end fashion houses may offer custom designs, but they would charge a small fortune for doing so. But by using artificial intelligence at every step of their supply chains – including fast-moving, efficient robots in their warehouses – big brands could become almost like personal couturiers to massive numbers of people.

Not that they want to

Premium brands may avoid this to keep their products valuable through scarcity, but the AI and robotics technology available today gives the traditional, boutique or individual tailor, seamstress and other crafts people in the clothes-making sector the opportunity to make a profit while remaining small scale. ■



Ignoring robotics and AI has cost retailers business

Artificial intelligence is here to stay. Sometimes it may sound like people are just using the term to make themselves sound topical or contemporary, but the fact is that AI is having profound effects on all industries and businesses, and, increasingly, society at large as well. And some would argue that this is just the beginning.

It's only in recent years that the computing power has become available to run programs that use AI algorithms. In the past, you would have needed an expensive supercomputer. Today, most large-scale AI applications are run on cloud computer networks. So it's no surprise that the leading companies in AI happen to also be the leading providers of cloud computing services – companies such as Google, Amazon, and Microsoft.

One of the above-mentioned companies – Amazon – is of particular interest for several reasons:

- Amazon is widely thought to have invented cloud computing,

Types of artificial intelligence

Artificial intelligence is a general or umbrella terms, within which there are many specific types of AI. Some overlaps are inevitable between different definitions, but the ultimate goal is to mimic human intelligence.

Artificial intelligence

An umbrella term referring advanced computer intelligence, although the term is debated.

Narrow AI

Designed to perform one task at a time and improve its execution through repetition.

General AI

A concept referring to AI that can learn and perform many tasks. This is still being developed.

Machine learning

Programs systems to learn and then make progress based on that learning.

Supervised learning

A type of machine learning where the system can base predictions on past data.

Unsupervised learning

Machine learning which is more flexible and initiative-driven, often spotting new patterns.

Reinforcement learning

Machine learning systems which are trained through rewards and punishments in a virtual sense.

Deep learning

Specialised form of machine learning, designed to mimic human neural processing.

AI tests

To see if a computer can flawlessly mimic a human. An example is the Turing Test.

and was certainly one of the very first companies to offer massive computing resources on a pay-as-you-go basis;

