Lecture #02

Coding in LabVIEW

Aims:

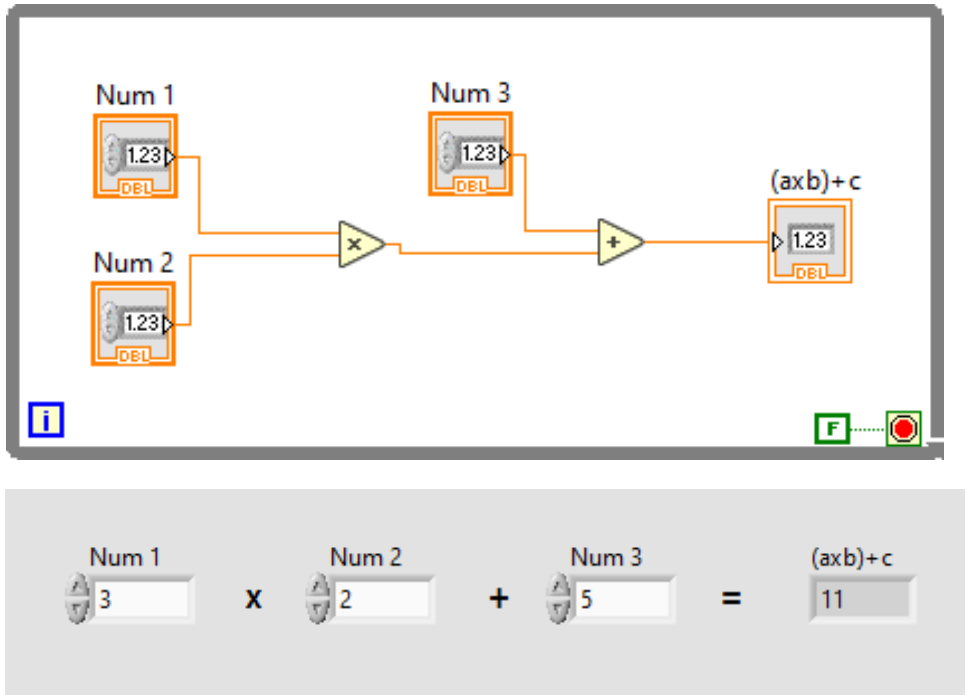
- Basic understanding of LabVIEW programming.
- A program to turn on a virtual LED
- A program to take temperature measurements from a thermistor
- A program to turn on LED when measured temperature is greater than user defined value

What Is LabVIEW programming?

LabVIEW provides is a graphical programming environment to computationally measure, analyze, control or automate physical world objects using power of computation. Such programs are called as **Virtual Instruments or VIs**.

```python
# Input two numbers
num1 = float(input("Enter the first number: "))
num2 = float(input("Enter the second number: "))

# Input the third number
num3 = float(input("Enter the third number: "))

# Multiply the first two numbers
product_result = num1 * num2

# Add the product to the third number
add_result = product_result + num3

# Display the result
print(f"The product of {num1} and {num2} is: {product_result}")
print(f"The result of ({num1} * {num2}) + {num3} is: {add_result}")
```

Text based programming



Graphical programming

Components of a virtual instrument (VI) in LabVIEW

Untitled 1 Front Panel *

File Edit View Project Operate Tools Window Help

12pt Application Font | Search

Front panel

A front panel is the user interface of a VI (Virtual Instrument), displaying interactive controls and indicators that allow users to input data and visualize program output during execution.

