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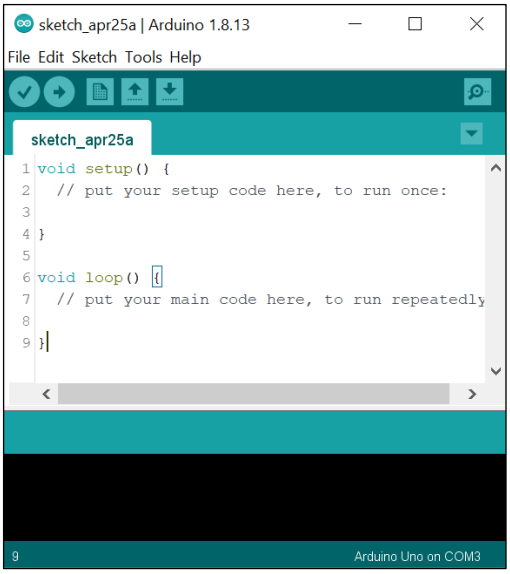
SIIT SINCE 1992	**School of ICT** **Sirindhorn International Institute of Technology**
CSS332 Microcontrollers and Applications	**Lab 10: Arduino UNO Programming Using Arduino IDE**

Aduino IDE Software

In Lab 10 – 11, we will create Arduino programs using Arduino programming language to command the ATmega328 and Arduino UNO board. To do so, we need a new software called the Arduino IDE. We will create our Arduino programs on the Arduino IDE instead of the Atmel Studio (where we use for assembly and C programs).



Please install the Arduino IDE on your computer by following these steps.

a) We need the Arduino IDE software, which can be downloaded from (as shown on Page 9 of Lecture Note 11):

https://www.arduino.cc/en/software

b) To set up and upload the sketch to the Arduino IDE, we can see from Pages 10 – 12 of Lecture Note 11. Please see the Lab Briefing video for the demonstration.

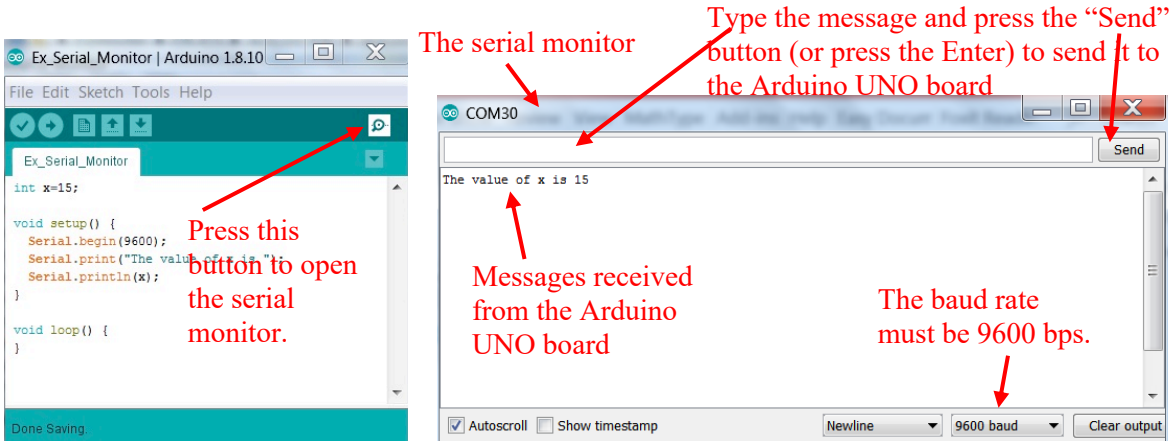
Serial Monitor

In this lab, the outputs of the exercises are shown on the serial monitor of the Arduino IDE. To open the serial monitor, please follow these steps (the Arduino UNO board must be connected to the computer):

a) On the Arduino IDE, press the serial monitor button to open the serial monitor.

b) On the serial monitor, the baud rate must be set to 9600 (for the Arduino UNO board).

Please see the Lab Briefing video for the demonstration.



Exercise 1: Write the following Arduino program by using the Arduino IDE. This program will ask the Arduino UNO to show a message every 1 second on the serial monitor. (No circuit connection.)

