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Modern Methods of Automatic Identification

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At the moment, there are many ways of automatic identification. For example, contactless (magnetic card, chip card) and contactless; optical (Barcode, Data Matrix, OCR) and radio frequency (RFID, RTLS) and others.

Now we will compare the two most common methods of automatic identification: barcode and RFID tags. Let's analyze their pros and cons, and also find out which identification method is better.

One of the most well-known product identification technologies in world trade is bar coding. Product barcoding is a procedure that consists in assigning a specific code to any type of single product or its group (transport) packaging, thanks to which it is possible to identify the product. Barcoding directly refers to the application of a unique graphic image on the packaging of the product, which is a combination of white and black stripes of different widths, as well as a certain sequence of numbers. The barcode provides information about the product, the place of its production and the issuing organization. Barcoding is used to automate the entry of information about the product and, accordingly, simplify the turnover.

The first 3 digits contain information about the national characteristic of the company that acts as the manufacturer of the product (or the applicant for the code). At the same time, the code itself cannot serve as a confirmation of the origin of the goods – it only provides such information to the consumer;

the following figures (4-6) contain information about the manufacturer of the product; the following figures reflect data about the product itself; the last figure is of a technical nature. It is necessary to determine the correctness of reading the entire barcode (the correctness of its conversion). With the help of barcoding systems, it is possible to:

- Keep records of goods, their quantity, expiration date, nomenclature and weight;

- To form labels, TTN and other documents;

- Take into account the terms of receipt and shipment of goods;

- Analyze the demand for goods;

- Make a purchase plan;

- Automate payments with customers;

- Keep records of cash transactions.

- Disadvantages of barcoding:

- To work with barcodes, special equipment is required - scanners, label printers, etc.;

- The barcode cannot be changed or supplemented – it remains unchanged after being applied to the label;

- The data on the label is open for copying or forgery;

- Regulated location on the product or packaging (to ensure the availability of scanning);

- Weak protection from environmental influences, short-lived [1].

An RFID tag is an electronic device for receiving, processing, and resending a signal. RFID technology allows to recognize living beings, inanimate objects, including containers, vehicles and clothes. The radio-frequency identification method provides unlimited possibilities for improving business processes. The cost of transponders is included in the price of the final product, because the purchase of tags is a constant item of expenditure.

At the heart of radio frequency identification is the transmission and recording of data. Information by means of the radio-wave method is recorded on a chip. Then a special device is used to read the stored information from the circuit

A small object is affixed to or embedded in products. The tag can contain information about the product, the direct producer. Antennas are provided to transmit information to a transceiver.

RFID chips include a receiver, an antenna, a transmitter and a memory for storing information. Radiofrequency identification scheme of operation:

The chip receives power from its own power source or the reader's radio signal;

The antenna picks up the electromagnetic waves from the reader; external structures are permitted to receive the signal;

the radio chip transmits a pulse in response to the external signal.

The data to be downloaded and displayed in the interface is determined after the ID has been read.

An RFID tag consists of at least three components:

A chip that stores identification and user information. The chip is also responsible for communication with the reader;

An antenna that allows transmitting information between the tag and the reader;

shell that encloses the chip and antenna;

external housing, adapted for tag attachment to various objects that require identification.

Advantages of FRID tags:

High physical reliability of identification means, increased reliability of the system as a whole due to the absence of mechanical wear and tear and decentralization of information processing;

Contactless reading at a distance;

High independence from operating conditions (temperature, gases, dust, dirt, grease, etc.).

High speed (fractions of a second) and read/write reliability, virtually unlimited lifetime;

Robust protection against counterfeiting and unauthorized operations;

Ease of use and maintenance;

System flexibility, ease of integration into any enterprise systems.

Disadvantages of FRID tags:

Unable to be placed under metal and electrically conductive surfaces;

Susceptibility to interference in the form of electromagnetic fields;

The cost of RFID tags is higher than the cost of labels with a bar code;

Impact on human health. Radio-frequency tags themselves do not pose any risk to health, because 99.99% of the time they are not active.

FRID tag has an advantage over barcoding, as greater memory capacity, range of registration, lifetime of the tag, simultaneous identification of several objects (up to 600 tags per second) is possible; counterfeiting of FRID tags is almost impossible [2].

References:

1. Barcode 101: Guide to Barcode Symbolologies [Electronic resource] – Mode of access: <https://www.gtin.info/barcode-101/> – Date of access: 20.04.2022.

2. What is RFID? [Electronic resource] – Mode of access: <https://www.abr.com/what-is-rfid-how-does-rfid-work/> – Date of access: 20.04.2022.