Touchscreen display of a tablet

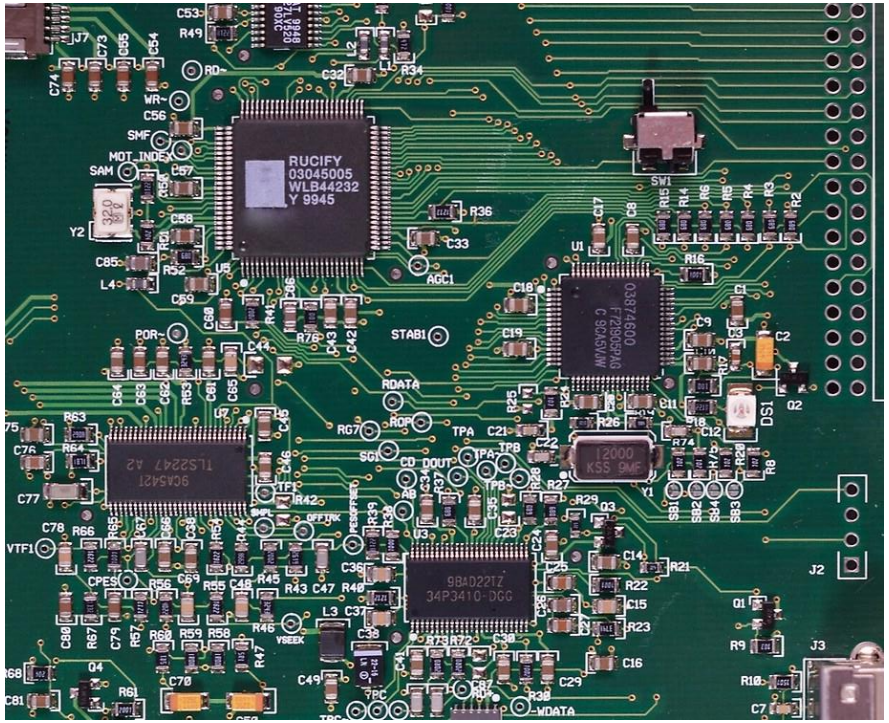
Untitled 1 Block Diagram *

File Edit View Project Operate Tools Window Help

15pt Application Font | Search

Block Diagram

