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WHAT EXACTLY IS ARDUINO?

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Анотація
У даній роботі розглядається плата Arduino, описується її призначення та основні структурні елементи.
Ключові слова: Arduino, плата, мікроконтролер, пристрій, програмування, електроніка.

Abstract
In this paper the Arduino Board is examined, also its purpose and main structural elements are described.
Keywords: Arduino, board, microcontroller, device, programming, electronics.

Introduction

Have you ever looked at some gadget and wondered how it really worked? Maybe it was a remote control boat, the system that controls an elevator, a vending machine, or an electronic toy? Or have you wanted to create your own robot or electronic signals for a model railroad, or perhaps you'd like to capture and analyze weather data over time? Where and how do you start?

The Arduino Board (shown in Figure 1) can help you find some of the answers to the mysteries of electronics in a hands-on way. The original creation of Massimo Banzi and David Cuartielles, the Arduino system offers an inexpensive way to build interactive projects, such as remote-controlled robots, GPS tracking systems, and electronic games [1].

Figure 1: The Arduino board (MEGA 2560) [2]

The Arduino project has grown exponentially since its introduction in 2005. It's now a thriving industry, supported by a community of people united with the common bond of creating something new. You'll find both individuals and groups, ranging from interest groups and clubs to local hackerspaces and educational institutions, all interested in toying with the Arduino.

To get a sense of the variety of Arduino projects in the world, you can simply search the Internet. You'll find a list of groups offering introductory programs and courses with like-minded, creative people.

The Arduino Board

What exactly is Arduino? According to the Arduino website [2], it is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments.

In simple terms, the Arduino is a tiny computer system that can be programmed with your instructions to interact with various forms of input and output. The current Arduino board model, the Mega, is quite small in size compared to the average human hand.

Although it might not look like much to the new observer, the Arduino system allows you to create devices that can interact with the world around you. By using an almost unlimited range of input and output devices, sensors, indicators, displays, motors, and more, you can program the exact interactions required to create a functional device. For example, artists have created installations with patterns of blinking lights that respond to the movements of passers-by, high school students have built autonomous robots that can detect an open flame and extinguish it, and geographers have designed systems that monitor temperature and humidity and transmit this data back to their offices via text message. In fact, you'll find an almost infinite number of examples with a quick search on the Internet.

Now let's move on and explore our Arduino Mega hardware (in other words, the "physical part") in more detail and see what we have (see Fig. 1).

On the far left is the Universal Serial Bus (USB) connector. This connects the board to your computer for three reasons: to supply power to the board, to upload your instructions to the Arduino, and to send data to and receive it from a computer. On the low left is the power connector. Through this connector, you can power the Arduino with a standard mains power adapter. At the middle is the heart of the board: the microcontroller.

The microcontroller is the "brains" of the Arduino. It is a tiny computer that contains a processor to execute instructions, includes various types of memory to hold data and instructions from our sketches, and provides various avenues of sending and receiving data. Just below the microcontroller are three rows of small sockets. The first row offers power connections and the ability to use an external RESET button. The second and third rows offer sixteen analog inputs that are used to measure electrical signals that vary in voltage. Furthermore, pins A4 and A5 can also be used for sending data to and receiving it from other devices. Along the top of the board are three more rows of sockets.

Sockets (or pins) numbered 0 to 13 are digital input/output (I/O) pins. They can either detect whether or not an electrical signal is present or generate a signal on command. Pins 0 and 1 are also known as the serial port, which is used to send and receive data to other devices, such as a computer via the USB connector circuitry. The pins labeled with a tilde (~) can also generate a varying electrical signal, which can be useful for such things as creating lighting effects or controlling electric motors.

Next are some very useful devices called light-emitting diodes (LEDs); these very tiny devices light up when a current passes through them. The Arduino board has four LEDs: one on the far right labeled ON, which indicates when the board has power, and three in another group.

The LEDs labeled TX and RX light up when data is being transmitted or received between the Arduino and attached devices via the serial port and USB. The L LED is for your own use (it is connected to the digital I/O pin number 13). The little black square part to the left of the LEDs is a tiny microcontroller that controls the USB interface that allows your Arduino to send data to and receive it from a computer. The simple RESET button on the board is used to restart the system to resolve many problems [2].

For everything from robots and a heating pad hand warming blanket to honest fortune-telling machines, and even a Dungeons and Dragons dice-throwing gauntlet, the Arduino can be used as the brains behind almost any electronics project. So don't just sit there – make something!

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