Activity 4: Programming Embedded Systems (Part 2)

tActivity 4 : Programming Embedded Systems (Having Fun with Arduino)

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Part 2: Serial and PWM

What is the meaning of “Baud Rate”? What is the unit of the “Baud Rate”?

It is the rate at which information is transferred in a communication channel.
The unit of Buad Rate is in “bits per second”.

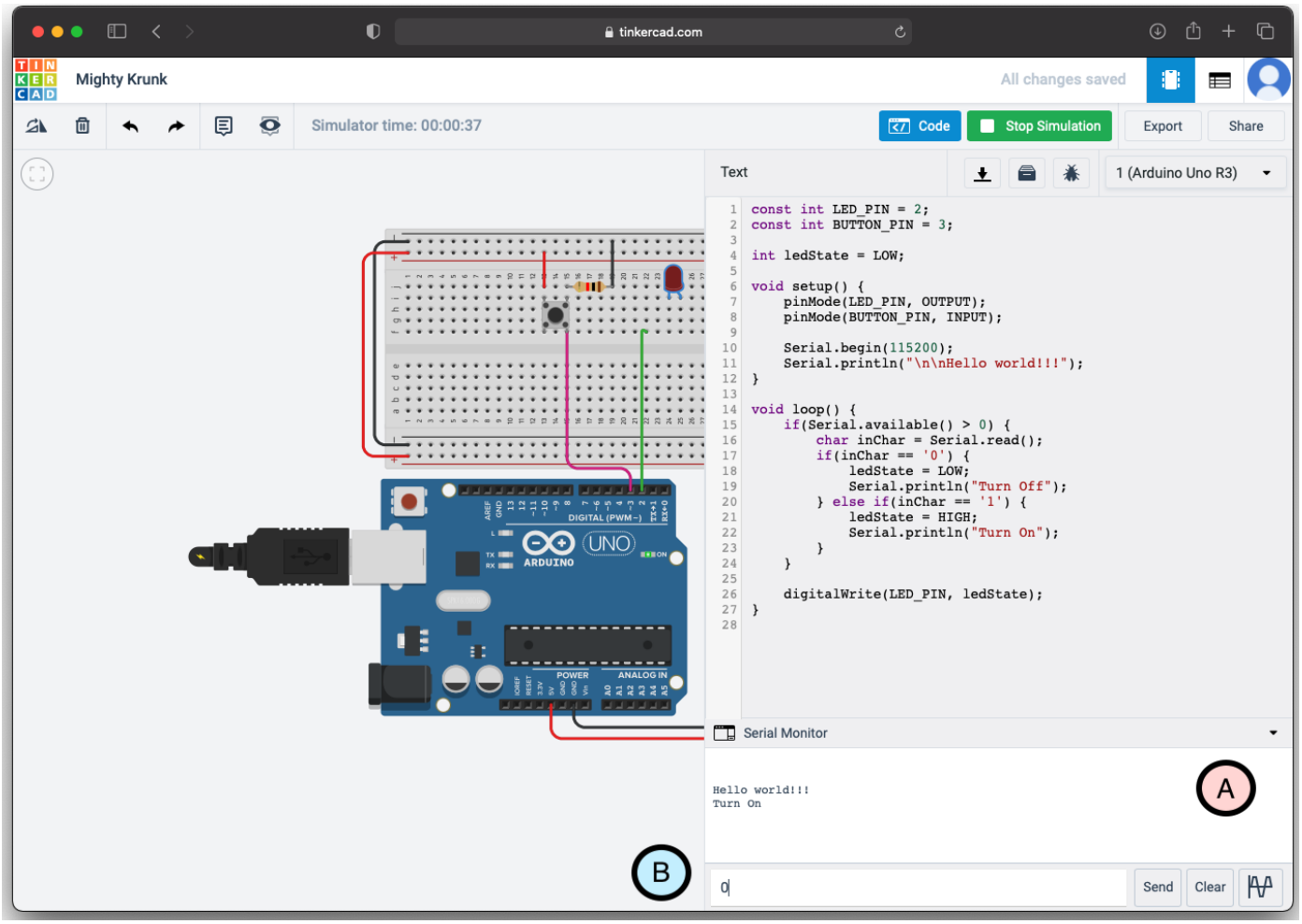
Try to control the LED from serial input. ‘1’ to turn on the LED, ‘0’ to turn off the LED. (Change circuit without Button switch).

```
const int LED_PIN = 2;
const int BUTTON_PIN = 3;

int ledState = LOW;

void setup() {
    pinMode(LED_PIN, OUTPUT);
    pinMode(BUTTON_PIN, INPUT);

    Serial.begin(115200);
    Serial.println("\n\nHello world!!!");
}

void loop() {
    if(Serial.available() > 0) {
        char inChar = Serial.read();
        if(inChar == '0') {
```

Activity 4: Programming Embedded Systems (Part 2)

```
            ledState = LOW;
            Serial.println("Turn Off");
        } else if(inChar == '1') {
            ledState = HIGH;
            Serial.println("Turn On");
        }
    }

    digitalWrite(LED_PIN, ledState);
}
```

Note that you can observe the serial output in the Serial Monitor (A) at the bottom of the Code pane. You can also enter input via Serial input (B).



What does “PWM” stand for?

It stands for Pulse Width Modulation.

Activity 4: Programming Embedded Systems (Part 2)

Try to control LED level from 0 to 9 by the serial input. You can monitor the PWM graph via the oscilloscope.

```
const int LED_PIN = 2;
const int BUTTON_PIN = 3;

int dutyCount = 0;
int currentDuty = 0;

void setup() {
    pinMode(LED_PIN, OUTPUT);
    pinMode(BUTTON_PIN, INPUT);

    Serial.begin(115200);
    Serial.println("\n\nHello world!!!");
}

void loop() {
    if(Serial.available() > 0) {
        char inChar = Serial.read();
        int temp = inChar - '0';
        if(temp >= 0 && temp <= 9) {
            currentDuty = temp;
        }
    }

    if(dutyCount%10 < currentDuty) {
        digitalWrite(LED_PIN, HIGH);
    } else {
        digitalWrite(LED_PIN, LOW);
    }
}
```

Activity 4: Programming Embedded Systems (Part 2)

Write Arduino code to do the following task. Input one digit ‘0’ to ‘9’ as a serial input, dim the LED as that number loops. (1 loop dim set PWM from 0% -> 90% -> 0%) Put the code in the answer box. (The range of PWM is between 0 and 255. If the PWM is at 0 that mean the system is running at 0% and If the PWM is at 255 this mean that the system is running at 100%)
Example Video Clip: https://youtu.be/oLsSGaJd38o

```
const int LED_PIN = 2;
const int BUTTON_PIN = 3;


int dutyCount = 0;
int currentDuty = 0;


void setup() {
    pinMode(LED_PIN, OUTPUT);
    pinMode(BUTTON_PIN, INPUT);

    Serial.begin(115200);
    Serial.println("\n\nHello world!!!");
}


void loop() {
    if(Serial.available() > 0) {
        char inChar = Serial.read();
        int temp = inChar - '0';
        if(temp >= 0 && temp <= 9) {
            currentDuty = temp;
        }
    }
    dutyCount += 1;
    if(dutyCount%100 < currentDuty*10) {
        digitalWrite(LED_PIN, HIGH);
    } else {
        digitalWrite(LED_PIN, LOW);
    }
}
```

Once you finish, students must inform an instructor or a TA for inspection.

— THIS IS THE END OF PART 2 —