■ Amazon is the largest online retailer in the world and continues to grow; and

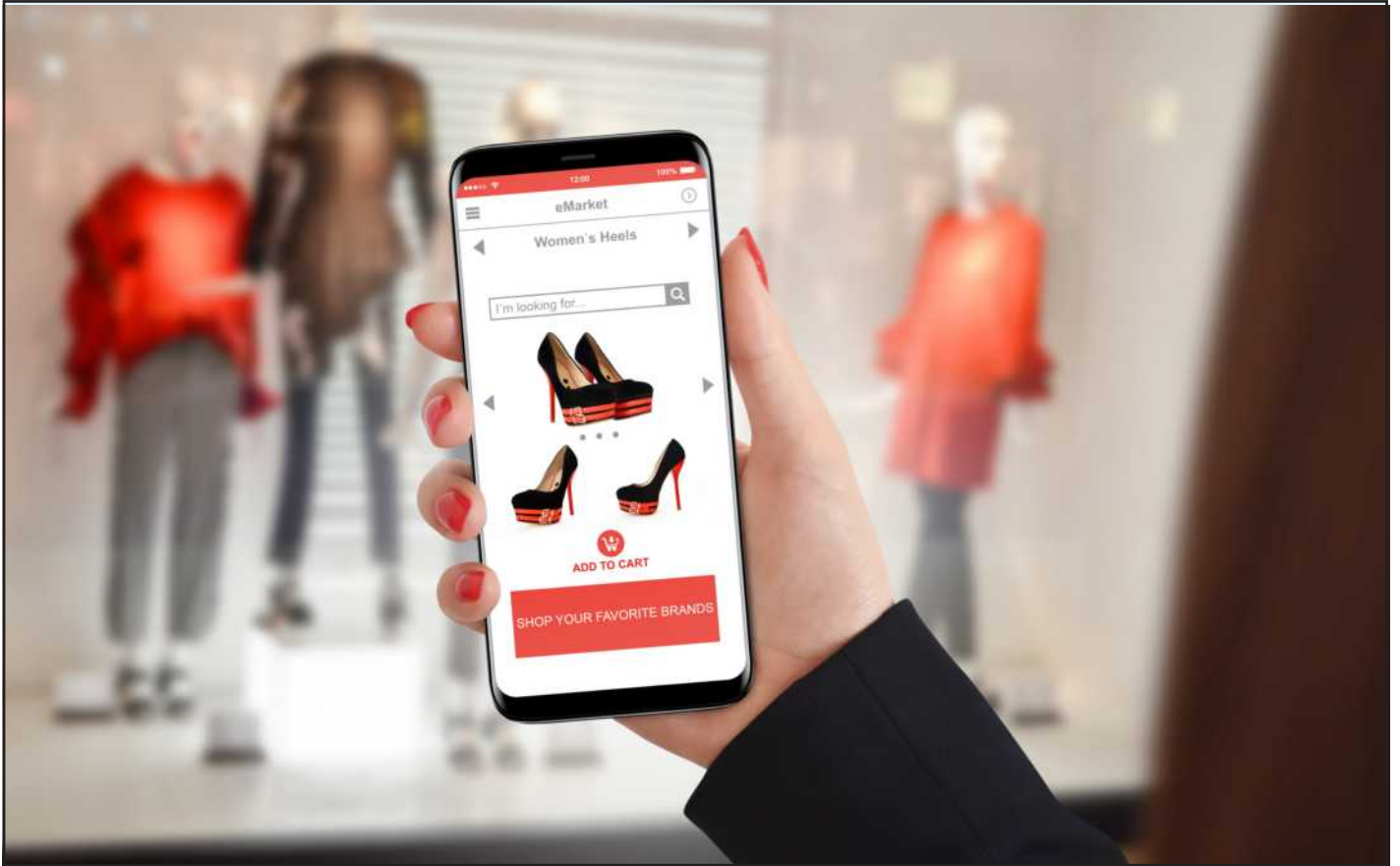
■ Amazon is the largest user of warehouse robots, having bought Kiva Systems for \$775 million in 2012 and proceeded to churn out tens of thousands of units – all for its own use.

All of these initiatives have AI at their core, and make Amazon an exemplary company in the retail and even logistics and supply chain sectors. Many companies are now following Amazon's example because they have seen the success brought about by such things as warehouse robots, a critical component in its ability to offer same-day delivery in some areas of the US. Robotics can help speed up a warehouse by around eight times.

The death of the high street

The phrase "the Amazon effect" has come to refer to what's said by the media to be "the death of the high street", where towns and cities all over America and Europe are seeing retailers close their bricks-and-mortar operations because of competition from online retailers – namely, Amazon.

But neither Amazon nor anyone else can be blamed for retailers ignoring AI and robotics, even as they could see Amazon taking their business away by using them. ■



