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TYPES OF ROBOTS

АННОТАЦИЯ. Основные цели этого текста - найти разницу между роботами-упаковщиками, выяснить, какие типы роботов можно встретить в нашей жизни в самых разных областях.

В тексте рассматриваются типы роботов, которые существуют в нашей жизни, различия между упаковщиками роботов, каждый из которых выполняет свою функцию на конвейере, и робот корпорации Nuspark.

КЛЮЧЕВЫЕ СЛОВА: робототехника, мехатроника, автоматизация.

ABSTRACT. The main purposes of this text are to find the difference between robots packers, find out consider the types of robots that can be met in our lives in various areas and key problems of mechatronics.

The article considers the types of robots that exist in our lives, the differences between robots packers, each of which performs its function on the conveyor and Nuspark Corporation's robot.

KEY WORDS: robotics, mechatronics, automation.

There are many types of robots: from Rosie's maid robot in "Jetsons" to the famous Star Wars droids, R2-D2 and C-3PO, Arnold Schwarzenegger as cyborg in "Terminator", "Robocop", "I Robot", Matrix, in the movie called "Robots", people have long been fascinated by the idea of robots. Although in the past people only fantasized about them, today many kinds of robots are a reality. For example, there are industrial robots, robot toys that entertain us, robots that help in space exploration, robots used in the medical field, robots used in agriculture, humanoid robots for the service sector, the performance of household duties or guardians for the elderly and disabled. Below there are some of the types of robots that were conceived, many of which are already being actively used.

Industrial robots: today robots are used in a wide variety of industries. Any work that includes repeatability, accuracy, endurance, speed, and reliability can be much better done by robots, so many jobs that people used to do are increasingly performed by robots. For example, over the past 30 years or so, the robots have gradually moved to fully automated production lines in the automotive industry in which the vehicle chassis is conveyed along the conveyor belt and welded, attached, painted, and assembled by a robot sequence.

Mobile robots: also known as automated controlled vehicles or AGV, they are used to transport materials in large sizes, such as hospitals, container ports and warehouses using wires or markers placed in the floor, or lasers or eyesight to experience this environment, in which they work. The advanced look of AGV is SGV or a self-learning vehicle, such as PatrolBot Gofer, Tug and Speci-Minder. These robots have the ability to perform tasks that are inconsistent and not repetitive in complex environments, therefore as smart robots.

Robots used in agriculture: although the idea that robots plant seeds, plow fields and harvest, may seem to be directly from a futuristic science fiction book, nevertheless, in the experimental stages of agricultural use, there are several robots, such as robots that can collect apples, prune grapevines, planting seedlings, etc. In fact, there already exists a type of robot that shears sheep in Australia.

Telerobots: These robots are used in places for humans, either inaccessible or far away. The human operator, located at a distance from the telerobot, controls its action, which is performed using the lever of the space shuttle. Some other examples of telerobots are a laparoscopic operation performed with the help of a telerobot. Physicians using remote solutions to communicate with their patients, which allows them to treat patients anywhere in the world. This has potential hazards to people, as patients in remote places in the world can consult with doctors around the world, and doctors, in turn, have the ability to monitor them.

Also, telerobots are especially useful for space exploration. For example, robots used to service satellites, robotic weapons for production in space, robots used for the construction of spacecraft and space stations, and so on.

For example, an unmanned aerial vehicle, for observation, and also shooting at targets. Some of them have even advanced to the level, allowing you automatically to make decisions, such as choosing a place to fly. Many of the television robots are used by the US military in Afghanistan and Iraq for the spread of IEDs or improvised explosive devices. Unmanned land transport, or UGV, can carry out military missions independently. For example, robots used to service satellites, robotic weapons for production in space, robots used to build spacecraft and space stations, and so on.

Telerobots are increasingly used for military purposes, for example, an unmanned aerial vehicle used for surveillance, as well as firing at targets. Some of them have even advanced to a level that allows you to automatically make decisions, such as choosing a place to fly. Many of the television robots are used by the US military in Afghanistan and Iraq for the spread of IEDs or improvised explosive devices. Unmanned land transport, or UGV, can carry out military missions independently.

Service robots: the Japanese are in front with these types of robots. Essentially, this category includes any robot that is used outside of industrial facilities, although they can be divided into two main types of robots: the robots are used for professional work, and the other robots are used for personal use. Among the above robots, there are robots for military use, that is, robots that are used for underwater work, or robots for cleaning hazardous waste, and the like.

Personal robots are becoming more popular, with increased sophistication in artificial intelligence they are becoming more accessible, and they can be seen in areas such as care, robots for pets, house cleaning and entertainment.

Creating a surprisingly walking humanoid Asimo gave impetus to a number of others, such as a housekeeper-robot named Vakamaru and Aibo-robot dog. In addition, there are popular competitions ROBOCHON held in Japan. Another area where robots are introduced for personal use is in the care of the elderly. In the countries where the number of elderly people with relatively fewer young people is increasing to ensure their care, due to low fertility and longer life expectancy. These robots are designed in such a way as to provide physical services, such as the transfer of elderly people with

disabilities (or even disabled people) or their washing, as well as performing various other daily tasks. There are robots designed to provide psychiatric services.

As it can be seen, the trend is aimed at the development of increasingly complex humanoid types of robots with human physical characteristics and intellectual abilities.

