



## Arduino Uno Programming Training for Senior High School in the City of Tasikmalaya

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### Abstract

This study aims to program basic Arduino UNO. First, we create an Arduino simulation circuit to turn on the Light Emitting Diode (LED) in the Proteus software. Next, make Arduino programming for the running LED. Finally, enter the Arduino program into the Arduino circuit on Proteus. This Arduino UNO programming training will be introduced to teachers in online training activities. With this training, it is hoped that teachers will be able to increase innovation and creativity in the subjects taught.

*Keywords:* Arduino UNO, Light Emitting Diode, Proteus

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### 1. Introduction

The COVID-19 pandemic that has hit the world has changed the system of human life in all areas of life, including the world of education (Nolan et al., 2021). The existence of policies to do work from home (WFH), social and physical distancing, requires people to stay at home, work, worship and study from home (Dubey and Tripathi, 2020; Purwanto et al., 2020). Such conditions require educational institutions to innovate in the learning process. With the abolition of the National Examination, studying at home through certain applications, online lectures, online tutoring and seminars are examples of education services that accelerate the application of education in the industrial revolution era 4.0 (Sudrajat et al., 2019; Vu and Le, 2019). From the several cases above that demand the role of technology in the field of education in the midst of the covid-19 pandemic, educators and students are expected to be able to adapt and take advantage of technology (Prestiadi et al., 2021; Sambas et al., 2019; Rayuwati, 2020).

Distance Learning is the main choice in delivering material to students during a pandemic (Dubey and Pandey, 2020; Nadeak, 2020). Online, offline and blended are ways for teachers to carry out the Distance Learning process. Mastery of IT and adaptation of teachers in delivering material that is different from what is usually done is very important to know (Abel, 2020; Foti, 2020). Mastery of technology in using laptops, WhatsApp, and various types of media that can be used to carry out online learning is very important (Olentsova, 2020; Jusas et al., 2021). Regardless of the form of the learning process, whether online, offline or blended, it must be carried out so that learning continues. Various ways are done so that the learning process can take place and students can still feel the education even though it does not require the completeness of the curriculum (Peloso et al., 2020; Machado Júnior and Pauna, 2020).

Light Emitting Diode is a semiconductor component that has the main function as a source or producer of light. Vázquez-Córdova et al. (2008) studied of the imple and inexpensive method to fabricate organic electroluminescent devices intended for educational purposes at the undergraduate level of physics, chemistry and material sciences. They report the measurement data on current-voltage curves, luminescence, and efficiencies obtained by students fabricating and testing the devices under normal room conditions. Oktavia and Halim (2018) presented of the professional development for teachers in developing experiments using LEDs for learning physics concepts and increase teachers' beliefs on their knowledge on using LEDs for physics experiments. They found that there are positive improvements on participants' understanding of ISLE-based STEM approach and of the use of LEDs as props. Marsya et al., (2020) investigate the pre-service chemistry teachers views of the nature of science and technology for organic light-emitting diodes learning. They found that the showed that there were many pre-service

chemistry teachers views of the nature of science and technology that categorized in HM and N categories. Identification of chemical concepts related to organic light-emitting diodes suggested that organic light-emitting diodes may be used in chemistry learning. However, some issue about simulation using software is still open for investigate for teaching and learning media.

The main purpose of this study is provided training for high school teachers in developing electronic learning media using Proteus software. The teachers were given an explanation related to the installation of the Proteus software and the introduction of electronic components on the platform. Finally, we provide an explanation regarding the LED control system using the Arduino software which is integrated with the Proteus software.

## 2. Materials and Methods

### 2.1 Material LED circuit

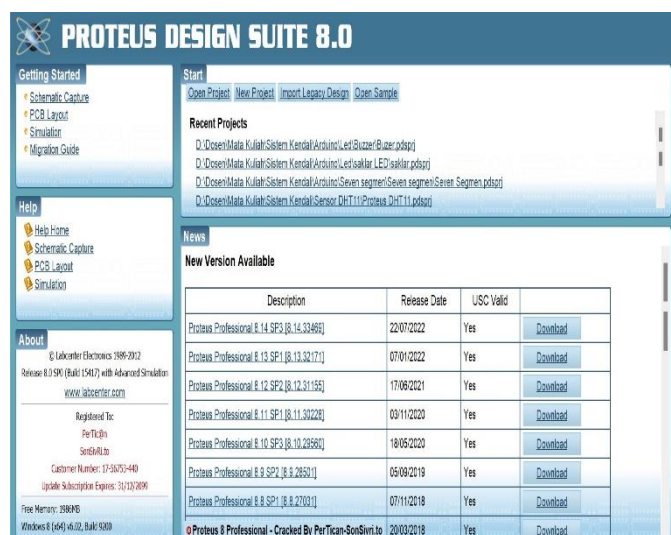
In this research method, several materials are used for simulating the manufacture of LED in the Table 1.