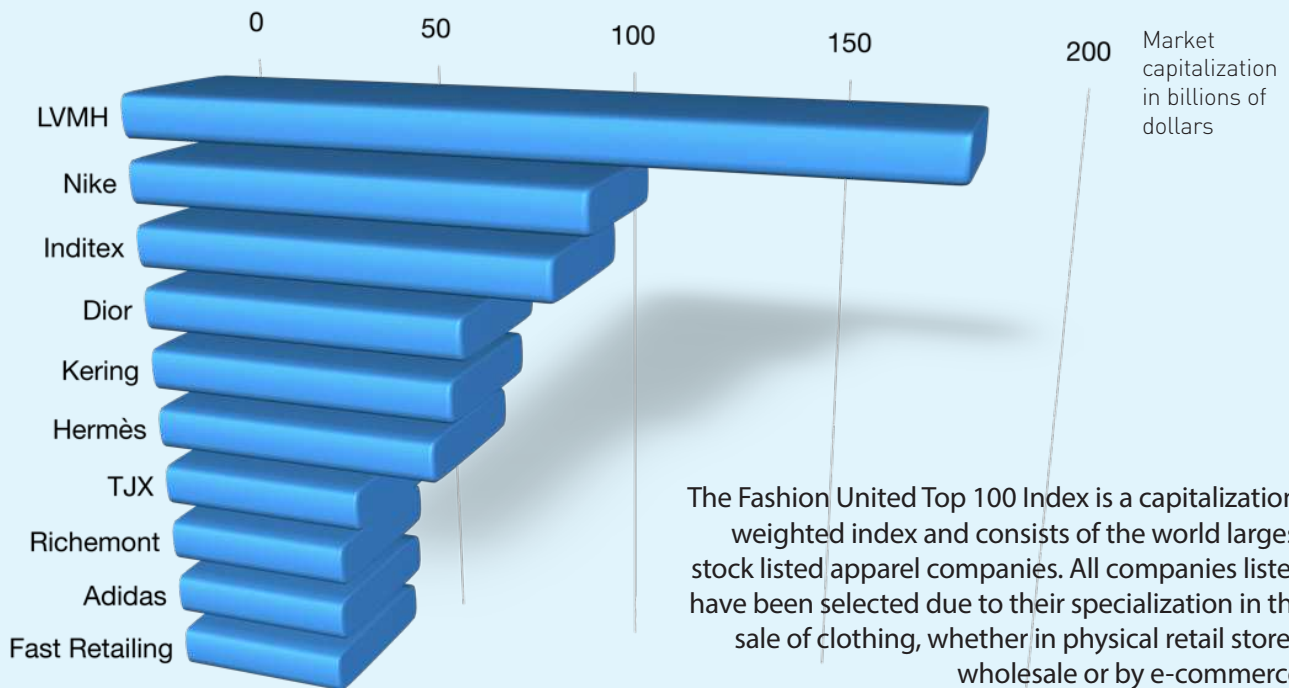
How AI is changing the fashion industry

Imagine entering a clothes shop that has mirrors which integrate cameras that not only observe the items you are checking against yourself but can also take your measurements and suggest other items that are in stock and might suit you. Perhaps it can also create an avatar of you on the fly and show you how you would look wearing a variety of items.

Not only might this enhance your shopping experience, it may more or less ensure that you end up buying something. And even if you don't buy something immediately, the data collected by the "smart mirror" – if it can be called that – could be used to email you or otherwise contact you long after you've left the store, continuing to suggest items or letting you know of new fashions that have arrived.

Many of the elements of the system described above are already in operation in some physical stores in different parts of the world, and this makes for a shopping experience that may

World's largest fashion brands



The Fashion United Top 100 Index is a capitalization-weighted index and consists of the world largest stock listed apparel companies. All companies listed have been selected due to their specialization in the sale of clothing, whether in physical retail stores, wholesale or by e-commerce.

Source: FashionUnited.com

bring back more people to traditional bricks-and-mortar stores instead of shopping online.

Either way, digital or real world, providing such a shopping experience relies on artificial intelligence, which essentially mimics what a human personal shopper might do – something that only rich people may have been able to afford in the past.

Now, everyone can have their own personal shopper – except that personal shopper is an AI algorithm.

Behind the smart mirror

The smart mirror scenario outlined above is not necessarily one that is used by retailers, but there are certainly many instances of AI-powered data analysis.

Kering, for example, has created an algorithm that uses AI to identify customers who were most likely to respond to personalised marketing efforts.

Some people might not like imparting so much data about themselves, but there is of course no requirement to share your data, or you can opt out. For those who don't mind sharing their data, in-store identification can link their digital and physical personas, which is what Alibaba and Taobao do.

Levi's, meanwhile, uses AI to improve its stock-keeping, making sure the right sizes are available at the right time. Similarly, Nike is using behavioural and geographical data

