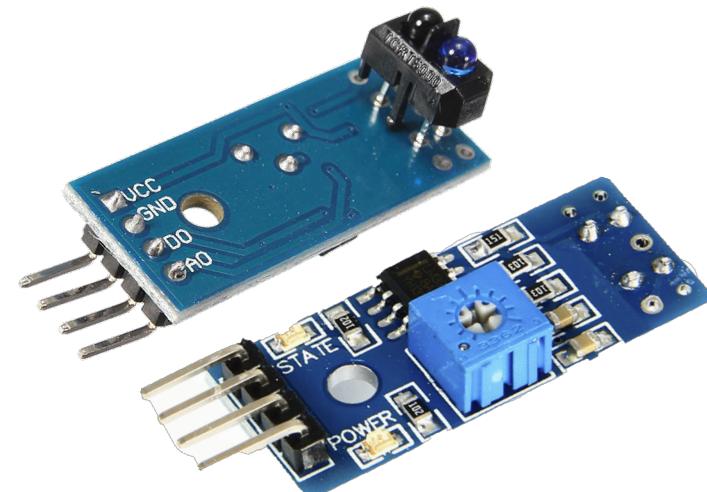


Mid term presentation



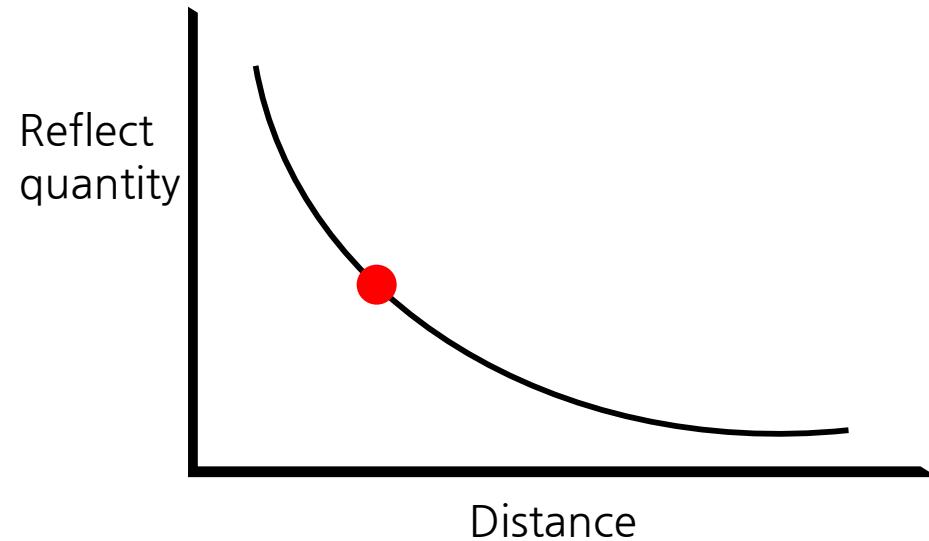
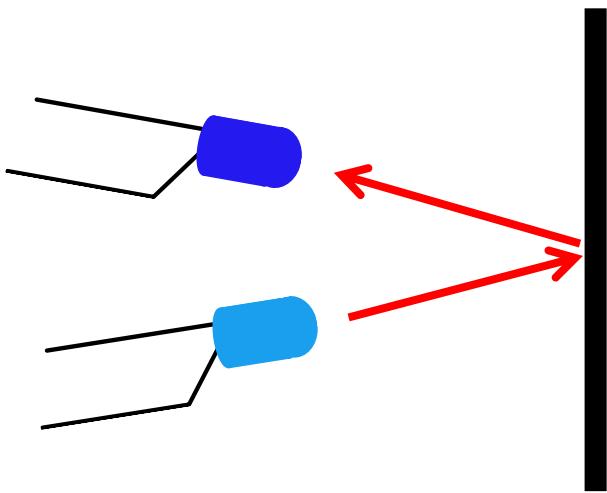
2) IR sensor (TCRT5000)



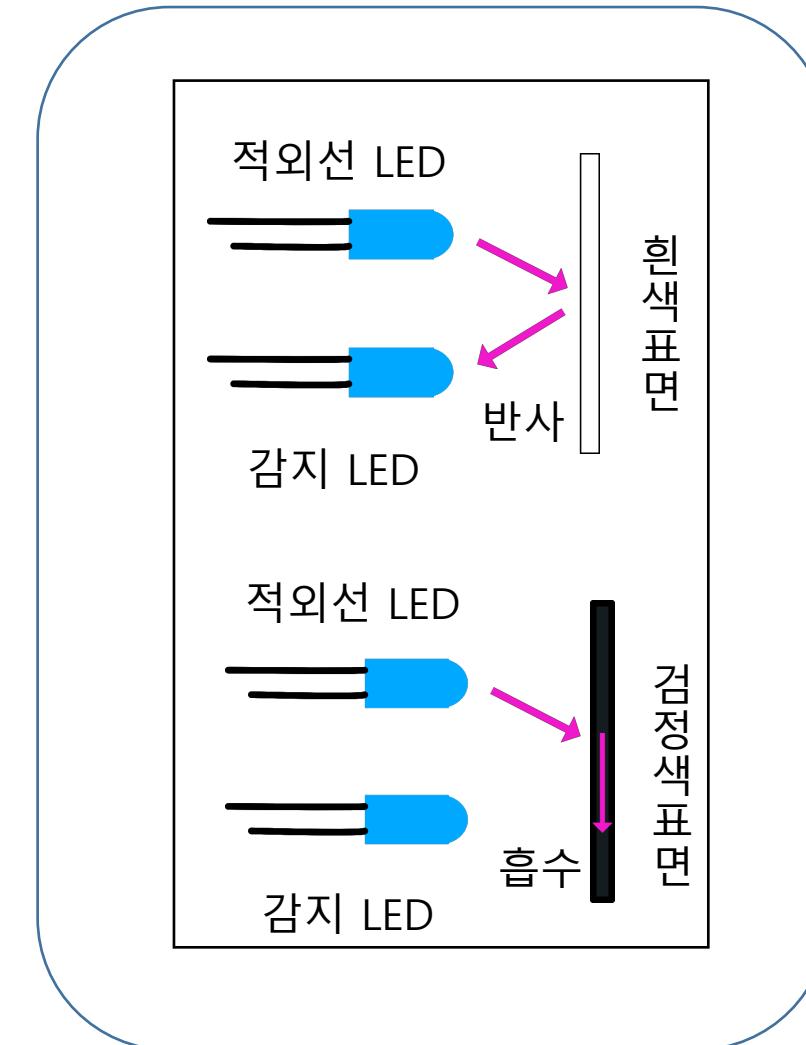
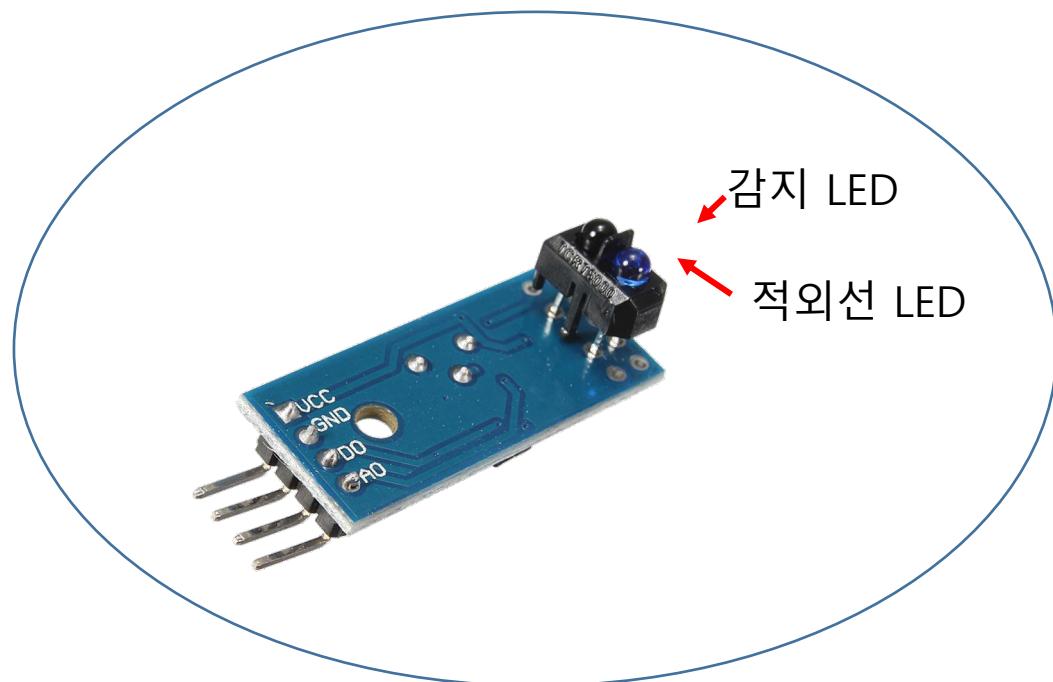
VISHAY



