

VISA R/W

NI-VISA Write: basic exercises

1. INTRODUCTION

One of the many applications that LabView has is an I/O software known as VISA (Virtual Instrument System Architecture). A standard tool to create interfaces that allow us to control (configure, program, debug) instruments/equipment or acquire data from external sensors. All the above tasks are done through any communication port like Ethernet, GPIB, USB, and more.

2. GOAL

Follow the directions to complete all exercises using the advantages of VISA to control and communicate with an external device (ARDUINO). After completing this activity, you will be able to connect, acquire, and send data through the USB serial port with the LabView program.

3. MATERIAL

- LabView software
- Arduino UNO + USB Cable
- Protoboard
- Jumper Kit
- Resistors (120W)
- LED's

4. METHODOLOGY

Use the knowledge acquired in the previous sessions:
Creating an interface in the front panel, variables, data processing and error handling.

Previous and Autonomous tasks:**

Install Arduino on your computer (<https://www.arduino.cc/en/software>)
Set-up the Arduino through the USB Serial Port.

****Find and follow the instructions in the “HOW TO:” section.**

5. CHALLENGES

Digital Output: Visa Write Function

In this challenge you will learn how to use the Digital Outputs from your Arduino, and the Visa write function to communicate your hardware (Arduino board) and software (LabView) through the USB Serial Port.

✓ Exercise 6.1

The aim is to turn on/off the LED of the Arduino board, or in other words, to activate or deactivate the PIN_13.

1.- Open a new project in LabView and create your user interface. (Figure 1)

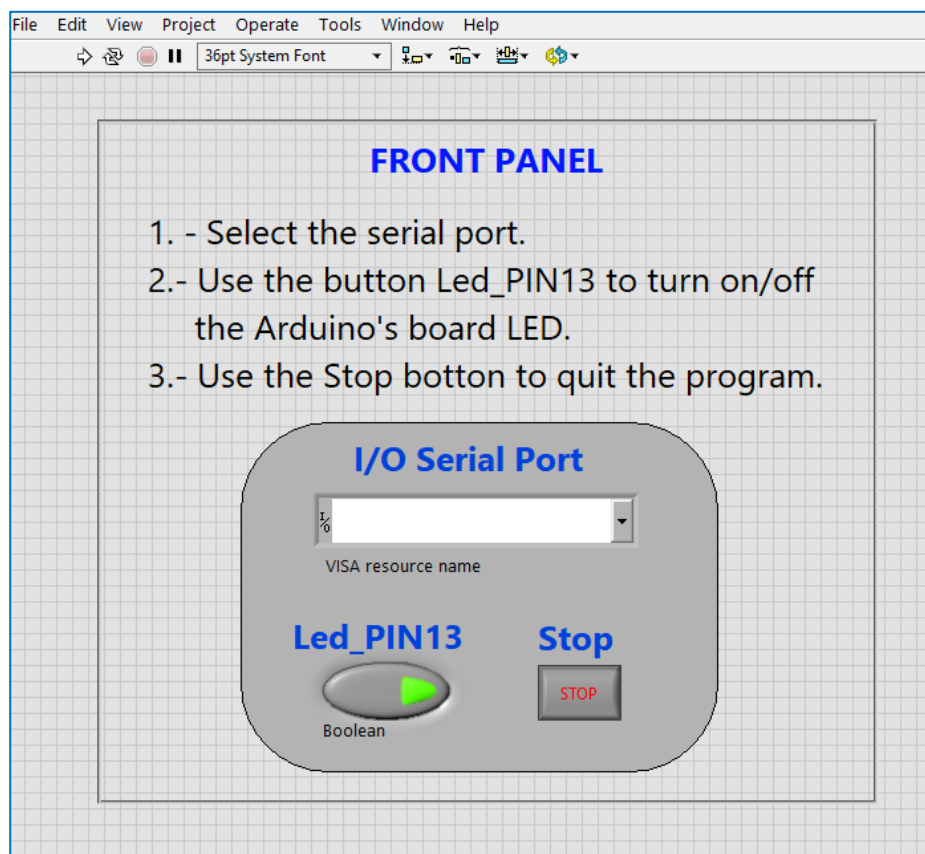


Figure 1. Front panel view

2.- On the Block Diagram: (Figure 2)

- 2.1 Configure de Serial Port by indicating the resource name and the baud rate.
- 2.2 Use "select" to choose whether de button should send an H (High=ON) or an L (Low=OFF) .

