

EMBEDDED SYSTEMS IN INFORMATION TECHNOLOGY

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Анотація

У цій статті досліджується використання вбудованих систем в інформаційних технологіях і розглядаються майбутні тенденції в цій галузі.

Ключові слова: вбудовані системи, інформаційні технології, брандмауери, штучний інтелект, мікроконтролери.

Abstract

This article explores the use of embedded systems in information technology and examines future trends in this field.

Keywords: embedded systems, information technology, firewalls, artificial intelligence, microcontrollers.

Introduction

The integration of embedded systems has become a key role that has revolutionized the way we perceive and interact with technology in this field. This article aims to provide you with information about embedded systems in IT by learning about their various applications and review the future trends of embedded systems.

Basic

Embedded systems in information technology

Firewalls are embedded network security systems that monitor and control incoming and outgoing network traffic based on predetermined security rules[1]. In the field of information technology firewalls are needed as, actually, access control and prevention of unauthorized attacks.

Network Firewalls. This kind of firewall monitors and controls network traffic, by the settings of access they control network safety.

Host-based Firewalls. Host-based firewalls work as the tracking potential security dangerous and incorrectly using networks. They can detect virus attacks which can appear during incorrectly working system processes[2].

Cloud Firewalls. Cloud firewalls to manage access to services for the safety of data. Furthermore, they are really important to detect attempts of unauthorized access to get or control data for negative consequences. A lot of online systems is developing daily and they contain crucial data that must be defended because of the question of safety, so firewalls allow access to requests for only authorized users. As well, firewalls can protect from DDoS attacks, it's kind of attacks performed on systems with the view of don't allow access to that[3].

Web Application Firewalls. These kinds are similar to cloud firewalls, however frequently used as the WEB application security.

Future trends of firewalls. Next Generation Firewalls (NGFW) should become the safest update in existing of these kinds of embedded systems as the best preserve of the security data from cyberattacks or warnings about danger. By SD-WAN enhances an allows simple deploying security across network edges. In the future NGFW will function by artificial intelligence and machine learning to discover significant dangers before they appear[4]. In conclusion, the system needs safety, that's why it needs firewalls.

Artificial intelligence

Embedded artificial intelligence is daily using by people as a convenient method to learn new information or find the solution to the request in different ways to do it. It's the embedded system that provides data preprocessing functions for AI algorithm-based functions for these devices. Nowadays, some neural networks have been created for some time and now we have some preferences to choose AI for our purposes.

The explanation of an embedded AI work will be the next - AI has so-called hardware accelerators for accelerating AI training processes, however, because those work needs to become more effective for

performing accurate calculations, that should be some enhancement. So, by the software tool chains, the compiling process transfigures the AI model into the device with adjusted instructions.

Software tool chains by AI hardware accelerators. NVIDIA JetPack includes frameworks for developing AI applications on NVIDIA's Jetson platform. By the Intel Movidius visual processing unit the models of deep training are optimized on Intel architectures. Apple Core ML structure for integrating ML models for macOS and IOS devices. By the MTIA application, the PyTorch Mobile tool chain allows deploying AI models for embedded and mobile devices[5].

Future trends of embedded artificial intelligence. In IT, relying on the opinion of embedded artificial intelligence specialists, has various futures, although objectively that will rely on privacy policy and algorithm optimization for enhancing interaction with users.

Microcontrollers

Microcontrollers are analog integrated embedded systems that are using to manage various systems as the displays and peripherals and contain a CPU, RAM, input and output devices like different ports and another functionalized unit[6].

Software package Arduino. In this field of information technology, Arduino was created by the C/C++ programs for maintaining some interfaces as: communication interface and integrated development environment. A communication interface was created for communication between two or more than two devices. Previously RS-232 and UART cables were used for communication interface, however, now we can use Bluetooth instead. By Bluetooth data can be exchanged by two devices without an internet connection, although thanks to WI-FI we can perform exchanges them more conveniently and faster at a long distance instead. An integrated development environment (IDE) introduces access to write code and debugging projects.

Teensyduino software package. Teensyduino is the integration of Teensy and Arduino software packages to the board's software development for more functionality of microcontrollers. Teensyduino contains frameworks of code and convenient using. For Teensyduino software packages exists optimized frameworks for the functionality work USB[6].

Future trends of microcontrollers. In IT microcontrollers will enhance different characteristics like the work productivity of IoT (Internet of Things), and support of network communication such as WI-FI, Bluetooth etc. They will become more versatile, powerful, and secure, with features that are tailored to meet the demands of a wide range of applications[7].

Conclusion

The embedded systems are significant components of devices that help to control the data access, productivity system's processes, and security data from the side of negative consequences in the future.

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