**Table 1.** Components for running LED

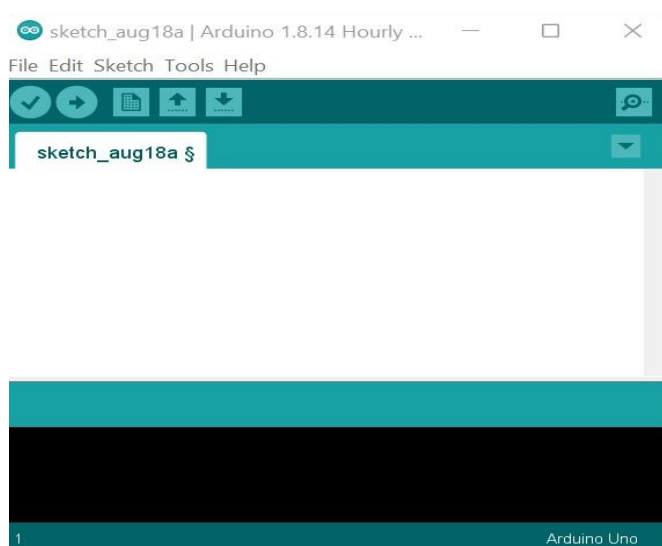
No	Component	Total
1	Arduino Uno	1
2	Resistors (220 $\Omega$ )	3
3	LED Red	1
4	LED Yellow	1
5	LED green	1
6	Battery	1

### 2.2 Software

In this study, we used 2 software for the learning process, namely Proteus software and Arduino software. Proteus software is used to create electronic circuits. While the Arduino software is used to create programs and give commands that are integrated into electronic circuits in the Proteus software. Figure 1 shows the display of the Proteus software and the Arduino software.



(a) Proteus Software



(b) Arduino Software

**Figure 1.** Display of front view of (a) Proteus Software and (b) Arduino Software

## 3. Results and Discussion

### 3.1. Electronic Circuit of the LED using Proteus

In this work, Arduino Pin 9 is connected to the Anode (+) on the red LED, Pin 8 Arduino is connected to the Anode (+) on the yellow LED, and Pin 7 Arduino is connected to the Anode (+) on the blue LED. Furthermore, all

cathodes (-) on the LED are connected to ground. In more detail, the scheme of electronic circuit running LEDs can be seen in Figure 2. Also, the simulation results of running LEDs can be seen in Figure 3.

