

## ARDUINO AS A FIRST STEP IN ENGINEERING АРДУИНО КАК ПЕРВЫЙ ШАГ В ИНЖЕНЕРНОЕ ДЕЛО

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**Annotation:** *The Internet of Things is becoming more and more popular nowadays. Our article tells about Arduino as an example of single-board computers and how it is connected with IoT and engineering. The main question of our article is “Why is it easy to start learning engineering with Arduino?”. There will be shown the features of Arduino programming language and the basics of device designing. The role of Arduino in engineering learning process will be explained.*

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### Introduction

We live in fast developing world. The Internet of Things and “smart” devices is getting more popular because people want to automate usual things. Generally, IoT is a network of objects that communicate with each other and environment. “Smart” things can be everywhere: in city infrastructure, in house, in car, at human body. It allows to get more information by easiest ways. It can be smart cameras, smart coffee machines and fridges.

Single-board Computers are of high importance in smart devices' development. In general SBC is small board with in-built CPU and memory. They help to build working system without great knowledge of electronics in short term. With much lower price than usual PC, SBC allows to automate usual things such as switching the light and temperature monitoring.

There are a lot of Single-Board Computers and the most popular of them are Raspberry Pi, Arduino, CuBox and Intel Galileo. And now I'm going to talk about Arduino.

### Arduino

The history of the project goes from 2005 when a couple of students have set a goal to create low cost, simple tools for non-engineers to create digital projects. Later this project caused an international revolution in electronic handmades. You can buy Arduino just for \$30 or build it from scratch. All schemes and source codes are available for free on condition to open source licenses. As a result, Arduino became the most influential platform with open source code.

### Language

The Arduino language is good for beginners because it is a simplifying of C language. It is easy to learn and now it is one of the most comfortable way to program microcontroller devices, despite it is required a bit more of setup and configuration of dev environment.

Arduino company has created own IDE, but because of open source there is a lot of another IDE, for example Visual Studio extension.

Sketch must contain two main functions:

- Setup, which is called once at the start
- Loop. Which is called endless

The simplest sketch that turns LED on and off contains:

- Setting number of pin with LED
- Setting pin as input or output
- Loop function

### **Shields**

Arduino is a board with CPU and memory. Without additional parts (shields) it will be hard to create full project.

There is a lot of shields, that allows to create a lot of devices for very different purposes. It can be screens, buttons, GPS, wifi, SDcard, Ethernet etc. They can be used to create everything: from light switcher to robot.

Another feature is that Arduino allows quickly create working model of device through element connection with breadboard without soldering iron. It allows to increase designing speed due to quick component replacement.

### **Students**

Arduino has been making big influence at learning process. We live in the world full of IT. Schools already have programming and robotics courses, it is the first step for schoolkids to learn engineering. Because of the reasons we were talking about, learning gets more clear and interesting. Especially programming, that may seem hard and unclear, becomes easier because of simple language. At Physics lesson Arduino can be used to demonstrate basic electricity laws. In view of the fact that a lot of equipment is outdated it can be created during the lesson. The fact that students have created it by themselves can increase interest. At Geography lesson Arduino can be used for weather station.

With that way of learning first of all student sees a result of his work right away and secondly there is a broad scope for creative activity. More over this creativity has reached level of contests.

But there is a problem. Some teachers are not ready to teach children new technologies. This is important for them to go with the time that's why they have a lot more interested students that increases the understanding of the course.

### **Conclusion**

Smart technologies make our life easier and our education – more interesting. Young engineers and programmers are studying with such technologies. It's good to see that more and more people are interested in that sphere. If we have a look on IT evolution nowadays, we'll see how much it will mean in peoples' life in the future.