2) IR sensor (TCRT5000)

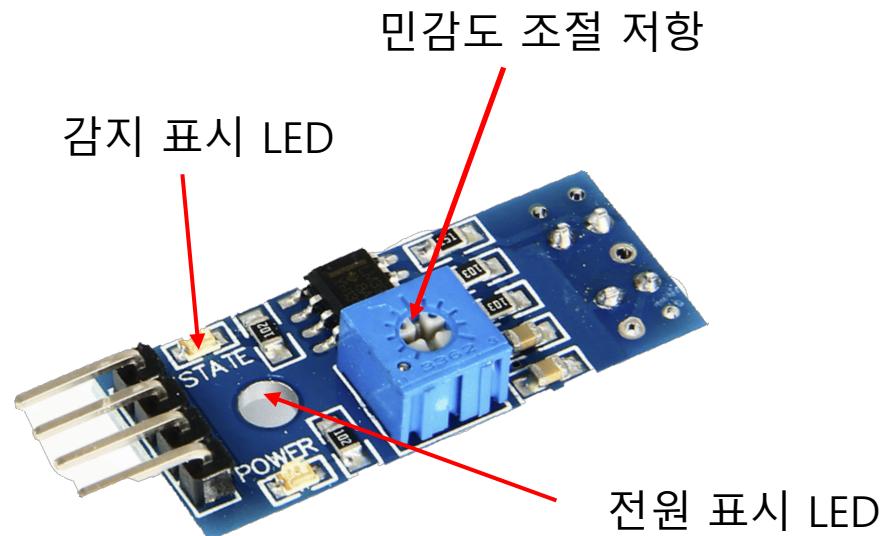


TCRT5000 흑백 라인센서





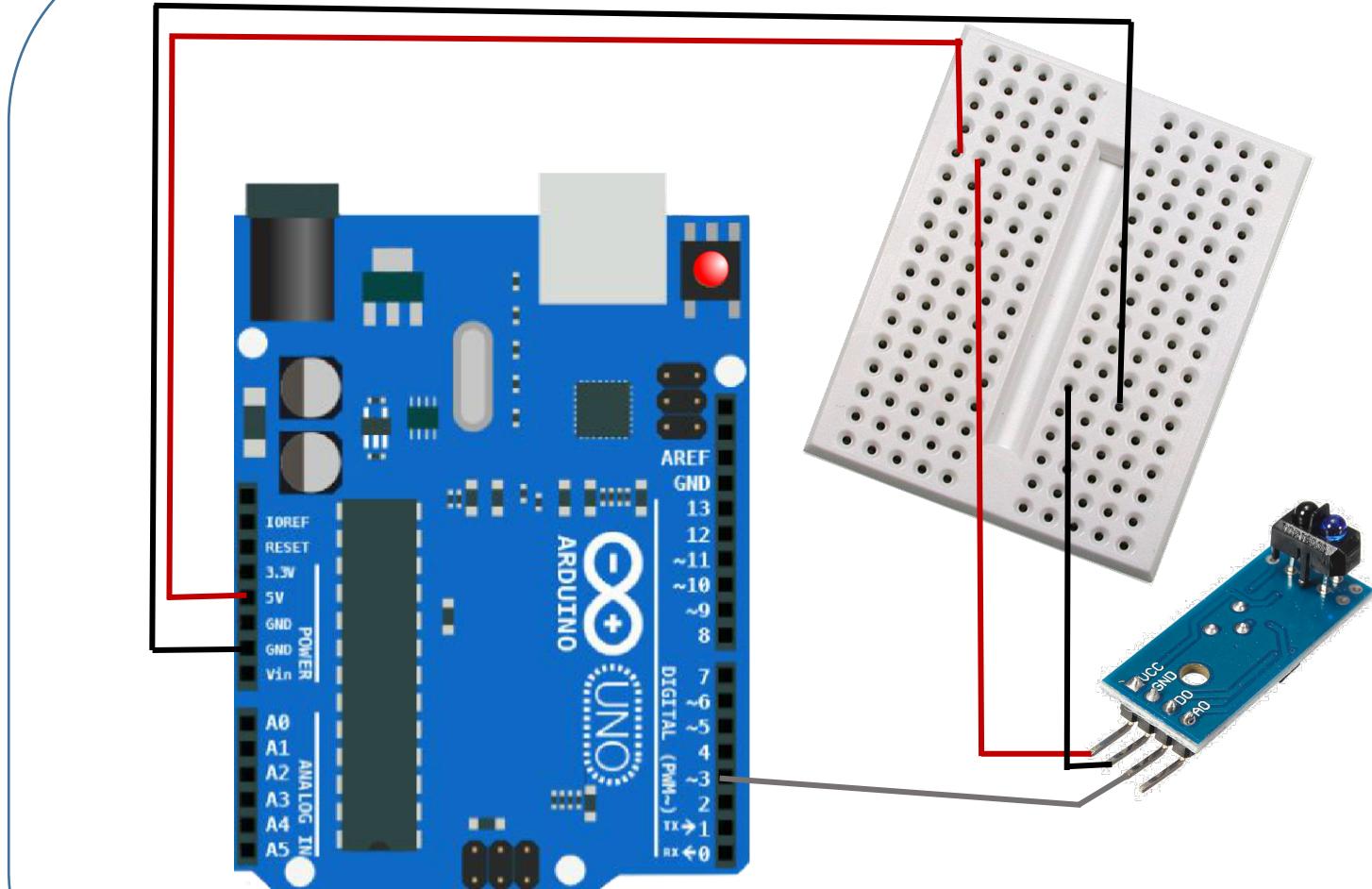
빛 감지 다이오드
적외선 LED



민감도 조절 저항
감지 표시 LED

전원 표시 LED

라인센서	아두이노
VCC	5V
GND	GND
DO	디지털 3번핀

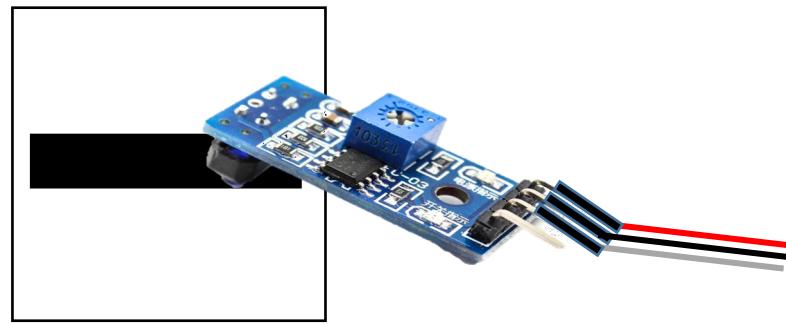


라인 센서 1개 연결 회로

The screenshot shows the Arduino IDE interface with a sketch titled "Line_Sensor_Test1". The code is written in C++ and performs the following tasks:

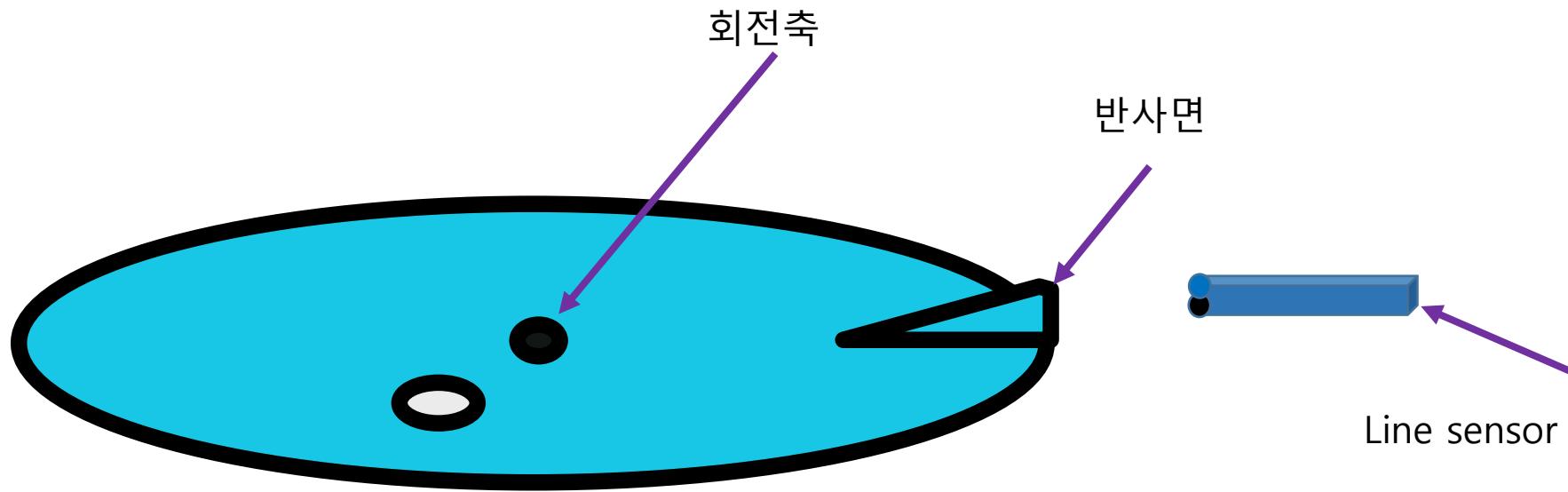
- Setup phase (lines 3-7):
 - Configures pin 3 as INPUT to read from the line sensor.
 - Configures pin 13 as OUTPUT to control the LED.
 - Initializes the Serial port at 9600 bps.
- Loop phase (line 9-21):
 - Reads the value from the line sensor (pin 3) into the variable "val".
 - Prints the value of "val" to the Serial monitor.
 - Checks if "val" is 0 (white line). If true, it turns the LED on (HIGH).
 - If "val" is not 0 (black line), it turns the LED off (LOW).
 - Waits for 30 milliseconds with `delay(30);`.

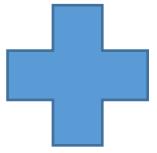
```
1 // 라인 센서 1개 테스트 (TCRT5000)
2
3 void setup(){
4     pinMode(3, INPUT); // 센서값 입력 = 디지털 3 번
5     pinMode(13, OUTPUT) ; // LED 출력 = 디지털 13 번
6     Serial.begin(9600);
7 }
8
9 void loop(){
10    int val = digitalRead(3); // 센서값 읽어 val에 저장
11    // 센서는 흰색은 0, 검정색은 1 으로 읽는다,
12    Serial.println(val) ; // val 값을 시리얼 모니터에 프린트하라
13
14    if (val == 0) {           // val 값이 0(흰색) 인가 ?
15        digitalWrite(13, HIGH); // 0(흰색) 이면 LED를 켜고
16
17    } else {                 // 1(검정색) 이면
18        digitalWrite(13, LOW); // LED 꺼라
19    }
20    delay(30) ;   // 그냥 좀 천천히 하라고 0.03 초 지연
21 }
```