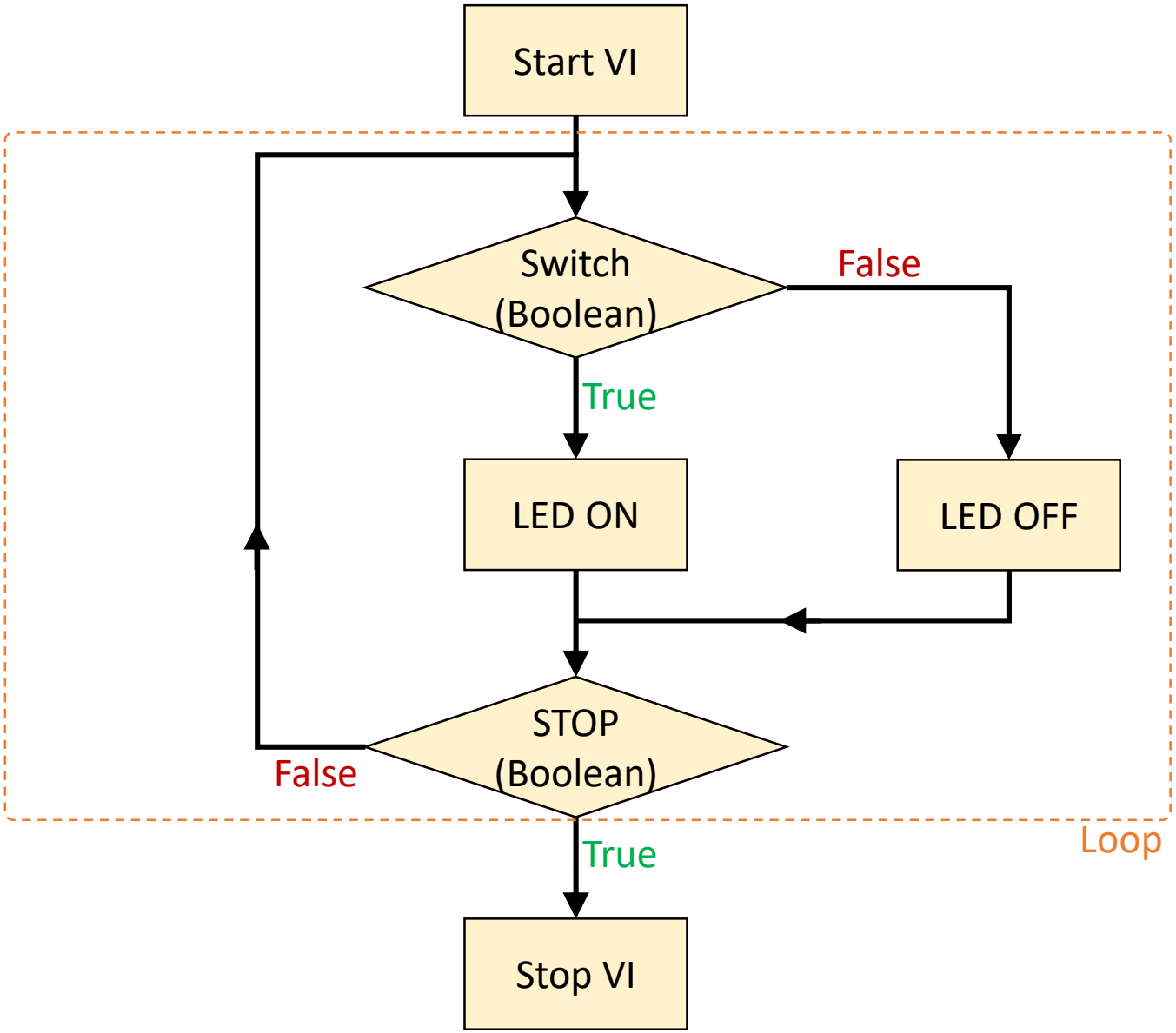
A block diagram in LabVIEW is a visual representation of a program's logic. It uses functional nodes and wires to establish data flow and control structures.



