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Using RFID for effective digital enterprise management

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Abstract

The article explores the significance of item identification within the digital enterprise concerning operational efficiency, data management, and security. It outlines potential challenges and difficulties associated with identifying objects. To facilitate effective administration in production, a control panel is introduced for managing the digital ecosystem. The article also delves into the application of RFID technology to address object identification issues in the digital enterprise, highlighting various benefits of RFID that play a crucial role in overcoming common challenges related to object identification.

Key Words: digital enterprise, RFID

Introduction

The term "digital enterprise" denotes an organization that leverages technology as a pivotal facilitator of business operations, strategy, and value creation. Typically, such an organization is consistently exploring novel methods and opportunities for ongoing development, utilizing emerging technologies and innovations to sustain competitiveness in the market.

In a digital enterprise, the identification of entities (IoT devices, assets, products, etc.) is crucial for streamlined operations, effective data management, and robust security. However, the process of identifying elements within a digital enterprise presents various challenges and concerns. One prominent issue is the absence of standardized protocols and formats for the identification and communication with IoT devices, leading to difficulties in integrating diverse devices into a unified system. Furthermore, as the quantity of devices grows, expanding and managing the identity infrastructure becomes progressively complex. Traditional authentication methods may struggle to accommodate the sheer volume of devices in extensive IoT deployments. The identification and tracking of subjects may involve the collection and processing of sensitive data. Ensuring compliance

with data protection regulations and addressing privacy concerns is pivotal for upholding trust and legal conformity. The adoption of advanced identification technologies may incur heightened costs, especially in large-scale deployments. Striking a balance between the cost-effectiveness of identification solutions and the requisite levels of accuracy and security is critical.

Some IoT devices may operate in environments with limited connectivity, such as remote locations or areas with poor network coverage. Identifying and communicating with these devices can be challenging, necessitating solutions that offer intermittent or low-bandwidth connections.

RFID technology emerges as an intriguing solution to the challenge of identifying objects in the digital enterprise. We would like to delve into some of the advantages of RFID in addressing common issues related to item identification [1].

It is important to note that RFID provides standardized and unique identification for each tagged item, ensuring individual identity for every device or product in the digital ecosystem. RFID tags can support cryptographic protocols, enhancing security and offering a robust authentication method. This helps prevent unauthorized access, ensuring data integrity during device-to-device data transfer. RFID systems are highly scalable, enabling efficient management of large numbers of devices. The infrastructure can be easily expanded to accommodate the growing adoption of the Internet of Things (IoT). RFID functions effectively in various environments, including those with limited connectivity. In particular, passive RFID tags, which do not require a battery and can be powered by an RFID reader signal, are suitable for devices in remote or hard-to-reach locations. Passive RFID tags consume minimal energy as they are activated by the RFID reader's signal, making RFID an energy-efficient system, especially for low-power IoT devices.

RFID systems can be designed with privacy features such as encrypted data transmission and selective access control, addressing data privacy concerns associated with identifying and tracking IoT devices. RFID aids in effectively managing the life cycle of devices by storing information about manufacturing details, service history, and end-of-life on tags, facilitating seamless management throughout their life cycle. Integration with other sensors and technologies allows RFID to provide a unified approach to item identification. RFID readers can collect data from various devices, creating a comprehensive view of the IoT ecosystem. RFID tags are available in various form factors, including rugged versions suitable for harsh environmental conditions, making RFID an effective solution for identifying objects in challenging conditions.

Over time, RFID technology has become more cost-effective, particularly for passive RFID tags. The benefits of scalability, efficiency, and improved operations often justify the initial investment. RFID systems can be integrated with existing enterprise infrastructure, allowing for a phased approach and coexistence with legacy systems. RFID reduces the likelihood of human error in identification processes through automatic scanning and recording of data, eliminating the need for manual data entry and reducing the risk of inaccuracies.

By leveraging RFID technology to identify items, digital businesses can enhance the efficiency, security, and scalability of their IoT ecosystems. It is crucial to carefully design RFID implementations, considering the organization's specific requirements and objectives, to maximize the benefits of this identification technology. Given the described advantages, the use of RFID to identify objects is considered a correct and effective solution.

Main Part

We provide a user-friendly dashboard for efficient administration in production, facilitating the management of the digital ecosystem and real-time analysis.

The digital dashboard presents the current state of the digital identity ecosystem in real time, featuring information such as the number of active users, devices, and current security details. Key statistics include metrics like successful authentication, access attempts, and indicators of system reliability.