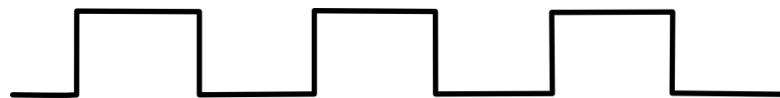
라인 트랙 축소판

Line sensor for home position of circular disk

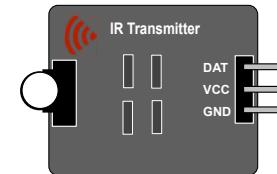




IR Receiver and Transmitter

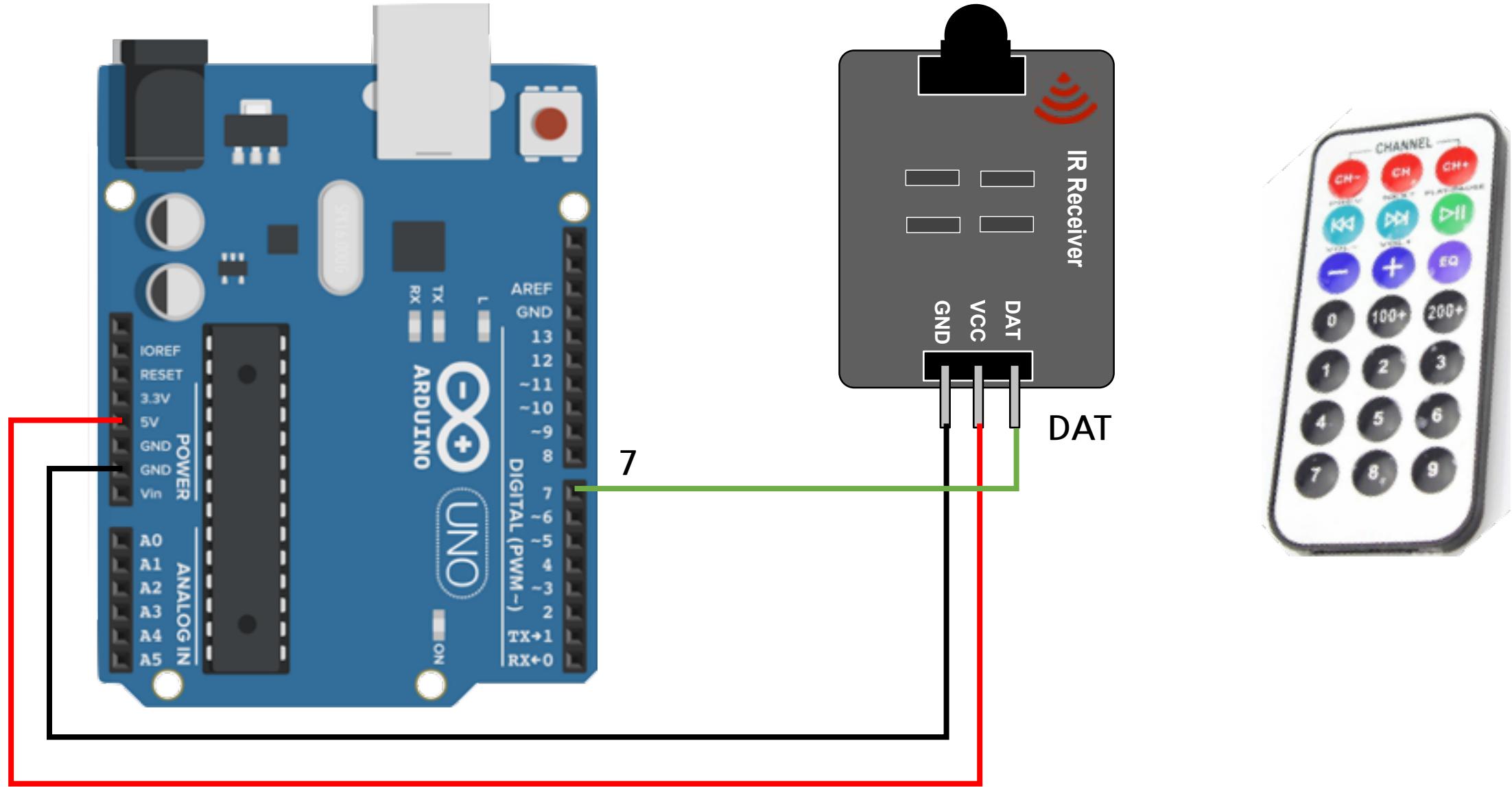


38 KHz

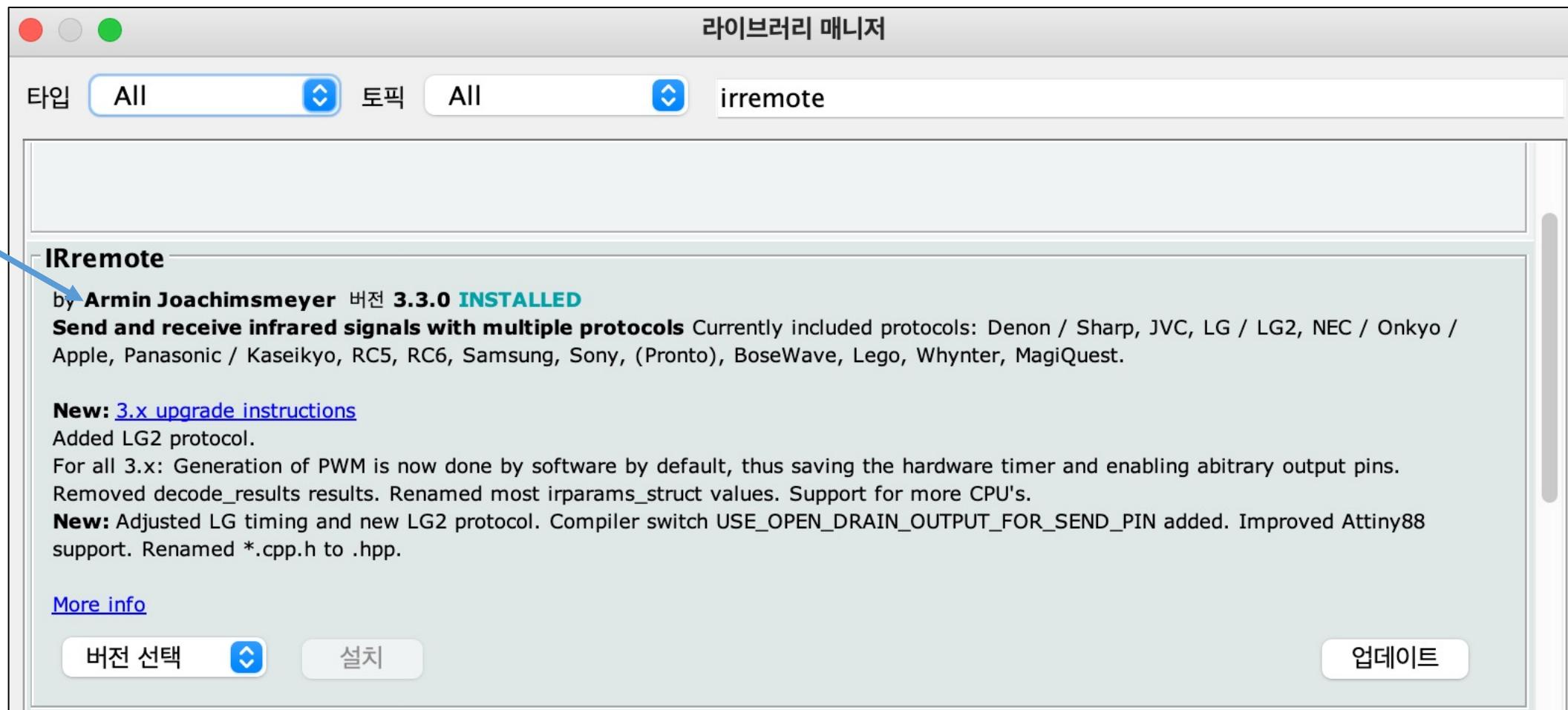


1. Light ON/OFF
2. 모터 스피드 컨트롤
3. 스텝 모터 각도 컨트롤
4. 방범 시스템 ON/OFF
5. ..

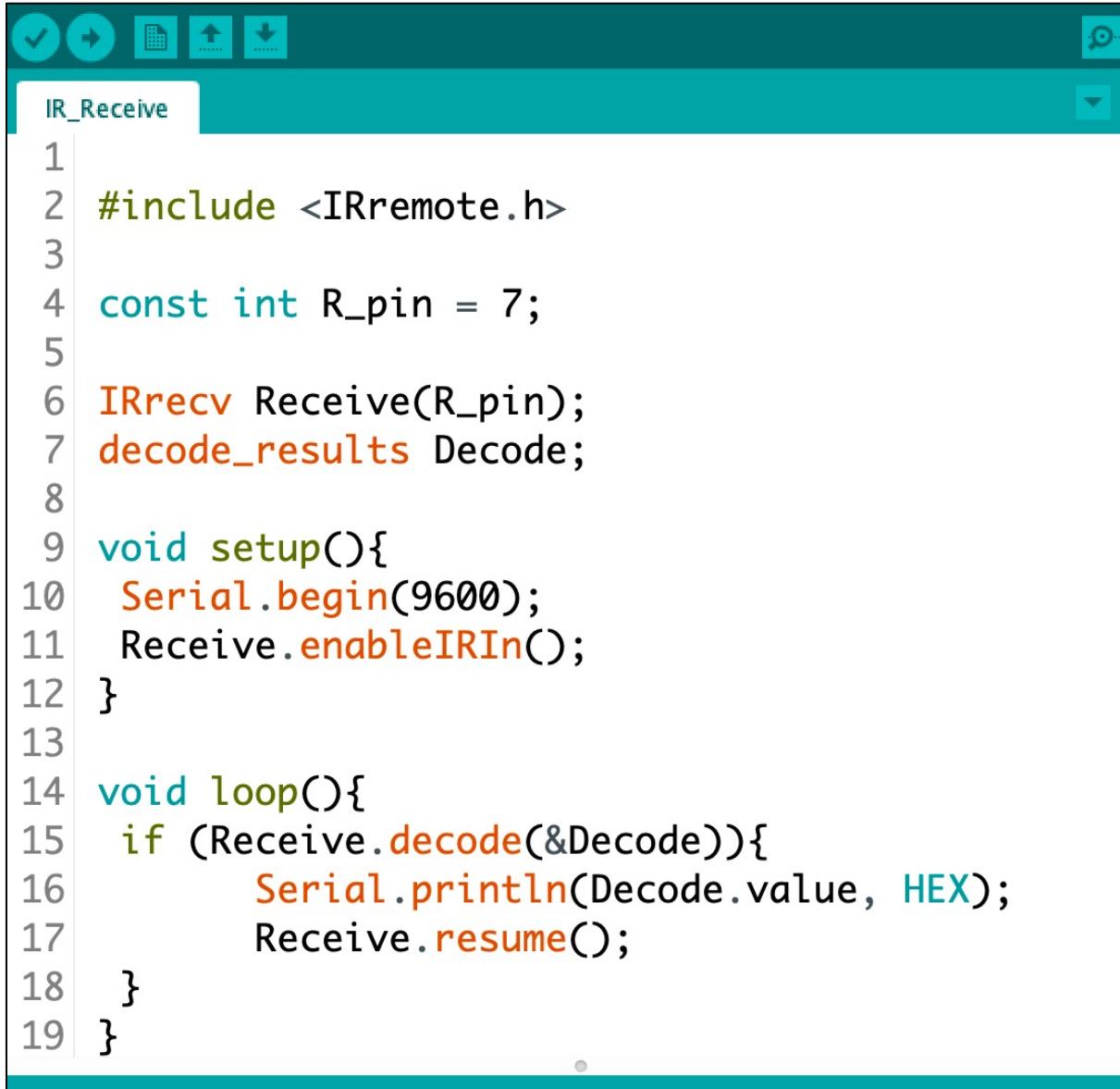
Receive Circuit



스케치 => 라이브러리 포함하기 => 라이브러리 관리



Receive Coding



```
IR_Receive
1
2 #include <IRremote.h>
3
4 const int R_pin = 7;
5
6 IRrecv Receive(R_pin);
