



Ecole nationale supérieure de l'intelligence artificielle et sciences des données Taroudant.

Filière : SITCN

Systèmes Embarqués

Thème :

TP N2 : Manipulation de la communication série

Réaliser par:

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Encadré par:

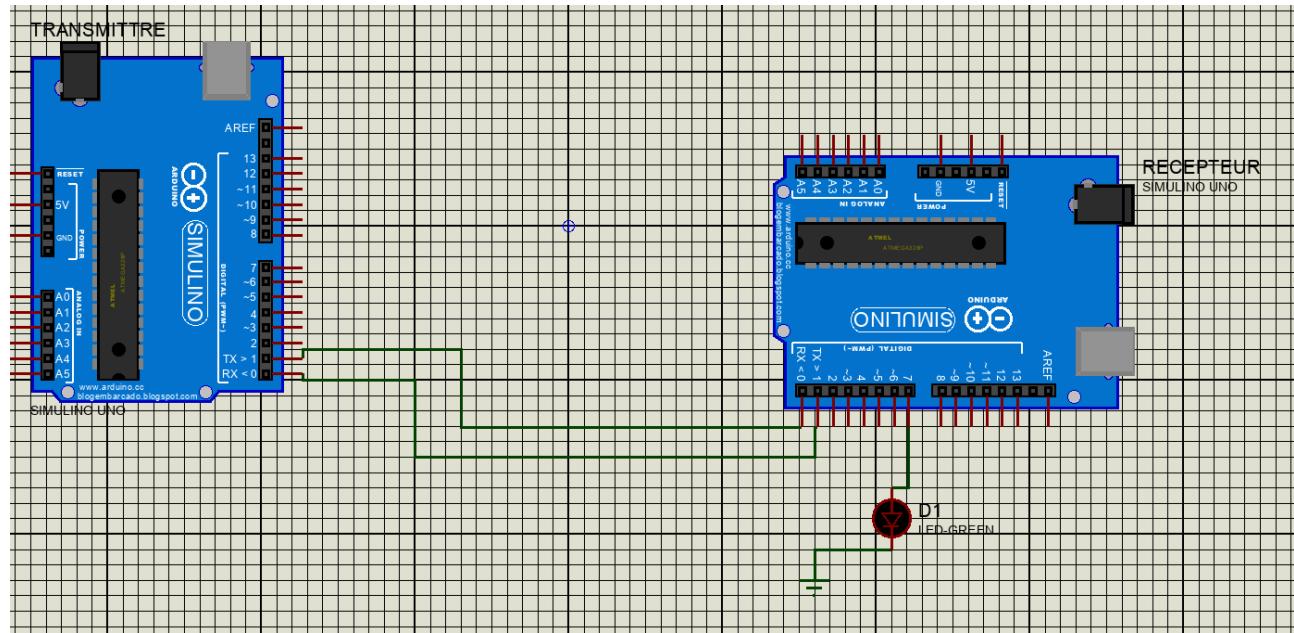
Pr. MOUDOUD

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Activité 1: Communication des données entre deux cartes Arduino

Il s'agit de réaliser la communication entre deux objets, un émetteur et un récepteur, via une liaison série (filaire). Dans cet activité, l'émetteur va envoyer une information de commande d'allumer ou éteindre d'une LED. Le récepteur va recevoir l'information et va actionner la sortie (LED).

SCHEMA :



CODE :

Sender:

```
sender_ex1.ino
1 void setup() {
2   Serial.begin(9600);
3 }
4
5 void loop() {
6
7   Serial.print('1');
8   delay(500);
9   Serial.print('0');
10  delay(500);
11
12 }
```