2.3 Write the data and close the VISA.

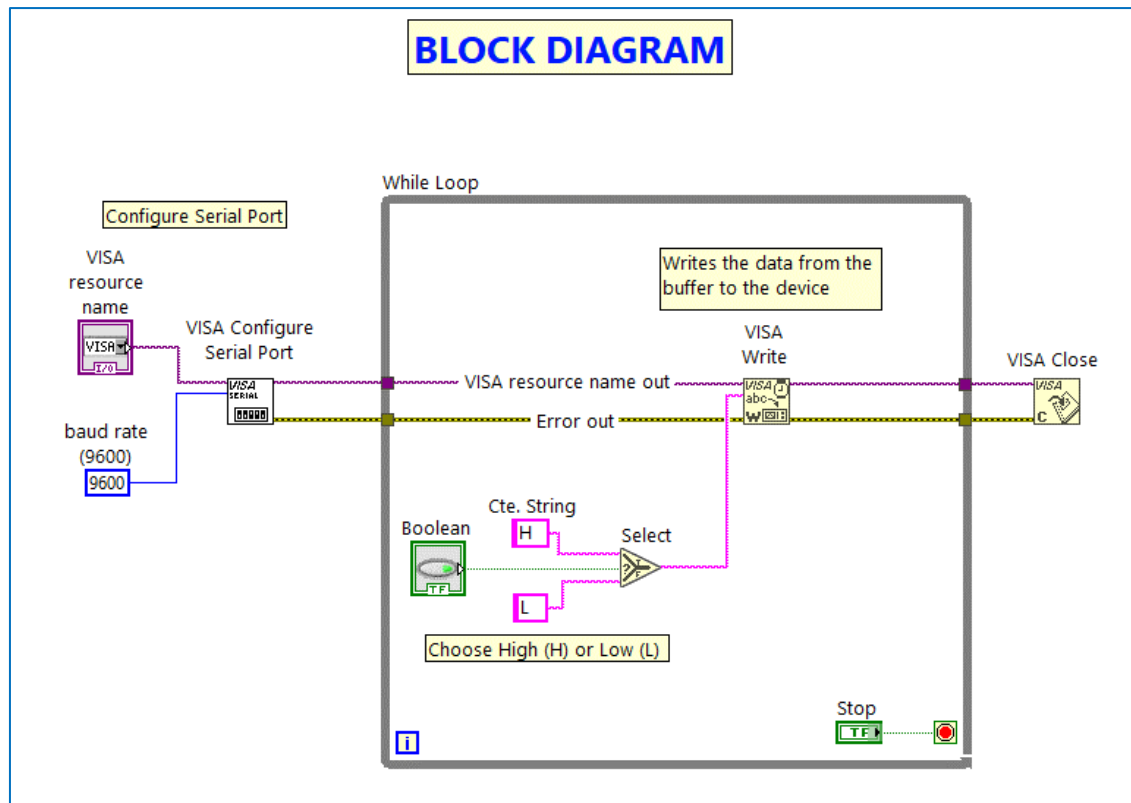


Figure 2. Block Diagram view

3.- Create a new Arduino Sketch to define the variables, the communication rate (be aware to use the same as in LabView Code), and the Main Code to activate/deactivate the board's LED.

```
// Define variables
int Led_pin13=13; //Output pin_13, variable
int variable; // create an integer variable

// Code to run only once
void setup()
{
  Serial.begin(9600); // communication rate 9600
  pinMode(Led_pin13, OUTPUT); //set pin13 as an output
}

// Main code to run repeatedly
void loop()
{
  if(Serial.available()) //the loop will occur after initialize the communication
  {
    variable=Serial.read(); // read the variable
    if(variable=='H')
    {
      digitalWrite(Led_pin13,HIGH); //write High/on to pin13
    }
    else
    {
      digitalWrite(Led_pin13,LOW); // write Low/off to pin13
    }
  }
}
```

Figure 3. Arduino Sketch

4.- Run the code to verify any errors that might have.



5.- Upload your code to the Arduino microcontroller.



✓ **Exercise 6.2**

The aim is to activate/deactivate the digital Pin_8 using LabView controllers.

1.- Modify the previous software using strings “a” and “b” to turn on/off a LED connected to the Arduino Board.