7 decode_results Decode;
8
9 void setup(){
10   Serial.begin(9600);
11   Receive.enableIRIn();
12 }
13
14 void loop(){
15   if (Receive.decode(&Decode)){
16     Serial.println(Decode.value, HEX);
17     Receive.resume();
18   }
19 }
```



Serial monitor window showing the following received codes in HEX:

FFFFFF
FF6897
FFFFFF
FF30CF
FFFFFF
FF18E7
FFFFFF
FF7A85
FFFFFF

Checkboxes at the bottom: 자동 스크롤 (checked), 타임스탬프 표시 (unchecked). Baud rate: 9600 보드레이트.

키트 리모컨



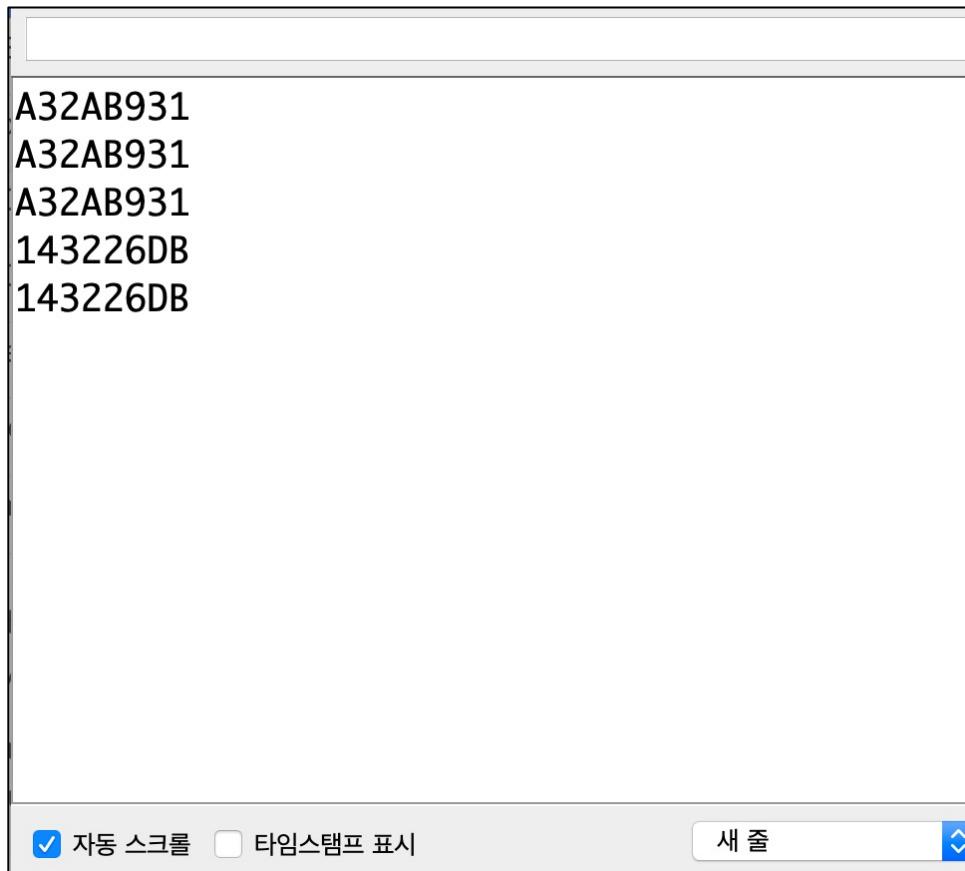
FFE01F
FFFFFFFF
FFFFFFFF
FFFFFFFF
FFA857
FFFFFFFF

