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THE USE OF ARDUINO PLATFORM IN SCIENCE AND ENGINEERING

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Анотація

У цій роботі розглядається плата Arduino, описується її призначення, види і основні структурні елементи.

Ключові слова: Arduino, мікроконтролер, IoT – Інтернет речей, плати Esplora, розумний одяг, IDE – Інтегроване програмне середовище

Abstract

This paper considers the Arduino board, its purpose and types. The main structural elements and components are described.

Keywords: Arduino, microcontroller, IoT – Internet of Things, Esplora boards, wearables, IDE - Integrated Development Environment

Introduction

The Arduino platform for technical equipment is perfectly suited for the educational process of designing a variety of automated technical systems and robots thanks to easy-to-use programming environment, the ability to observe physical processes in real time. It is intended both for beginners who do not yet have any skills in the field of robotics and well experienced users.

In 2005, a group at Italy's Integration Design Institute Ivrea developed Arduino as a low-cost, easy-to-use electronics platform for students and artists. It borrows its name from nearby watering hole Bra di Re Arduino. Arduino has cultivated a flourishing community of inventors, engineers, and hackers dedicated to sharing code and developing hardware ender an open-source banner. [3]

Basics and structure

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board.

The Arduino programming language uses a set of C/C++ instructions. So if you're already familiar with these languages, the Arduino programming language will be like learning a new library to use. Arduino uses the avr-g++ compiler. Most Arduino boards consist of an Atmel 8-bit AVR microcontroller (ATmega8, ATmega168, ATmega328, ATmega1280, ATmega2560) with varying amounts of flash memory, pins, and features. The 32-bit Arduino Due, based on the Atmel SAM3X8E was introduced in 2012. [1] The boards use single or double-row pins or female headers that facilitate connections for programming and incorporation into other circuits. These may connect with add-on modules termed shields. Most boards include a 5V linear regulator and a 16 MHz crystal oscillator or ceramic resonator. Some designs, such as the LilyPad, run at 8 MHz and dispense with the onboard voltage regulator due to specific form-factor restrictions.

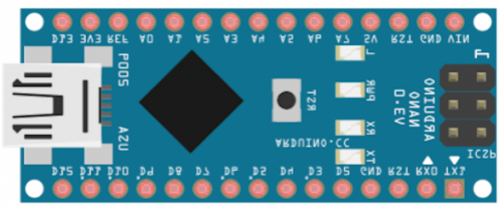

Figure 1 – The Arduino Nano board pinout

The Arduino IDE (Integrated Development Environment) is built upon Wiring – a software project written by one of Banzi's students (Hernando Barragan). It provides easy-to-use libraries which hide some of the raw C++ going on behind the scenes. [2]

Figure 2 – Arduino today [4]

Conclusion

Thanks to its simple and accessible user experience, Arduino has been used in thousands of different projects and applications. The Arduino software is easy-to-use for beginners and flexible enough for advanced users. It runs on Mac, Windows, and Linux. Teachers and students use it to build low cost scientific instruments, to prove chemistry and physics principles, or to get started with programming and robotics. Designers and architects build interactive prototypes, musicians and artists use it for installations and to experiment with new musical instruments. Makers, of course, use it to build many of the projects exhibited at the Maker Faire, for example. Arduino is a key tool to learn new things. Anyone - children, hobbyists, artists, programmers - can start tinkering just following the step by step instructions of a kit, or sharing ideas online with other members of the Arduino community.

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