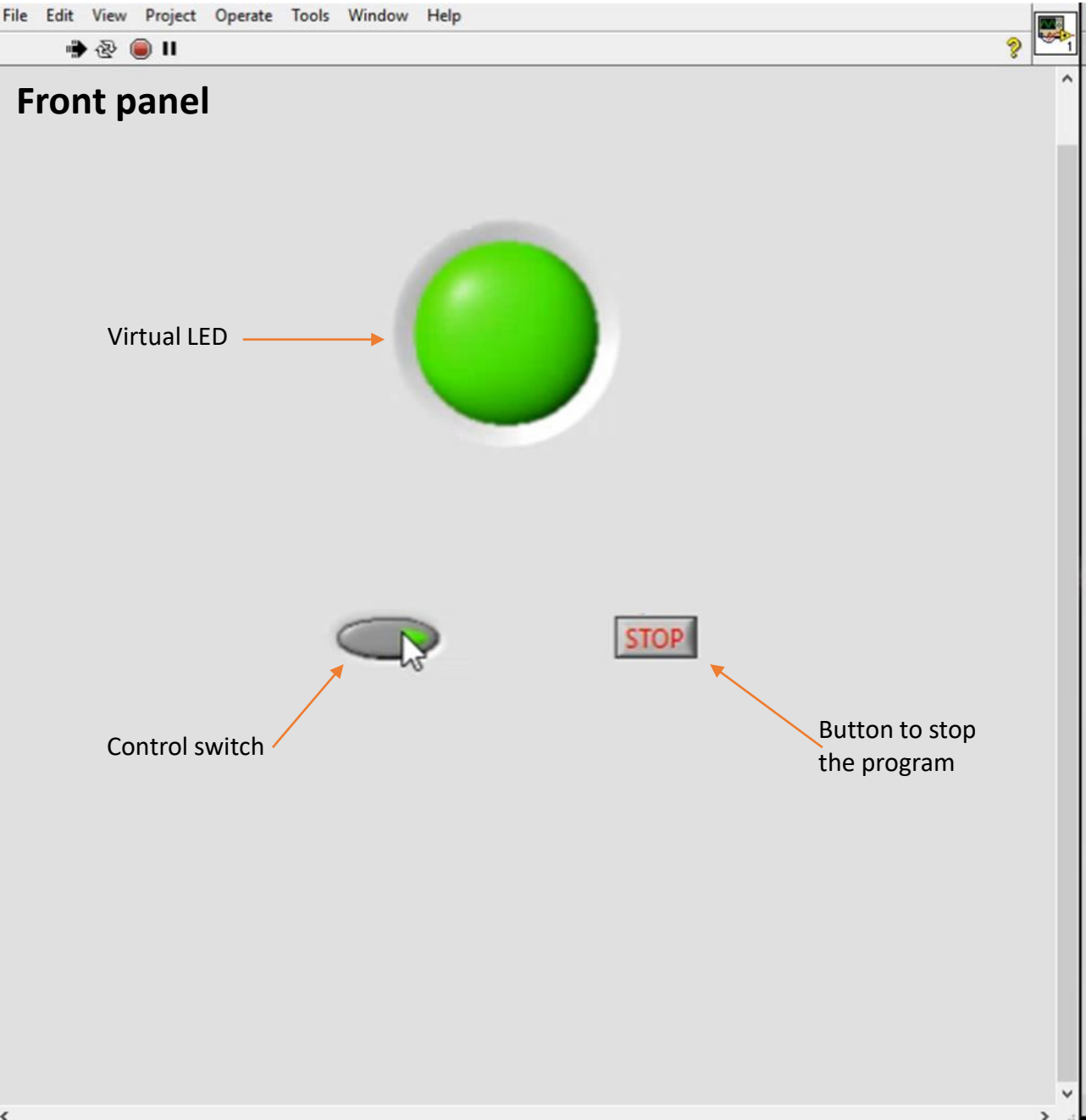
Tablet’s motherboard

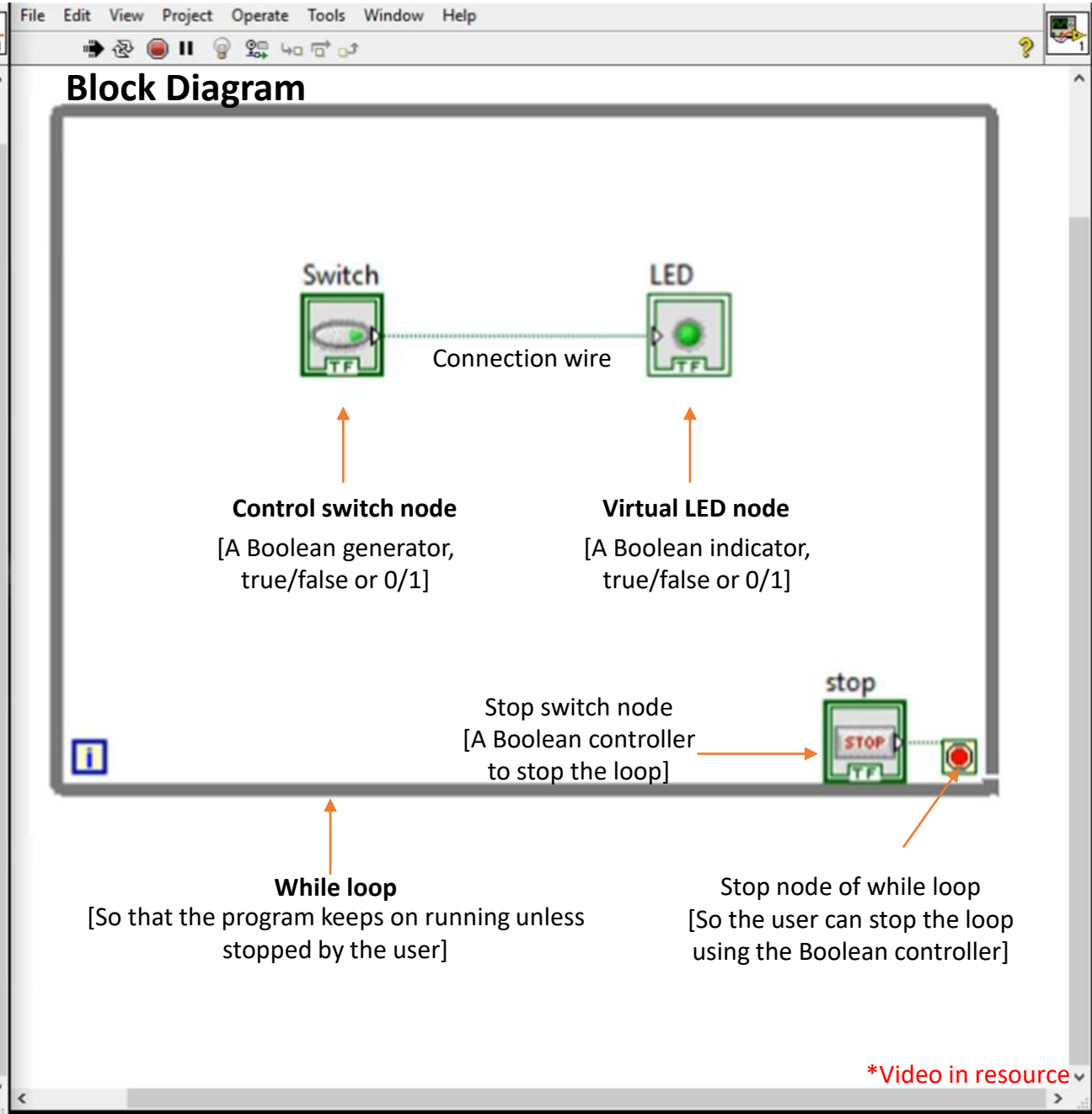
Building a simple VI to turn on/off a (virtual) LED

The Logic that our VI should follow:



Building a simple VI to turn on/off a (virtual) LED

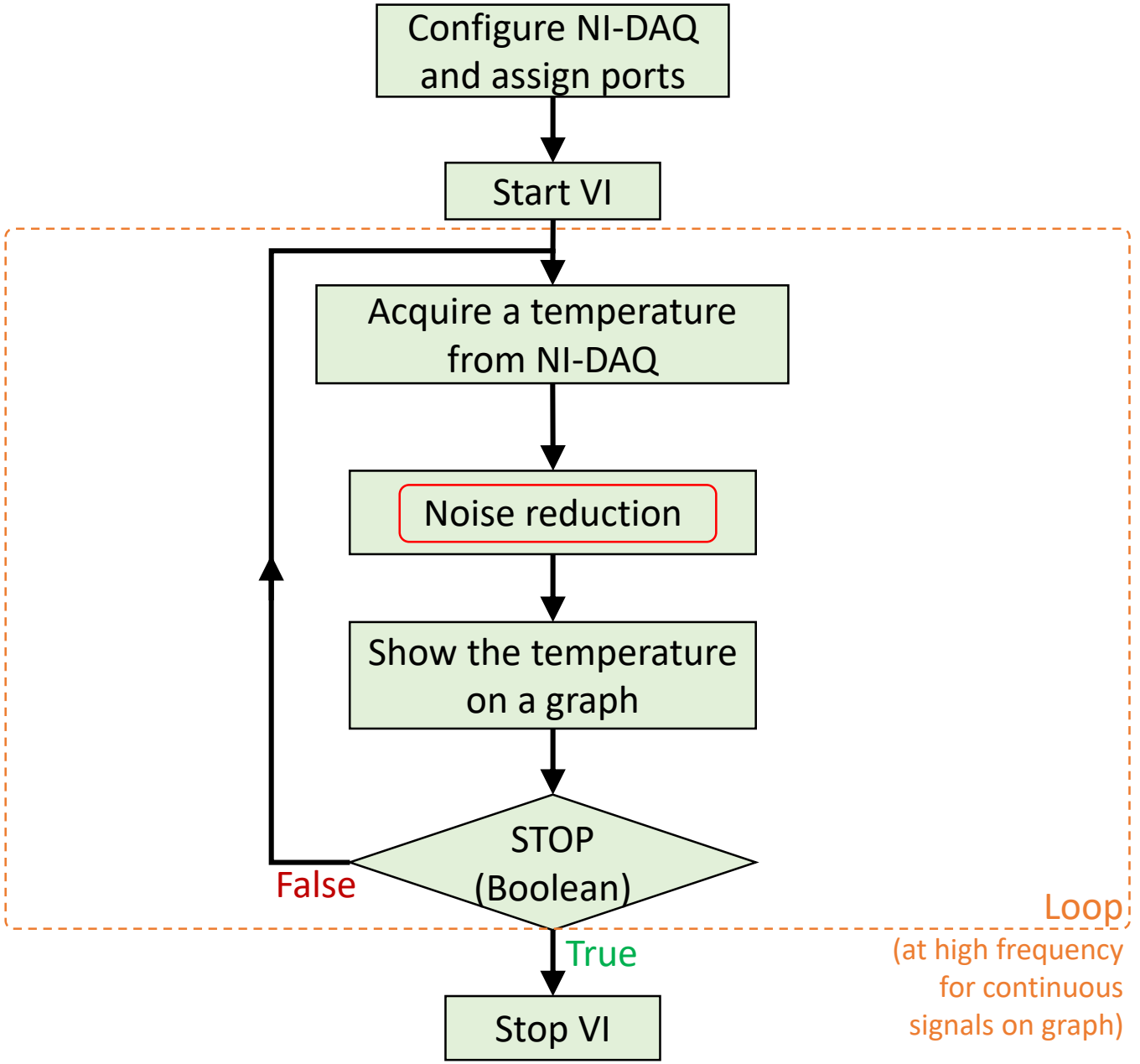




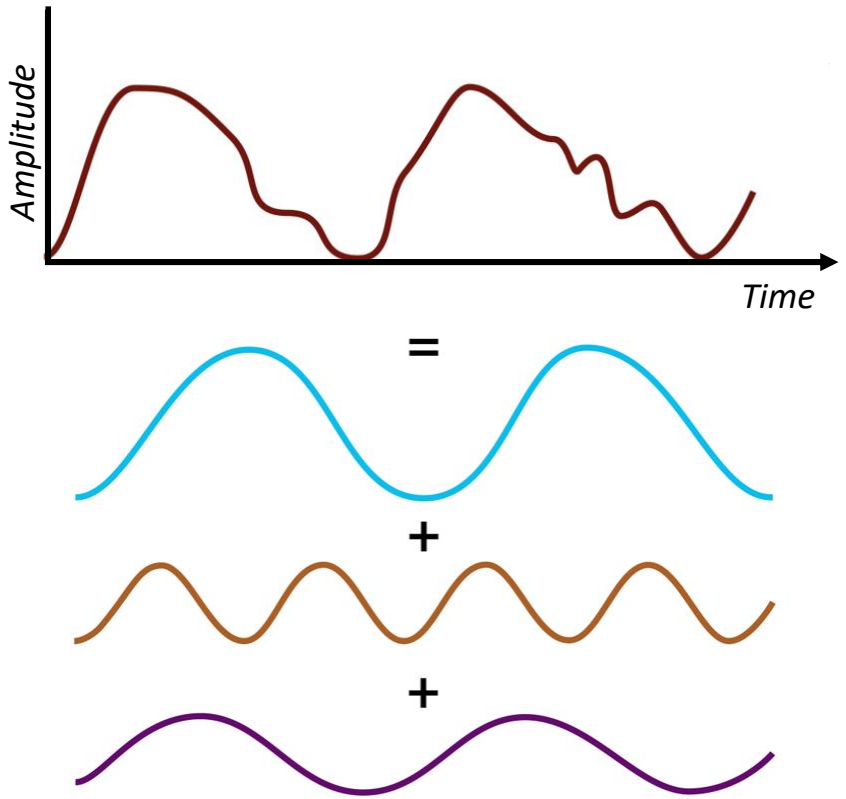
A VI to acquire data from physical world:

Objective: Building a VI to acquire body temperature using a thermistor

The Logic that our VI should follow:



Signal filtering:

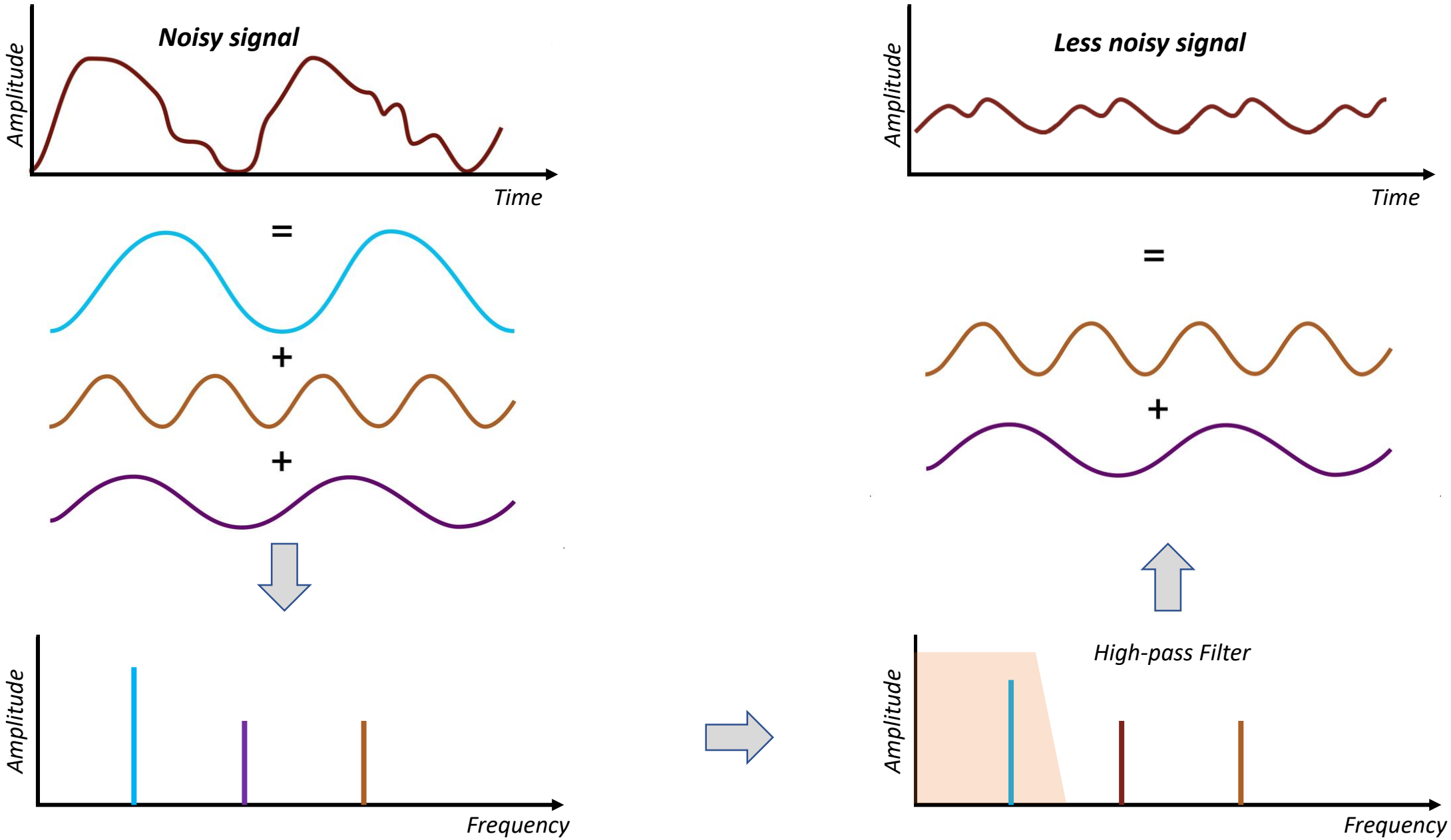


"Every continuous function is a composite of many pure sine-waves of different frequencies."