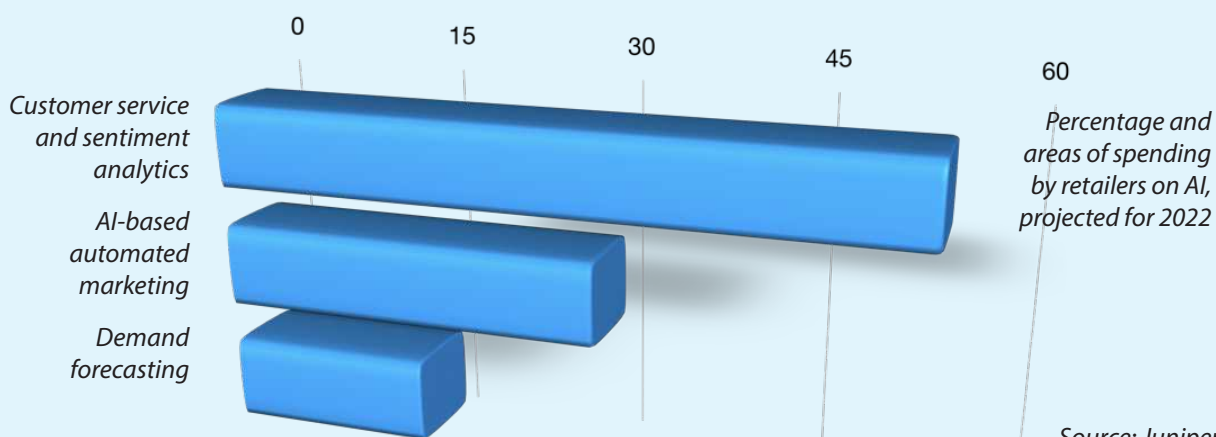
What is the fashion industry using AI for?

There are a large number of ways that the fashion industry uses artificial intelligence, and the sector spent a total of \$2 billion on AI in 2018. That figure is forecast to increase to \$7.3 billion a year by 2022, according to Juniper Research.

Juniper found that AI-backed demand forecasting is increasingly becoming a key tool for retailers. With the advent of specific days for shopping, such as the Black Friday

phenomena, understanding customer demand and correctly planning based on this is more important than ever.

Juniper suggests retailers must invest in this area in order to stay competitive, particularly in low-margin retail segments. It noted that the cost of AI tools, currently uneconomical for many players, will drop by 8 percent over the next four years, helping realise a 300 percent increase in software spend.



Source: Juniper Research

collected through its app to decide what to stock at its stores.

Such data is useful in parts of the retail operation beyond the store – in the supply chain and warehouses, for example, where things have changed dramatically in many ways.

Whereas in the past, fashion retailers used to decide what they will release in a given season, and what they would stock in their warehouses and stores, nowadays the whole operation is more responsive to consumers' ever-changing tastes and demands – not just as large groups, but individuals as well.

What this means in theory is that the person who makes the clothes in the factory is better connected than ever to the end customer through the use of AI.

Closer relationship

The only example of a closer connection between consumer and manufacturer in the apparel world is the relationship between a tailor or seamstress with his or her customer, who usually pays a visit in person to get measured up for their clothes, which is made specifically for them.

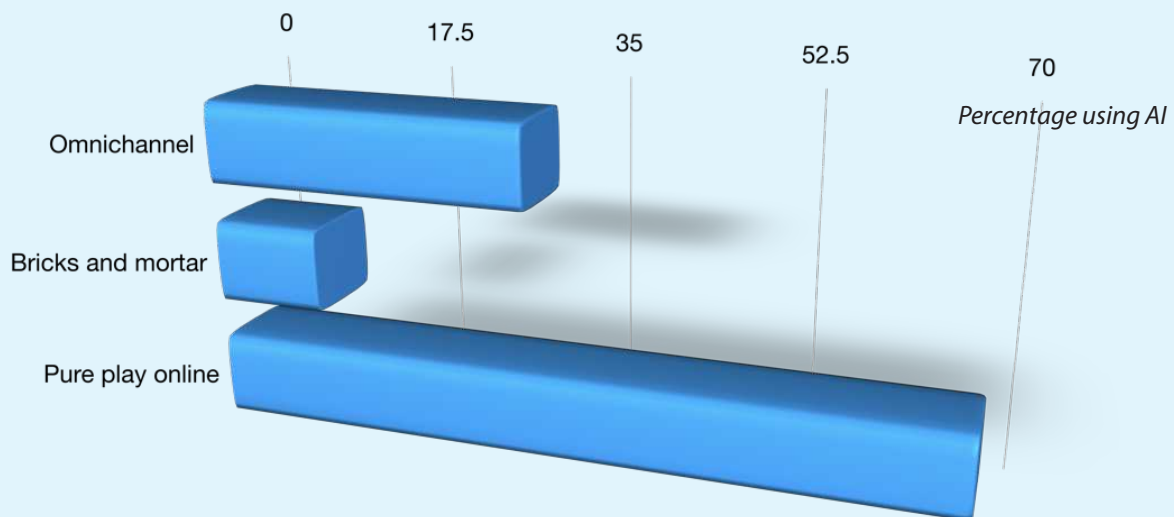
Simulating that direct relationship appears to be the ultimate aim of fashion retailers for obvious reasons – fewer unsold items, less inefficiency all along the supply chain, greater turnover, and happier customers.