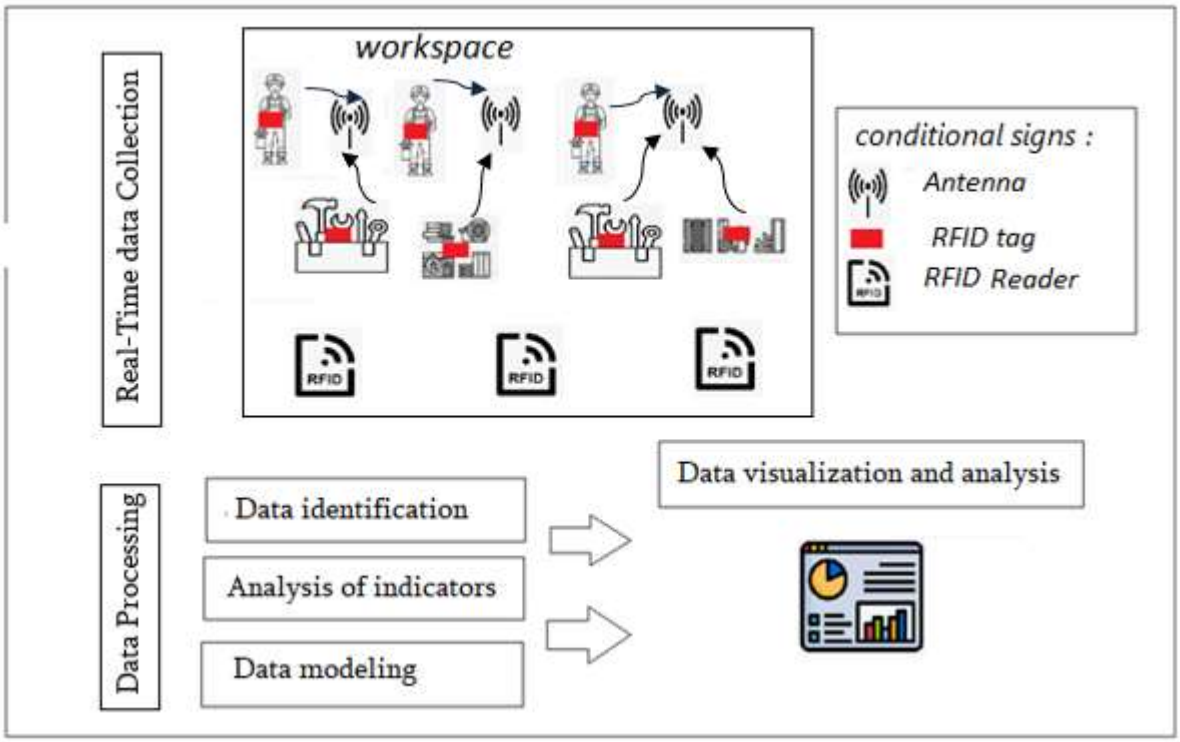

Figure 2 Framework of RFID-based Real-Time Location System in digital manufacturing

This dashboard seamlessly integrates with RFID readers and sensors across the enterprise, capturing data on user location, access attempts, and interactions with physical assets. It offers interactive visualizations, combining dynamic charts, graphs, and maps. Users can filter and customize visualizations to focus on specific areas or individuals [1] [2].

The digital display provides information on the following modules:

User Activity: Displays information about recent user activity and access issues, enabling administrators to quickly identify patterns or anomalies. Additional information, such as charts or graphs showing user distribution by department, role, or location, can be prepared or processed.

Security Analysis: Collects information about potential threats or anomalous user behavior. The corresponding program assesses severity levels and recommends actions in the current situation. Artificial intelligence may be employed for risk assessment to identify potential vulnerabilities and develop preventative security measures.

Access Control Management: Includes a table or graphical representation of user access rights, allowing administrators to swiftly view and modify access levels. The dashboard can display pending and approved access requests, along with the rationale for access changes.

Device Tracking: Visualizes the geographic location of RFID-enabled devices, offering a solution for monitoring device movement and potential security issues. To assess device performance, it notes the condition of RFID devices, battery levels, and any issues affecting functionality.

Integration: Ensures interaction with other enterprise systems, facilitating continuous data exchange with HR databases, access control systems, and other relevant platforms [2] [3].

Help and Support: Integrates with the knowledge base to provide assistance and support.

Conclusion

The dashboard prioritizes simplicity, clarity, and actionable information, enabling administrators to make informed decisions and promptly respond to security events in the digital identity ecosystem. Regular user feedback will continually enhance the usability and effectiveness of the dashboard.

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RFID-ის გამოყენება ციფრული საწარმოს ეფექტური ადმინისტრებისთვის

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საქართველოს ტექნიკური უნივერსიტეტი

სტატიაში განხილულია ციფრულ საწარმოში ნივთების იდენტიფიკაციის აქტუალურობა ეფექტური ოპერაციების, მონაცემთა მართვისა და უსაფრთხოებისთვის. აღწერილია ნივთების იდენტიფიკაციისას შესაძლო პრობლემები და გამოწვევები. წარმოებაში ეფექტური ადმინისტრირებისათვის შემოთავაზებულია საინფორმაციო პანელი, რომელიც შეიძლება გამოყენებულ იქნას ციფრული ეკოსისტემის მართვისათვის. ციფრულ საწარმოში საგნების იდენტიფიკაციის გამოწვევების გადასაჭრელად გამოყენებულია RFID ტექნოლოგია განხილულია RFID-ის რამდენიმე უპირატესობა, რაც მნიშვნელოვანია ნივთების იდენტიფიკაციასთან დაკავშირებული საერთო პრობლემების მოსაგვარებლად.

საკვანძო სიტყვები: RFID, ციფრული საწარმო