자동 스크롤 타임스탬프 표시

새 줄



선풍기 리모컨





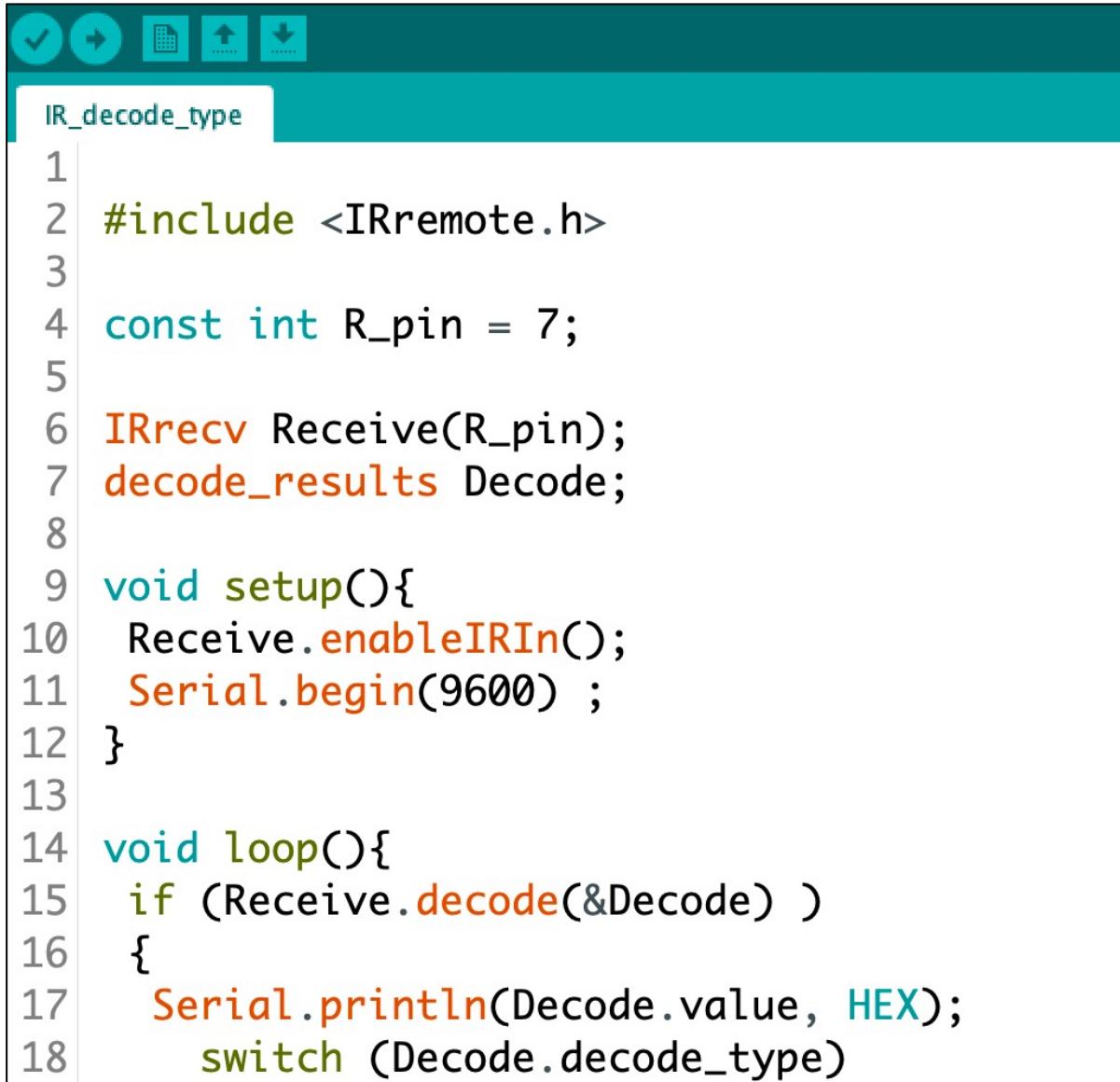
Project :

키트 리모컨 + 버튼을 누르면 8번에 연결된 LED 가 2초 동안 켜진 다음 꺼지는 회로와 코딩을 수행하세요.



Find the manufacturer code

Identify manufacturer code



```
IR_decode_type

1 #include <IRremote.h>
2
3 const int R_pin = 7;
4
5 IRrecv Receive(R_pin);
6 decode_results Decode;
7
8 void setup(){
9     Receive.enableIRIn();
10    Serial.begin(9600) ;
11 }
12
13 void loop(){
14     if (Receive.decode(&Decode) )
15     {
16         Serial.println(Decode.value, HEX);
17         switch (Decode.decode_type)
```

```
20     case NEC:
21         Serial.println("NEC");
22         break;
23     case SONY:
24         Serial.println("SONY");
25         break;
26     case SAMSUNG:
27         Serial.println("SAMSUNG");
28         break;
29     case LG:
30         Serial.println("LG");
31         break;
32     default:
33     case UNKNOWN:
34         Serial.println("UNKNOWN");
35         break;
36     }
37     Receive.resume();
38 }
39 }
```

