

THE FEATURES OF USING THE ARDUINO PLATFORM IN THE EDUCATIONAL PROCESS

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The Arduino is one of the most successful open source hardware projects in the world. Arduino boards based on open designs released by the team of developers have been fabricated in many countries that have made the boards popular. The usage of this platform allows students to get knowledge in hardware and electronic schemes.

The modern market of IT services is increasingly in need of specialists in the field of embedded systems, in particular with a specialization in hardware platforms. According to the results of a number of rating surveys, one of the easiest to learn is the debugging platform Arduino [1]. Thus, the purpose of this work is to analyze the features of the use of the Arduino platform in the educational process to create principles that are the basis for knowledge by specialists in the development and programming of microcontroller systems.

The development of the Arduino platform dates back to 2005, when the task arose to create a debug board that would meet such requirements as: easy to use by specialists, adaptive when connected to various devices (for example relays, motors, sensors, etc.), free in programming in one of the basic programming languages (based on the C++ language, which has undergone some changes and was called Arduino C); economically feasible, as the market was focused on students and people who can not spend enough money on their education.

The technological feature is that when choosing a microcontroller for the platform, a family of 8-bit AVR microcontrollers was chosen. This is justified by their speed. In turn, the speed is achieved due to the fact that most instructions on AVR-microcontrollers are executed in one cycle, on analogues - at least several cycles. Another feature is that each board has a ready-to-use firmware on its microcontroller. This allows you to use the platform immediately by connecting it to a device (on which the IDE is pre-installed) with a USB-Type-B AM-BM cable and downloading the appropriate software through it.

Consider the features of the most commonly used features and functions of the platform. Arduino LLC currently provides more than 16 assembled platforms [2]. The smallest platform has 14 digital inputs / outputs. In particular, 6 of them can be used for pulse-width modulation when the sawtooth signal is generated by an N-bit counter. The board also has 6 analog inputs / outputs that allow the user to interact with analog devices.

It is worth noting that the digital outputs have a certain frequency. In particular, in the periods of signals between the fronts of the clock pulses at the digital output, you can keep a high or low signal level. Approximating the dynamics of change allows you to assess the state of the device depending on the tasks it performs. If necessary, the number of inputs / outputs can be scaled using additional expansion cards.

At the turn of 2010/20, the Due board, which is based on the ARM Cortex-M3 architecture, entered serial production. This architecture is characterized by the following parameters: 32-bit core, core frequency is 84 MHz and flash memory is 512 KB. When using the Arduino platform, the following disadvantages should be taken into account: higher price for more powerful implementations, uneven power consumption of components, difficulty in organizing autonomous power systems.

In recent years, a modern implementation of the Arduino Yún has appeared on the market. It is built on the Arduino Leonardo platform, but differs in the presence of a Wi-Fi and Ethernet module (in previous versions, Wi-Fi and Ethernet modules could be connected separately). The innovation of the platform is that it was controlled by a combination of ATmega32u4 microcontroller and Atheros AR9331 SoC, running the Linilo distribution (that is modified OpenWRT distribution [3]). Thus, the developers of the Arduino platform have expanded the range of tasks that can solve their Arduino Yún.

Summarizing the above, it can be noted that the use of Arduino debugging platforms in the educational process allows to increase the level of proximity of the recipient of knowledge in the field of computer engineering in order to become a qualified specialist in the subject area.

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