As recently as three years ago, famous shopping streets in

Which type of retailer is using AI the most?

It may surprise some people, but bricks-and-mortar stores – or traditional high street shops – have been rather slow and tentative when it comes to investing in digital, with only 10 percent of them using AI. By contrast, what are “pure play

online” stores – meaning those that do not have high street outlets – are way ahead on almost 70 percent. Thirty percent of omnichannel retailers – the ones which have a foothold in both the digital and the real world – have invested in AI.



Source: Vogue Business

London and New York were filled with large, famous stores which operated as though their bricks-and-mortar stores were viewed in exactly the same way as they have always been – the perception seemed to be that the stores were the only place to buy their goods. Even if some stores had a website through which they sold their goods, their annual reports tended not to drill down into the details of how their digital operations were doing. It was as if the websites and online shopping did not exist.

This was clearly an indication of having lost connection with, or having simply ignored, the seismic shift brought about by online shopping. Consequently, many of these retail stores – some of which were established around a century ago – are now struggling to stay in business, with the government getting involved in trying to find solutions to the malaise.

Now, with a restructuring of the fashion industry and its associated retail segment well under way, it seems obvious that there is no real alternative to the implementation of AI throughout the operation and the introduction of robotic and automation technologies in warehouses and anywhere in the supply chain that would benefit.

One of the possible end results of the current trends is that clothes manufacturers directly sell to consumers, in much the same way that tailors supply their customers, except it would be on a much larger scale. And AI is at its best at large scale. ■



How AI is changing the warehousing sector

The fashion industry is investing huge amounts of money in artificial intelligence systems that can provide what is called “sentiment analysis”, which is similar to customer feedback, except that it’s indirectly acquired. Typically, sentiment analytics systems can gather information from social media pages as well as through natural language processing, perhaps through listening to customer phone calls.

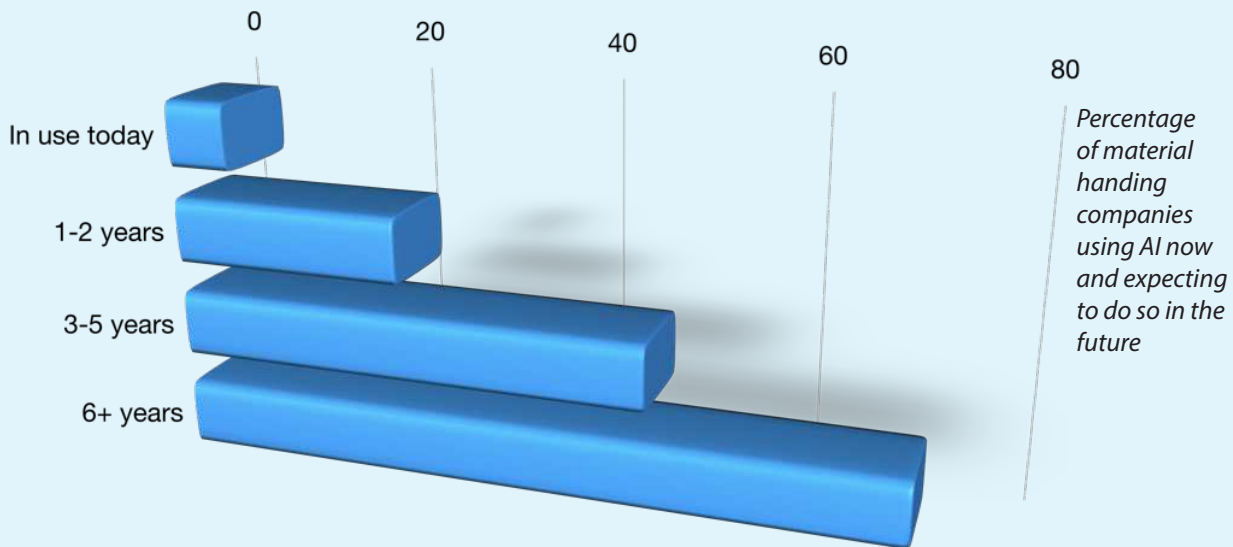
A massive number of data points can be collated and analysed – a quantity of information that only an AI system can process. And after processing it all, conclusions can be drawn. For example, sentiment analysis can help discover whether people are speaking positively about some products or negatively about others; or it can collate and organise all reviews; or it can monitor the news media to see if the brand is being mentioned, and in what context.