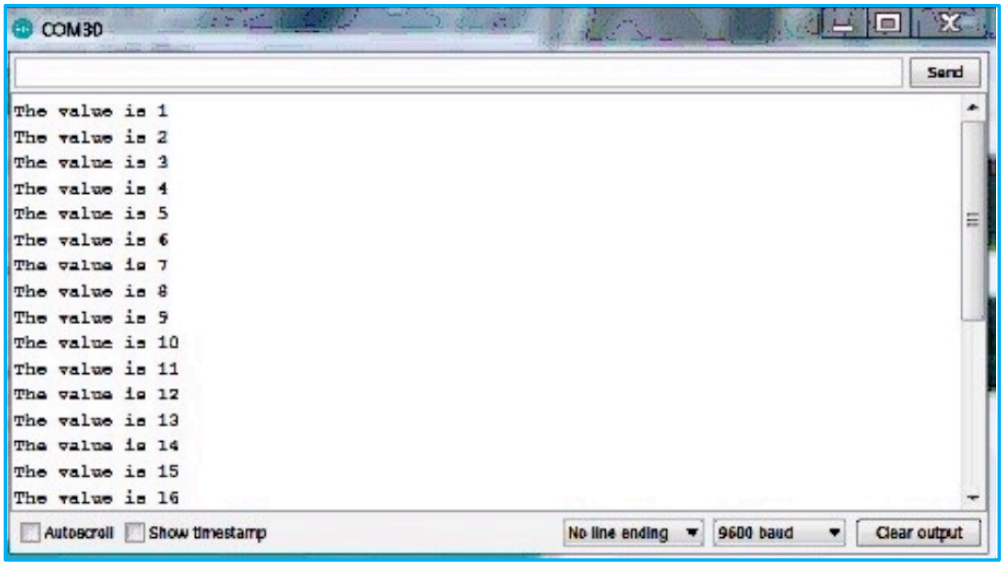
Ex_A1

```
int test;

void setup() {
  Serial.begin(9600);
  test = 0;
}

void loop() {
  test = test + 1;
  Serial.print("The value is ");
  Serial.println(test);
  delay(1000);
}
```

Connect the Arduino UNO board to the computer and upload the Arduino program. Open the serial monitor to see the messages shown on the serial monitor.



Record the video to show your work. Name it "Ex1" and submit to the Google Classroom.

Exercise 2: Write the following Arduino program by using the Arduino IDE. This program will ask the Arduino UNO to show a message whenever x is an even number on the serial monitor. (No circuit connection.)

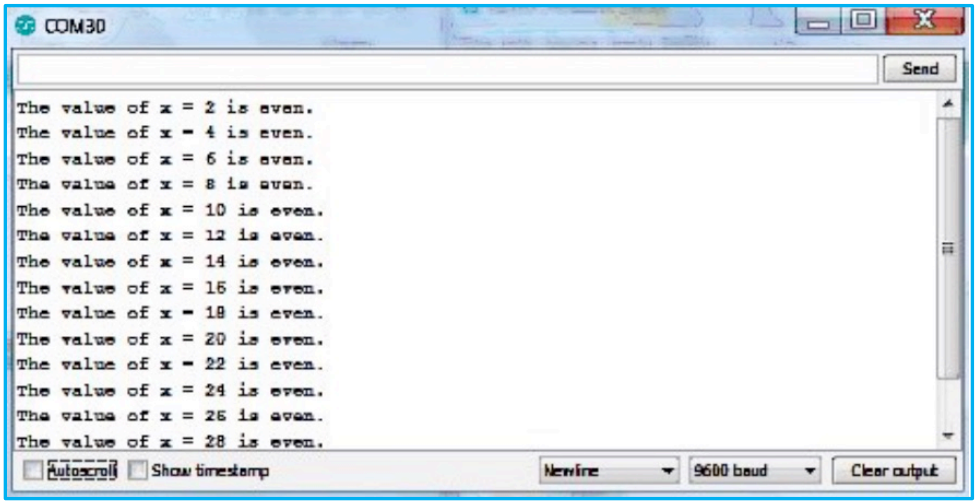
Ex_A5

```
int x = 0;

void setup() {
  Serial.begin(9600);
}

void loop() {
  x++;
  if (x%2 == 0) {
    Serial.print("The value of x = ");
    Serial.print(x);
    Serial.println(" is even.");
  }
  delay(1500);
}
```

Connect the Arduino UNO board to the computer and upload the Arduino program. Open the serial monitor to see the messages shown on the serial monitor.



Record the video to show your work. Name it "Ex2" and submit to the Google Classroom.

Exercise 3: Write the following Arduino program by using the Arduino IDE. This program will ask the Arduino UNO to compute a set of circle areas and show them on the serial monitor. (No circuit connection.)

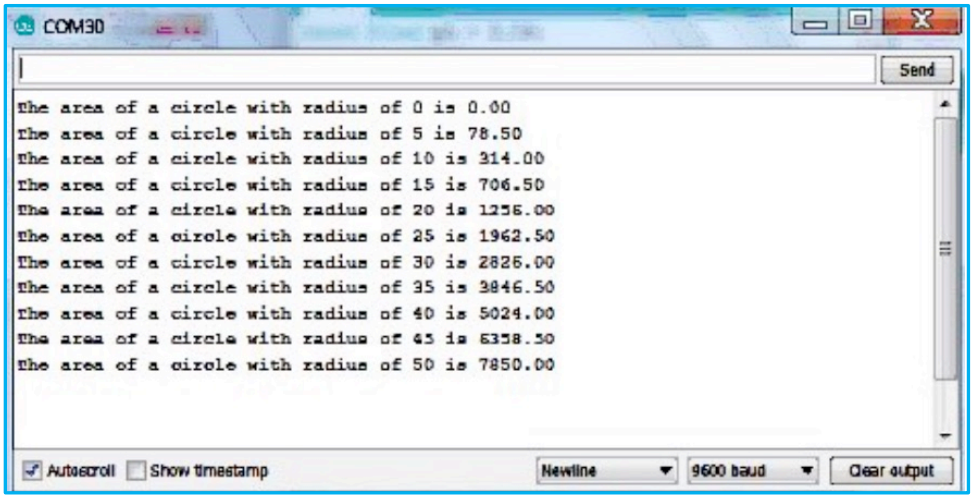
Ex_A7

```
const float pi = 3.14;
void setup() {
  float area;
  Serial.begin(9600);
  for (int r = 0; r <= 50; r = r+5) {
    Serial.print("The area of a circle with radius of ");
    Serial.print(r);
    Serial.print(" is ");
    area = circleArea(r);
    Serial.println(area);
  }
}

void loop() {
}

float circleArea(int radius) {
  float result = pi * radius * radius;
  return result;
}
```