FFE01F
NEC
FFFFFF
NEC
FFFFFF
NEC

키트 리모컨

자동 스크롤 타임스탬프 표시

새 줄 

20DF10EF
NEC
E0E040BF
SAMSUNG

삼성 TV 리모컨

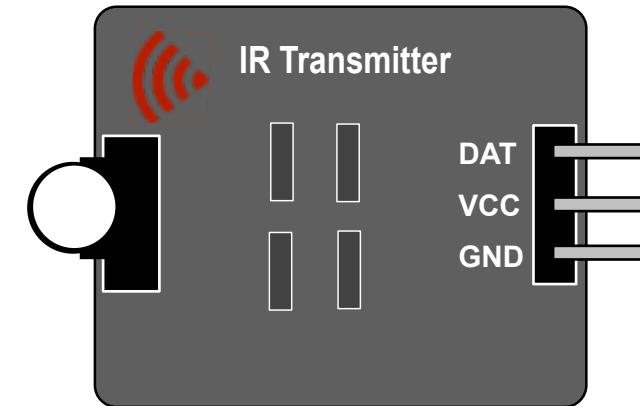
자동 스크롤 타임스탬프 표시

새 줄 

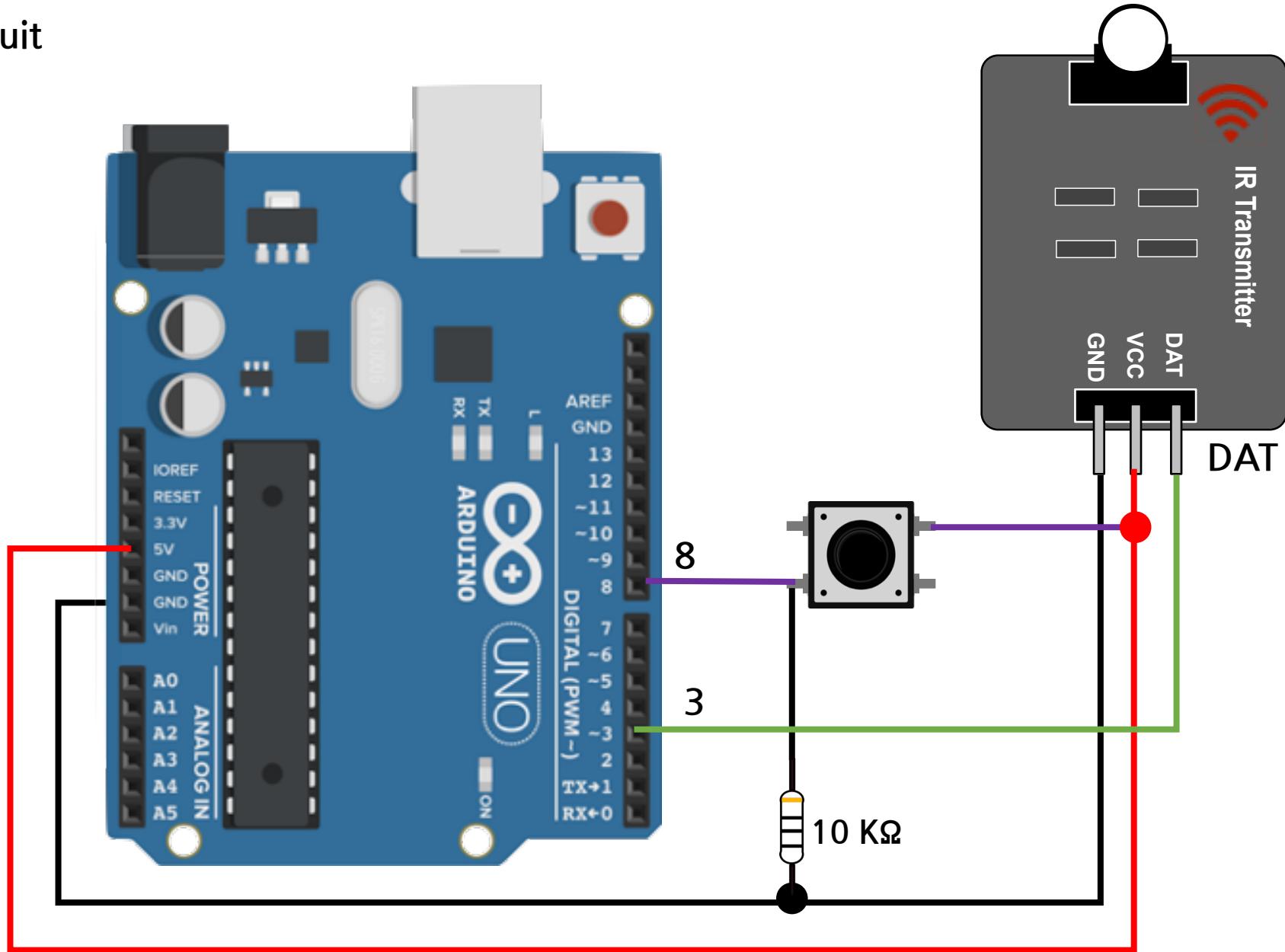


Control Home appliance from you made Remote controller

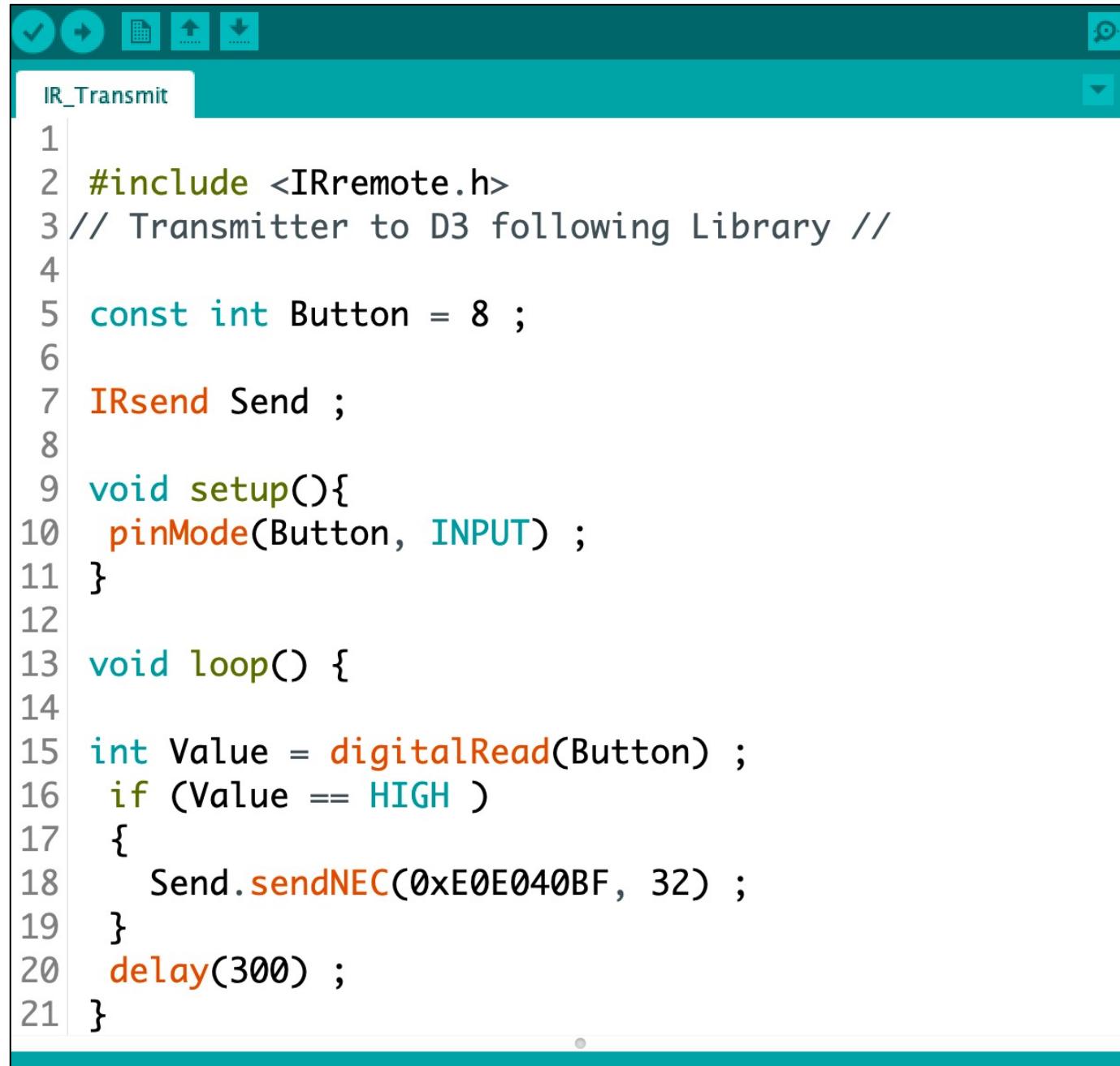
Control TV



Transmit Circuit



Transmit coding



The screenshot shows the Arduino IDE interface with the following details:

- Title Bar:** Shows the title "IR_Tx".
- Toolbar:** Standard Arduino toolbar with icons for file operations (checkmark, plus, save, upload, download).
- Sketch Area:** Displays the C++ code for an infrared transmitter sketch.
- Code Content:** The code uses the `<IRremote.h>` library to control an infrared transmitter. It defines a button on pin D3 and initializes an `IRsend` object. The `setup()` function sets the button pin as an input. The `loop()` function reads the button state and sends a NEC protocol command (0xE0E040BF) if the button is pressed. A `delay(300)` is included after each transmission.