See the images below to carried out the relevant changes.

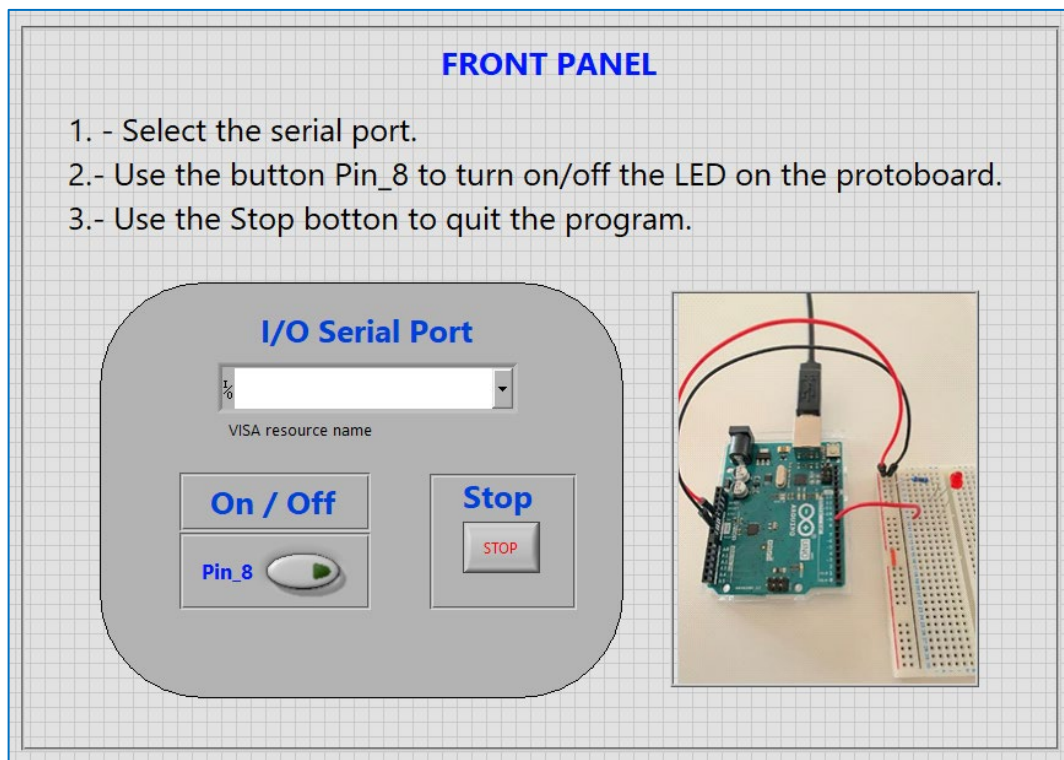


Figure 4. LabView Front Panel view

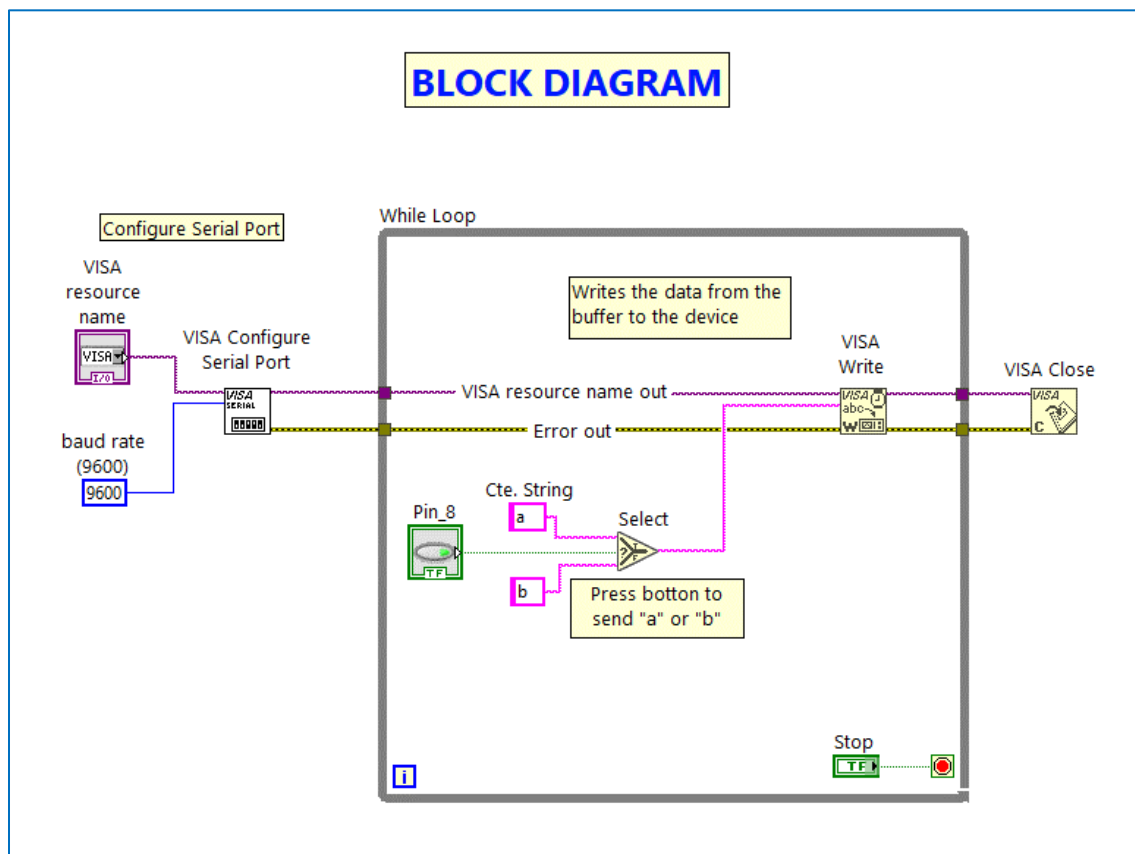


Figure 5. Block Diagram view

2.- On your Arduino Sketch set up data and values to create Pin_8 variable and change

```

// Define variables
int Led_8=8; //Output pin, variable

int variable; // create an integer variable

// Code to run only once
void setup()
{
  Serial.begin(9600); // communication rate 9600
  pinMode(Led_8, OUTPUT); //set pin8 as an output
}

// Main code to run repeatedly
void loop()
{
  if(Serial.available()) //the loop will occur after initialize
                        //the communication
  {
    variable=Serial.read(); // read the variable
    if(variable=='a')
    {
      digitalWrite(Led_8,HIGH); //write High/on to pin8
    }
    else
    {