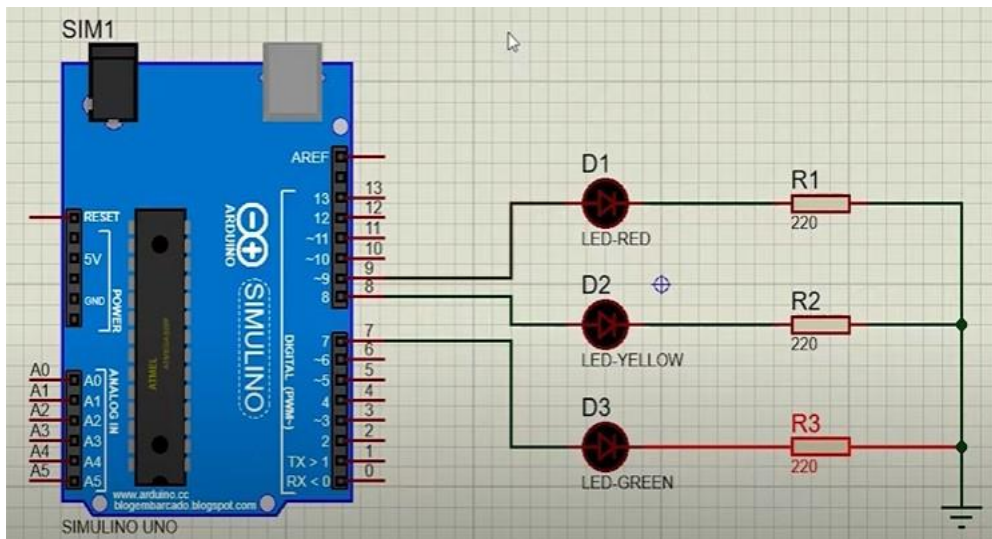


Figure 2. Electronic circuit for the running LED

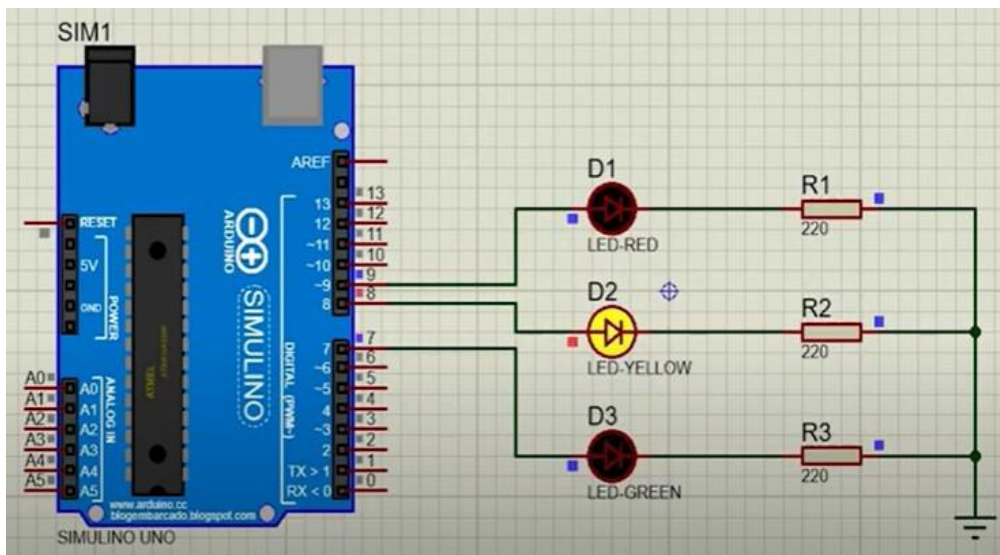


Figure 3. The simulation results of running LEDs

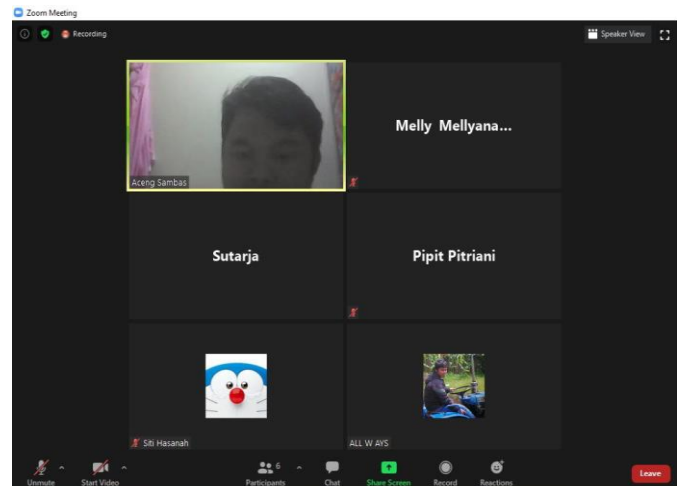


Figure 4. Zoom display for teacher participants

The participants of this training were from various senior high schools such as SMK Bina Bangsa, SMK Jaya Mandiri, MAN 1 Tasikmalaya, SMAN 7 Tasikmalaya, SMAIT-TQ Ihya As-Sunnah Tasikmalaya, SMA Quranic Science Boarding School, SMA Negeri 5 Tasikmalaya, SMAI Yappas Albarokah, SMAN 1 Jatiwaras, MAN 3 Tasikmalaya, SMK Ar Ridwan Cintamulya, and SMAS PGRI 43 Singaparna.

### 3.2 Software

At this stage, the running LED programming system will be programmed using Arduino software. First, we define all Arduino pins that are connected to the LED, namely Pins 9, 8 and 7. Then, the syntax for programming is as follows.

```
//pin 9, 8, 7 has an LED connected Arduino
```

```
int Red=9;
int Yellow=8;
int Blue=7;
```

The next step is to define the pin in the form of 'input' or output. Then, the syntax for programming is as follows.

```
void setup()
{
  pinMode(Red,OUTPUT);
  pinMode(Yellow,OUTPUT);
  pinMode(Blue,OUTPUT);
}
```

The final stage of programming is to make commands so that the LEDs can light up alternately. Then, the syntax for programming is as follows.

```
void loop()
{
  digitalWrite(Red, HIGH );
  delay(600);
  digitalWrite(Red, LOW);
  delay(600);
  digitalWrite(Yellow, HIGH );
  delay(600);
  digitalWrite(Yellow, LOW );
  delay(600);
  digitalWrite(Blue, HIGH );
  delay(600);
  digitalWrite(Blue, LOW );
  delay(600);
}
```

### 4. Conclusion

In this paper, we training for high school teachers in developing electronic learning media using Proteus software. The teachers were given an explanation related to the installation of the Proteus software and the introduction of electronic components on the platform. Finally, we provide an explanation regarding the LED control system using the Arduino software which is integrated with the Proteus software. The results showed that all teachers had succeeded in making electronic circuits using Proteus and making programs using Arduino software on the running LED circuit.

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