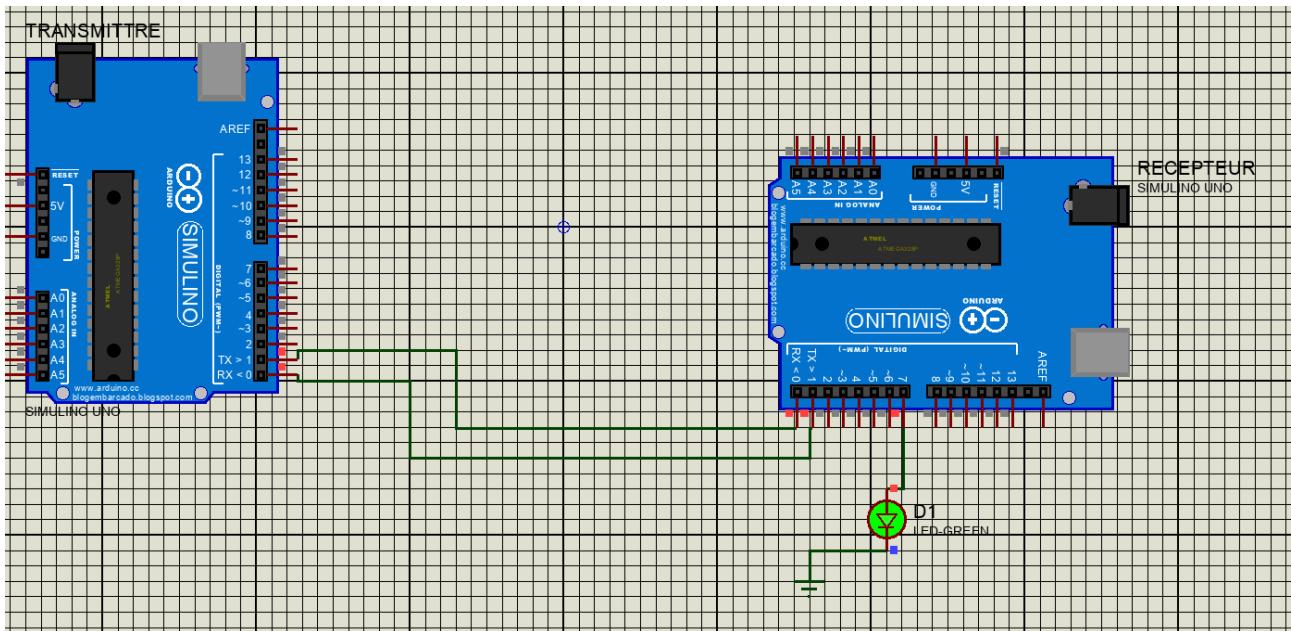
Receiver :



```
recepteur_ex1.ino

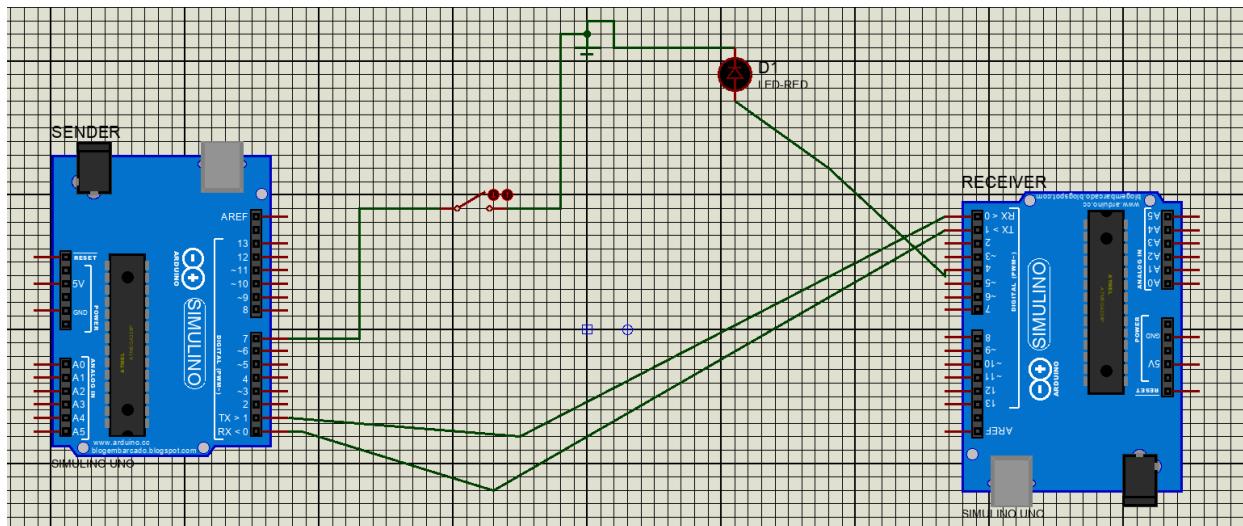
1 #define led 7
2
3 void setup() {
4     // put your setup code here, to run once:
5     Serial.begin(9600);
6     pinMode(led, OUTPUT);
7
8 }
9
10 void loop() {
11     // put your main code here, to run repeatedly:
12
13     if(Serial.available()){
14         char commande = Serial.read();
15
16         if(commande == '1'){
17             digitalWrite(led,HIGH);
18         }else if(commande == '0'){
19             digitalWrite(led,LOW);
20         }
21     }
22
23 }
24 }
```