Packing robots

Packing robots perform tasks that are not found in other applications, so the use of instructions for an automotive or welding robot is inappropriate. Here's a look at the management strategies specific to packaging.

XPAK USA, LLC has developed an iridescent robotic packer with Schneider Electric support, specifically to help contractors and smaller manufacturers automate the repackaging process.

What distinguishes a robot packer from a welding robot is that a robot that processes materials, a robotic dye and a robotic assembler, as well as a configuration of traditional SCARA, portal and hinged robots with consoles embedded in safety cages on the plant floor? For the most part, those industrial robots that move heavy objects from point A to point B, using mechanical end effectors to handle loads at relatively low speeds, are constantly looking for collisions.

When the robot moves the engine block, the programming questions revolve around picking up the block and moving it to a new location. Welding applications usually use articulated robots with a wrist, which requires all six axes to be synchronized around the radius - the center point of the instrument (CTI).

Packaging applications rarely require these two tasks - with the exception of a batching robot that is unloading or handling a tertiary package, since both primary and secondary packs have been completed. The configurations of the robot packer tend to be three-dimensional (Delta 3) and two-dimensional (Delta 2) manual configurations.

You can program the robot packer to use the same approaches that are used in engineering or welding, but different control strategies work better. The difference is in packing.

Tracking tape - in most packaging applications, it is critical to ensure that the conveyor belt continues to move. Thus, the robot must track the movement of the tape and calculate where the product will be on the tape after it is detected. This task often requires the robot to work in three-dimensional space: selecting objects from the tape, orienting them, and placing them in the tray on occasion. In some cases, the size of the object (more than 1 pound) will require the use of a two-dimensional robot.

The sorting belt - like the classic double tape - is in 70% of packaging applications. Two-dimensional robots are used here, since you must exhibit the product. Two-dimensional robots with sorting can perform several complex tasks.

Planning the way - collisions are not a big problem in packaging, since the robot is coordinated with the rest of the equipment. But you are working at high speeds - say, 70 cycles per minute - and the optimal path can give higher performance. In planning the way, you draw a spline in space at the shortest distance and with the smoothest accelerations in this space, then memorize it as a planned path. From this path, the robot moves to the clock positions and places the profile of the standard camera software in the position.

If you have programmed robots in the automotive industry, you probably used the remote. This method works in packaging, but may not always be effective for high-speed operations.

A robotic trough 3-packer works on the opposite end of the spectrum, which is ideal for high-capacity applications.

Acceleration control - Once the path is planned, you command the robot to run it at the programmed speed. What speed is correct? The client can arbitrarily calculate the speed of 60 cycles per minute. But they do not know overloads at the vacuum point and in the product, so they can incur damage or loss of control over the product due to excessive overload.

Acceleration (overload) control is a software function for programming the robot to the maximum speed while maintaining specific overload in all control dimensions (up, down, forward, backward).

Kinematics of the client - Ready-made robots usually use a standard management package, which includes software capabilities for kinematics. Such a package tends to limit the flexibility of the OEM to program the robot for a special application that is not contained in the standard package. Other robot designs face the same restriction as a global robot or robot on a stand, combining up, down and portal movements on a rotating base, a configuration commonly used to change tools on CNC machines. You can take a three-axis robot and add it to one of these robot formats. But the robot-packer system is not only a connection of robot types, but also the addition of unusual mechanics - such as cranking - to achieve complex mechanical movements.

With many systems of robotic packers, control over all the different planes in space is the core of the packaging machine, which allows the client to program everything he needs. Any unusual set of mechanics can be changed to measurements with a large number of degrees of freedom of the robot, and programmed.

A software that works with such programming is known as conversion. It gives the client a way to express his kinematics. Here is an example of the use of packaging.

Iridescent packages are multi-flavored packages of drinks, yoghurts, confectionery, snacks and other products in the size of one serving. For profitability, they are largely repackaged manually in distribution centers and joint packaging institutions - with the addition of cost, time, shrinkage potential, and sometimes less than ideal secondary packages.

More economically, they can be packed with robots that are equipped with a vacuum and servo.

The machine building corporation Nuspak mastered the art of two-dimensional robots for the case of packaging, sheathing, orienting and feeding operations. The robot can even double the performance by adding a second ELAU robot hand on the same frame.

The SetLine is the "older brother" of TwinLine, which is considered to be the very first case for packing delta-2. It is suitable for larger packaging operations, including food processing plants, where products can be diverted from specialized bottling lines for each flavor after packaging the tray / casing onto a separate rainbow

line. The SetLine machine can also be configured easily to pack jumbo fragrances on the main packaging lines.

The trend in packaging was to abandon third-party general-purpose robots in primary and secondary packaging for embedded robots implemented by packaging machine developers. Built-in robots are compact, provide good payload and freedom of movement, strongly synchronized with the rest of the packaging machine, and they are applied taking into account OEM knowledge of the packaging process.

The package packaging, in particular, was used by compact autonomous robots Delta 2. The Delta 2 robot from Nuspark Engineering Inc. can pack packets, empty bottles to fill, or orient and transfer packets from one belt to another. The second hand can fit on the same frame, doubling the bandwidth.

In all these examples, an IEC-compatible automation control system replaces the traditional branded black box robot controllers. Where complex kinematic algorithms are required, programming is the same as for "regular" servo packaging machines.

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