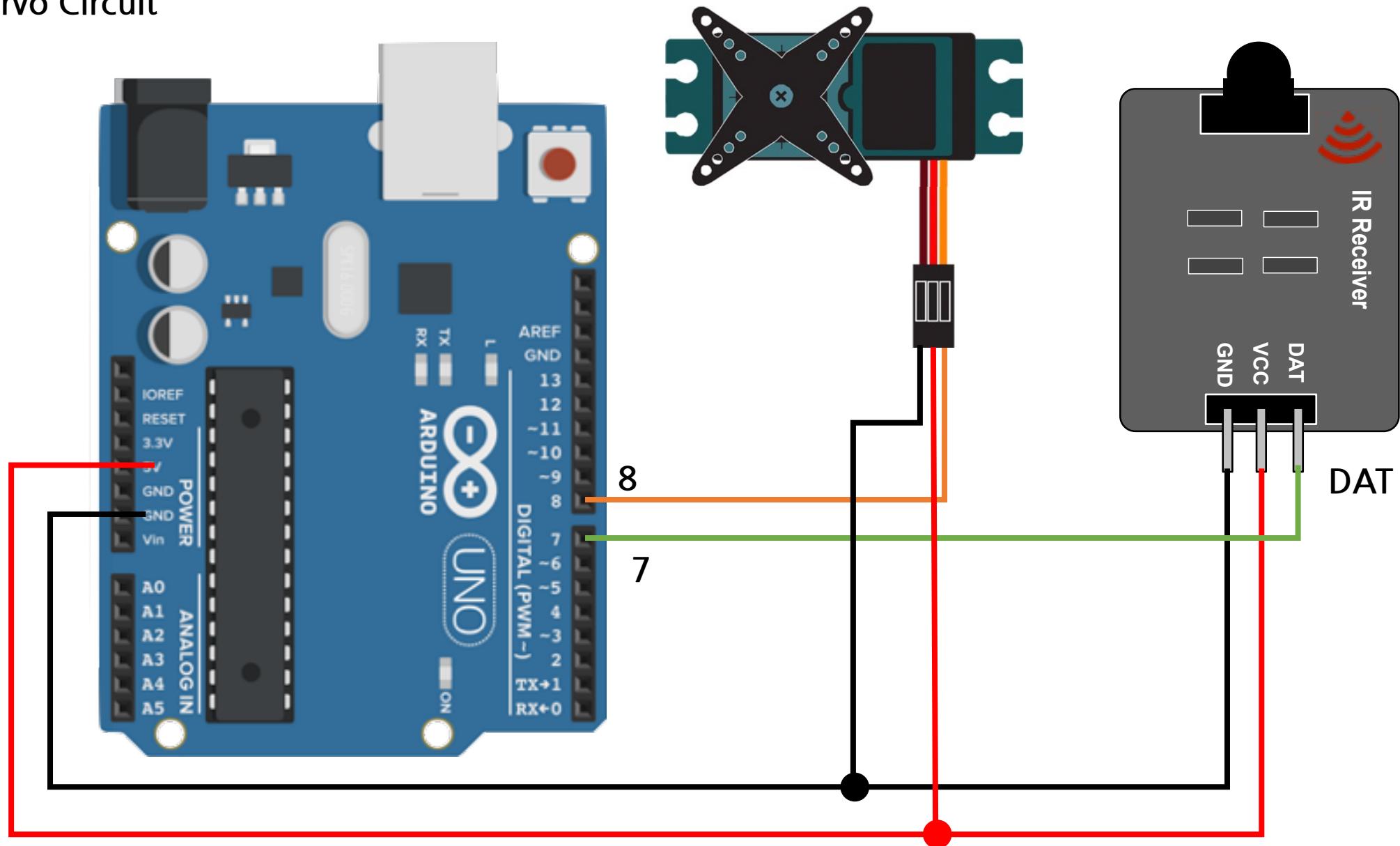
```
1 #include <IRremote.h>
2 // Transmitter to D3 following Library //
3
4 const int Button = 8 ;
5
6
7 IRsend Send ;
8
9 void setup(){
10   pinMode(Button, INPUT) ;
11 }
12
13 void loop() {
14
15   int Value = digitalRead(Button) ;
16   if (Value == HIGH )
17   {
18     Send.sendNEC(0xE0E040BF, 32) ;
19   }
20   delay(300) ;
21 }
```



Project :

**Control Servo motor connected to D8
from remote controller. IR Receiver is connected to D7**

Servo Circuit



IR_decode_type

```
IR_decode_type  
2 #include <IRremote.h>  
3
```

FFA25D
NEC
FFFFFFF
NEC
FF629D
NEC
FFFFFFF
NEC
FFE21D
NEC
FFFFFFF
NEC

CH- : FFA25D NE
C

CH : FF629D NE
C

CH+ : FFE21D NE
C



자동 스크롤 타임스탬프 표시

스크린샷

새 줄



IR_Servo

```
2 #include <IRremote.h>
3 #include <Servo.h>
4
5 const int R_pin = 7 ; // receiver
6 const int S_pin = 8 ; // servo motor
7 int pos = 90 ;
8
9 unsigned long lastCode ;
10
11 IRrecv Receive(R_pin) ;
12 decode_results Decode ;
13 Servo myservo ;
14
15 void setup() {
16   Receive.enableIRIn() ;
17   myservo.attach(S_pin) ;
18   myservo.write(pos) ;
19 }
20
21 void loop()
22 {
23   if(Receive.decode(&Decode))
24   {
25     if(Decode.value == 0xFFFFFFFF) // repeat
26     {
27       Decode.value = lastCode;
28     }
29 }
```

```
30   if(Decode.value == 0xFFA25D) // CH-
31   {
32     lastCode = Decode.value ;
33     pos = pos+2 ;
34     if(pos > 180)
35       { pos = 180 ; } // max
36     myservo.write(pos);
37   }
38
39   if(Decode.value == 0xFFE21D) // CH+
40   {
41     lastCode = Decode.value ;
42     pos = pos-2;
43     if(pos < 0)
44       { pos = 0 ; } // min
45     myservo.write(pos) ;
46   }
47   if(Decode.value == 0xFF629D) // CH
48   {
49     lastCode = Decode.value ;
50     pos = 90 ;
51     myservo.write(pos);
52   }
53   delay(30);
54   Receive.resume();
55 }
56 }
```