Usually, all of the information collected and then what might

The presence of AI in material handling

Material handling – or warehousing – may have traditionally been thought of a relatively low-tech sector, especially when it comes to computers. But now, there is a huge number of systems available for automating the material handling

process, from robots to software, all of which use AI and can be applied at an affordable and in a customized way. So it is surprising to see that only 6 percent of warehouses currently use significant amounts of AI in their processes.



Source: Material Handling Institute

be called “real” intelligence ultimately needs to be applied. While an AI system can make simple judgments, such as if an item is being positively discussed and reviewed, it’s obvious that the item in question could do well if it was continually stocked. However, it is ultimately a human who will have to make decisions about how to respond to stories in the media, for example. And anyway, it’s not often the case that products are universally liked or disliked – the human will probably have to decide what to do about the balance.

But whether it’s a human or AI that makes the decision about which products to manufacture, the supply chain aspect of the operation needs to be fast enough to take the product to the market and customer before tastes and fashions change.

The warehousing aspect of the supply chain, in particular, is a critical part of the product’s journey. A warehouse can be something of a bottleneck, slowing down distribution, if it is a traditional type of facility, of which there are still a surprising number still in existence.

According to the Material Handling Association, the vast majority of warehouses do not use advanced technologies such as AI and robotics. In fact, the MHI found that just 6 percent of warehouses have implemented robotics and AI so far. However, that number is set to grow almost four-fold, to 23 per cent, within the next two years as warehouses prepare to invest in

Sales of apparel and accessories in the US

Sales of apparel and accessories in the US have grown consistently year on year for around a decade. Much of the growth has come from the digital and e-commerce sector. As can be seen from the graph on page 9, the

retailers categorized as "pure play online" have been the most receptive to innovations such as artificial intelligence and robotics, which can speed up fulfilment dramatically, particularly for high-mix, low-volume warehouses.



Source: eMarketer

the new technologies that will help them deal with a number of challenges facing the industry.

Apart from intense ongoing competition in a low-margin market, warehouse operators are having to deal with difficulties in finding human workers who are willing to stay in the job for any significant length of time. Constantly advertising for new workers, hiring them, and training them costs money, further eating away at margins.

The e-commerce market may be booming, but many warehouse operators are finding the going quite tough.

But robotics and AI offers a solution which would change the fortunes of most if not all warehouses. No longer do they have to think of automation as expensive installations of fixed infrastructure such as conveyors and large, grid-like automated storage and retrieval systems, they can hire small autonomous mobile robots which can do the job.

The advantages of autonomous mobile robots are many. To begin with, a warehouse could be completely empty today, and a fully functioning, highly efficient and productive warehouse within a few weeks if the autonomous mobile robots option is chosen. Geek+ says its system can not only be installed within weeks, the time to see the return on investment is much shorter than with traditional warehouse automation systems. Moreover,

Artificial intelligence in warehouse robots

Warehouse robots are increasing in number and type every day. At the same time, the amount of tech each one packs is also growing. Here are the most advanced AI-based systems being used by warehouse robots.

Mapping

Robots use AI algorithms to collect, organise and retrieve data about, and map, the environment they are in.