Resultat :



1. Modifier le programme et le montage pour commander la LED par un interrupteur au niveau de l'émetteur.

SCHEMA :



CODE :

Sender :

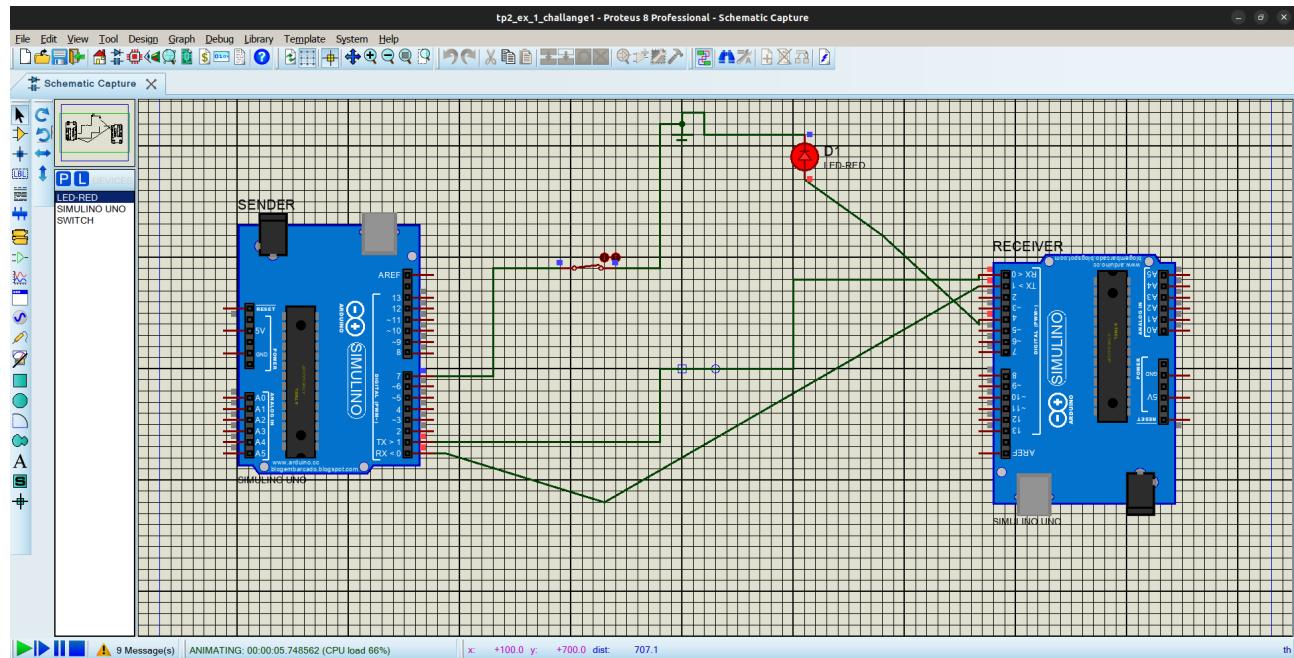
```
sender_challange1.ino
1 #define swi 7
2
3 void setup() {
4     Serial.begin(9600);
5     pinMode(swi,INPUT);
6
7 }
8
9 void loop() {
10    if(digitalRead(swi) == HIGH){
11        Serial.print('0');
12    }else if(digitalRead(swi) == LOW){
13        Serial.print('1');
14    }
15    delay(100);
16}
17
18}
```