Connect the Arduino UNO board to the computer and upload the Arduino program. Open the serial monitor to see the messages shown on the serial monitor.



Record the video to show your work. Name it "Ex3" and submit to the Google Classroom.

Exercise 4: Write a program (Arduino code) such that it will work like the following vending machine (shown on the Serial Monitor):

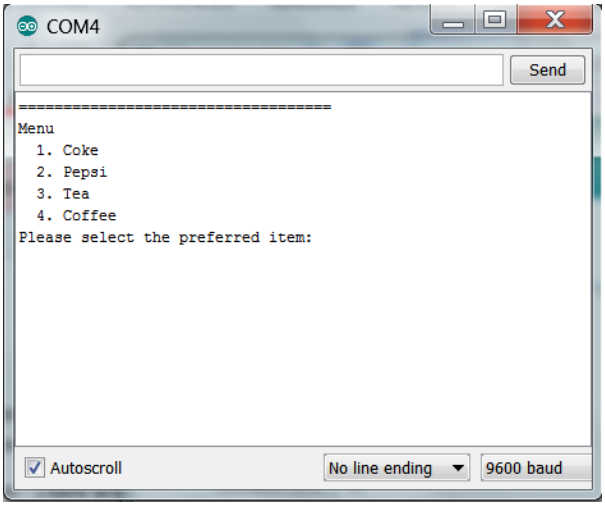
a) Menu: There are 4 items to select: Coke, Pepsi, Tea, Coffee.
b) There is the text "Please select the preferred item: ".
c) When you enter the selected item, the vending machine repeats what you have selected by showing the text "I chose X", where X is the item chosen.
d) If you chose a number other than 1 – 4, the machine asks you to choose again by showing the text "Not in the list. Please select again: ".

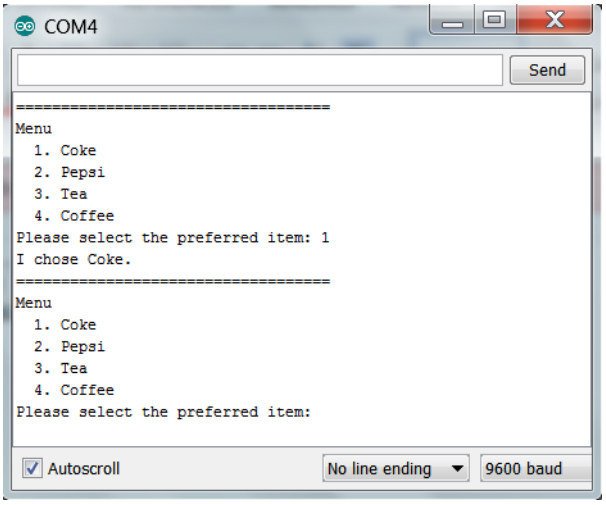
You will need the following additional information:

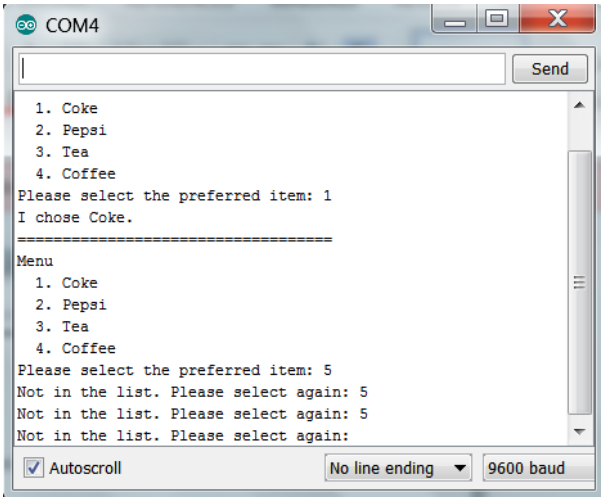
- Keyword: Arduino serial input.
- Arduino commands: ***Serial.available()***, ***Serial.read()***
- Study the code example from this website:

  https://startingelectronics.org/software/arduino/learn-to-program-course/19-serial-input/

Screenshot examples are shown below.







Record a video to demonstrate your output. Name it “Ex4”, and submit to the Google Classroom.