Navigation

Autonomous mobile robots navigate using laser and vision systems, and do not need external guidance technologies.

Collision avoidance

Single robots as well as swarms can operate at high speed without colliding into anything.

Identification of SKU

Using scanning and other technologies, robots can identify individual stock units.

Dynamic location

Robots can decide to rest in places where they will be most often required, based on data.



Source: Geek+

autonomous mobile robots are ideal for a high-mix, low-volume orders, which is perfect for today's mass customization environment, where more people will want a greater variety of products than ever before. And they will want it, like, yesterday.

The days of waiting for six weeks for the mail-order catalogue company to deliver your order are long gone. Same-day delivery is the aim for some retailers.

In terms of the AI integrated into autonomous mobile robots, it's a growing list. At the moment, Geek+ says its robots feature the following AI functionalities:

- mapping;
- navigation;
- collision avoidance;
- identification of SKUs; and
- dynamic location.

The last one on the list deserves a more elaborate explanation because it's quite sophisticated. Dynamic location is the term being used, but what it basically means is that the robot is connected to the cloud, which stores data about which goods are selling fast and which ones slow.

The robot will autonomously locate itself closer to the order-picking station if its shelf contains faster-moving goods, and further away if it's slower-selling goods. AI at its simple best. ■



AI and the IoT are critical to continuing growth

Most broad conversations about artificial intelligence often bring up science fiction films such as *The Terminator*, where the self-aware AI system decides that human beings are a threat to its continued existence and then proceeds to try and kill all of them. A frightening prospect expertly depicted on film, but probably ultimately unhelpful in understanding the majority of AI activity in societies today.

The Terminator debate usually revolves around the subject of AI in the military, and there are basically two sides – people who want AI systems to pull the trigger and, on the other side, people who say it must always be humans who decide to fire or not.

But that debate or nightmare scenario is, for the moment at least, largely academic because AI is not being used to its full capability in the military, while in the business sector and in society in general, AI is effectively taking over many, many functions and tasks which used to be performed by humans –



and the pace of this takeover is accelerating.

The vast majority of what AI does is not obvious. Most people simply don't notice what AI does even though they carry around an object which is jam-packed with AI functionality – their smartphones, which could be described as a mini-supercomputer if the standards of computing from only a couple of decades ago are applied.

Not only do smartphones and their slightly larger relatives, tablet computers, contain and use a lot of AI, they also provide access to an even larger amount of AI power. Many people in industry today use such mobile devices to manage large machines or even entire factories and warehouses, often through connections in the cloud.

The technology – both the hardware and software infrastructure – that enables such activity is relatively new and is often described using the term “internet of things”, or IoT, which can be thought of as a network of sensors attached to machines, devices and appliances which, in turn, can be monitored and managed remotely or from a central location using smartphones, tablets or other computers.

It's difficult to overstate the effect of the IoT, especially when you consider the reports about how much value is being added by the technology. For example, networking giant Cisco estimates that the market for the IoT will surpass \$14 trillion by 2022, with efficiencies and individualisation accounting for a significant portion of the total.

Cisco says more than \$9 trillion of this will be generated through industry-specific use cases such as smart grids, connected commercial vehicles and so on; and almost \$5 trillion will come from from cross-industry use cases such as telecommuting and so on. The company's report breaks down the market further, predicting where the value will come from:

- \$3.7 trillion from improved customer experience;
- \$3 trillion from reduced time to market;
- \$2.7 trillion from supply chain and logistics;
- \$2.5 trillion in reduced costs; and
- \$2.5 trillion in increased employee activity.

Most of the above items are indirectly relevant to warehouse robots, but two findings in particular are underlined by findings by Geek+ in its analyses of warehouse operations. Specifically, that using warehouse robots increases picking productivity to an average of 300 pieces per hour, where manual picking was achieving 60 to 80 per hour. Such multiples of increases in productivity show why retailers would be well advised to adopt new technology rather than ignore it and go the way of many traditional, high-street, bricks-and-mortar stores. ■



Moving the world intelligently

Website: <https://www.GeekPlusRobotics.com/>
Email: Global.Sales@GeekPlus.com.cn