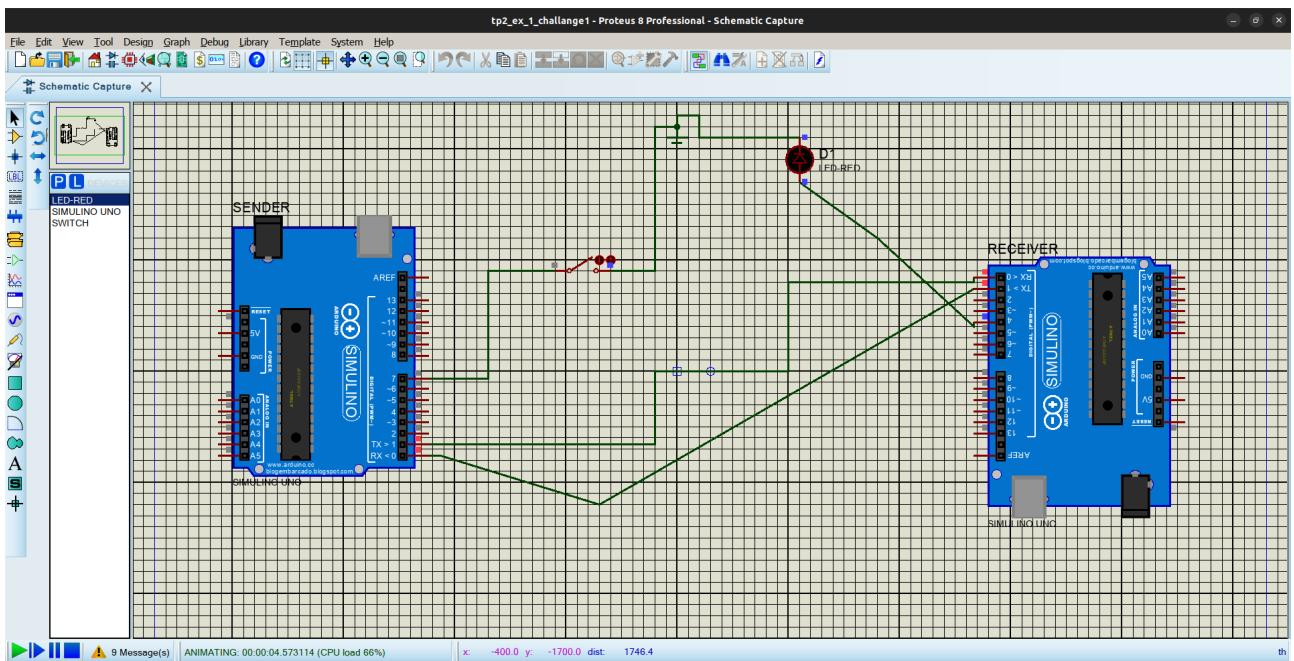
Receiver :

recepteur_challenge1.ino

```
1 #define led 4
2
3 void setup() {
4     Serial.begin(9600);
5     pinMode(led,OUTPUT);
6 }
7
8
9 void loop() {
10
11    if(Serial.available()){
12        char commande = Serial.read();
13        if(commande == '1'){
14            digitalWrite(led,HIGH);
15        }else if(commande == '0'){
16            digitalWrite(led,LOW);
17        }
18    }
19
20
21 }
22 }
```