      digitalWrite(Led_8,LOW); // write Low/off to pin8
    }
  }
}

```

Figure 6. Block Diagram view

its value to 1 or 0 according to the data acquired from LabView.

6.- Connect the Arduino and protoboard as follows

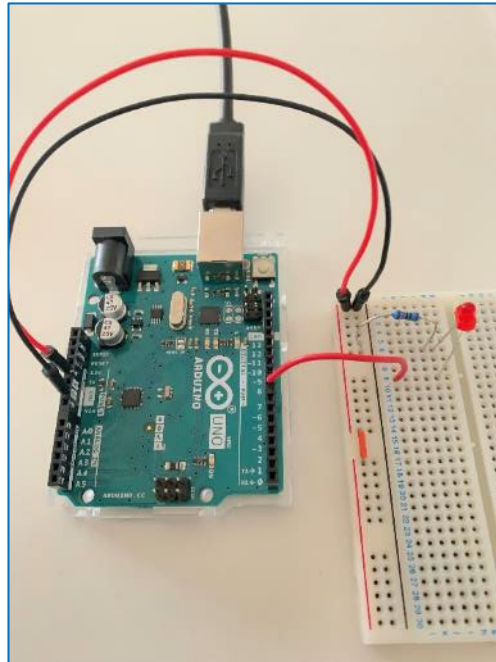


Figure 7. Hardware set-up

7.- As you learned previously:

- Verify, upload and close Arduino Sketch.
- Run the LabView program.
- Turn the led on/off using LabView button.

8.- Change the Front Panel (adding two more buttons), Block Diagram, Arduino Sketch and protoboard connections to turn on/off two more LEDs. Led 9 'c' and Led10 'e'.

Upload to Campus Virtual the program file from the last point 8, and add a picture of your hardware set-up.

References:

- NI-VISA user manual: <https://www.ni.com/pdf/manuals/370423a.pdf>
- Arduino and LabView communication: Digital Outputs:
<https://www.youtube.com/watch?v=GQwSWOLFDkQ>