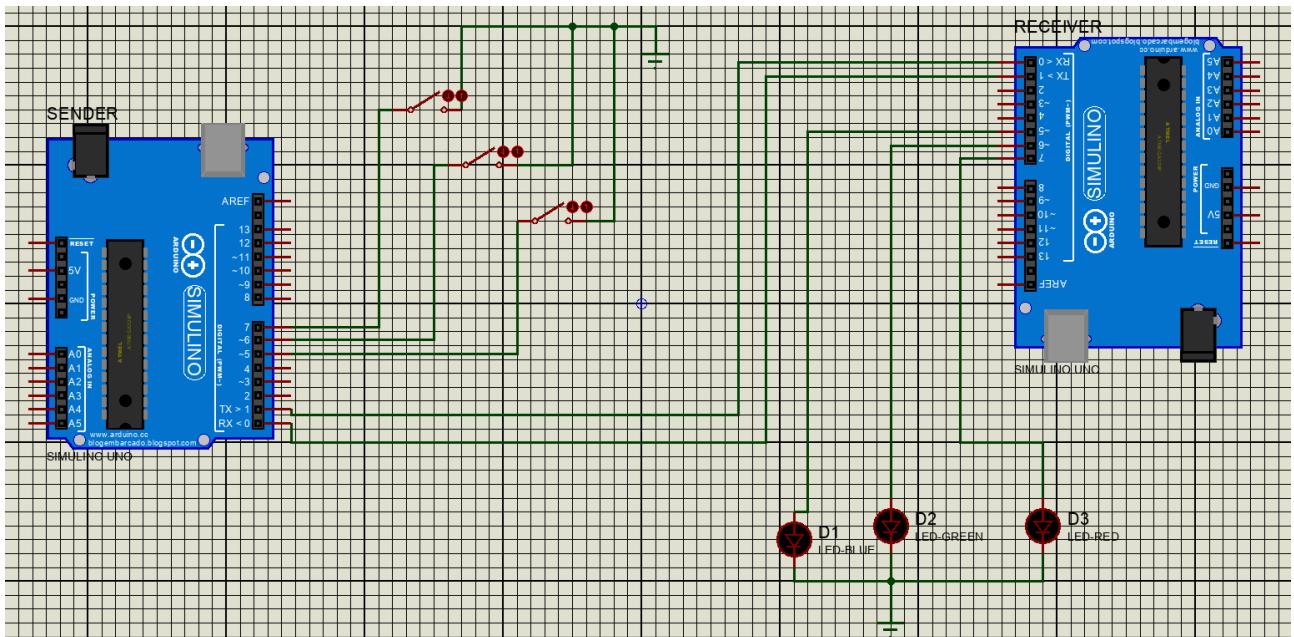
Resultat :





2. Modifier le programme et le montage pour commander trois LEDs en utilisant trois interrupteurs.

SCHEMA :



CODE :

Sender :

```

sender_challange2.ino
1 #define swi1 5
2 #define swi2 6
3 #define swi3 7
4
5
6 void setup() {
7
8   Serial.begin(9600);
9   pinMode(swi1,INPUT);
10  pinMode(swi2,INPUT);
11  pinMode(swi3,INPUT);
12
13 }
14
15 void loop() {
16
17   Serial.write(digitalRead(swi1) | digitalRead(swi2) << 1 | digitalRead(swi3) << 2);
18   delay(200);
19
20
21 }
22
23

```

the idea is to transmit three bits each bit will control a led by example :

001 => will turn on led 1

010 => will turn on led 2

100 => will turn on led 3

the expression `digitalRead(swi1) | digitalRead(swi2) << 1 | digitalRead(swi3) << 2`

as we know that `digitalRead()` return two state either 1 or 0

`digitalRead(swi2) << 1` : means shifting one bit to the left if `0001 << 1` will result `0010`

let `digitalRead(swi1) = 1` and `digitalRead(swi2) = 0` and `digitalRead(swi3) = 1`

converting to binary `001 | 000 << 1 | 001 << 2` and performing the shift will result `001 | 000 | 100`

and then the logical OR will result `101` this means led1 and led3 will be turned on , and the function `write()` in the class `Serial` as the arduino documentation said, it sends data in the serial port This data is sent as a byte or series of bytes

Receiver :

```

recepteur_challange2.ino
1 #define led1 5
2 #define led2 6
3 #define led3 7
4
5 void setup() {
6
7   Serial.begin(9600);
8   pinMode(led1,OUTPUT);
9   pinMode(led2,OUTPUT);
10  pinMode(led3,OUTPUT);
11
12 }
13
14 void loop() {
15
16   if(Serial.available()){
17     int states = Serial.read();
18     if((states & 0b001)){
19       digitalWrite(led1,HIGH);
20     }else if((states & 0b001) == 0){
21       digitalWrite(led1,LOW);
22     }
23     if(states & 0b010)[]
24       digitalWrite(led2,HIGH);
25     }else if((states & 0b010) == 0){
26       digitalWrite(led2,LOW);
27     }
28     if(states & 0b100){
29       digitalWrite(led3,HIGH);
30     }else if((states & 0b100) == 0){
31       digitalWrite(led3,LOW);
32     }
33   }
34
35
36 }
37

```

at the receiver side I perform logical AND to know which led will be turned on working with the previous

Resultat :