*Joseph **Fourier***

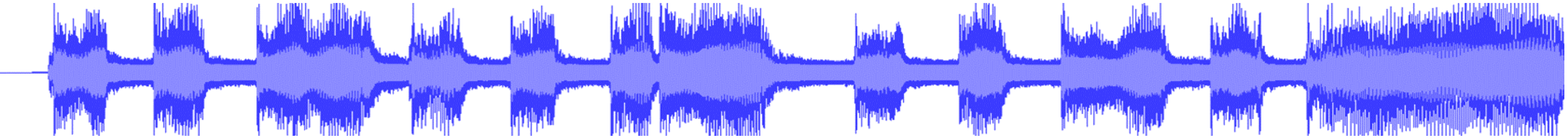
1768 –1830

Signal filtering:

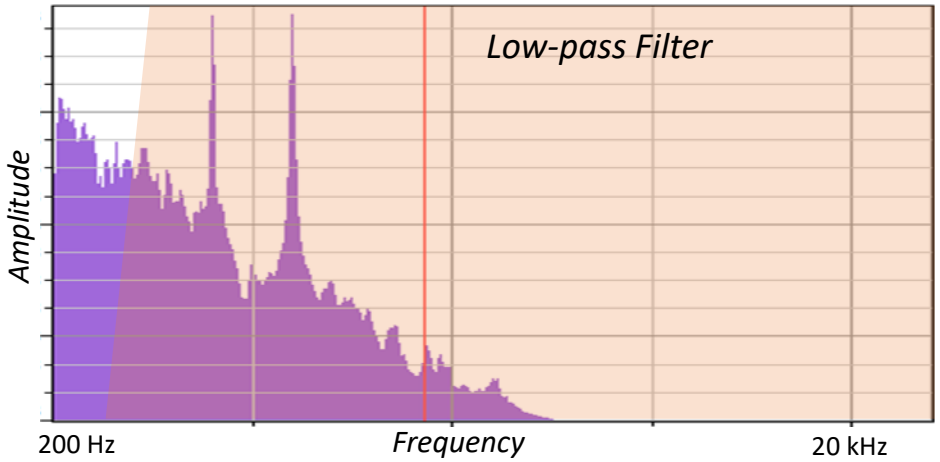


Example: Filtering an audio signal using Fourier transform

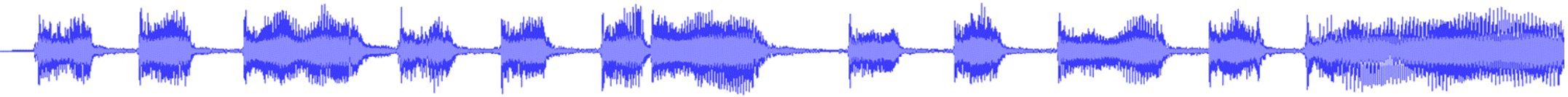
Signal with noise



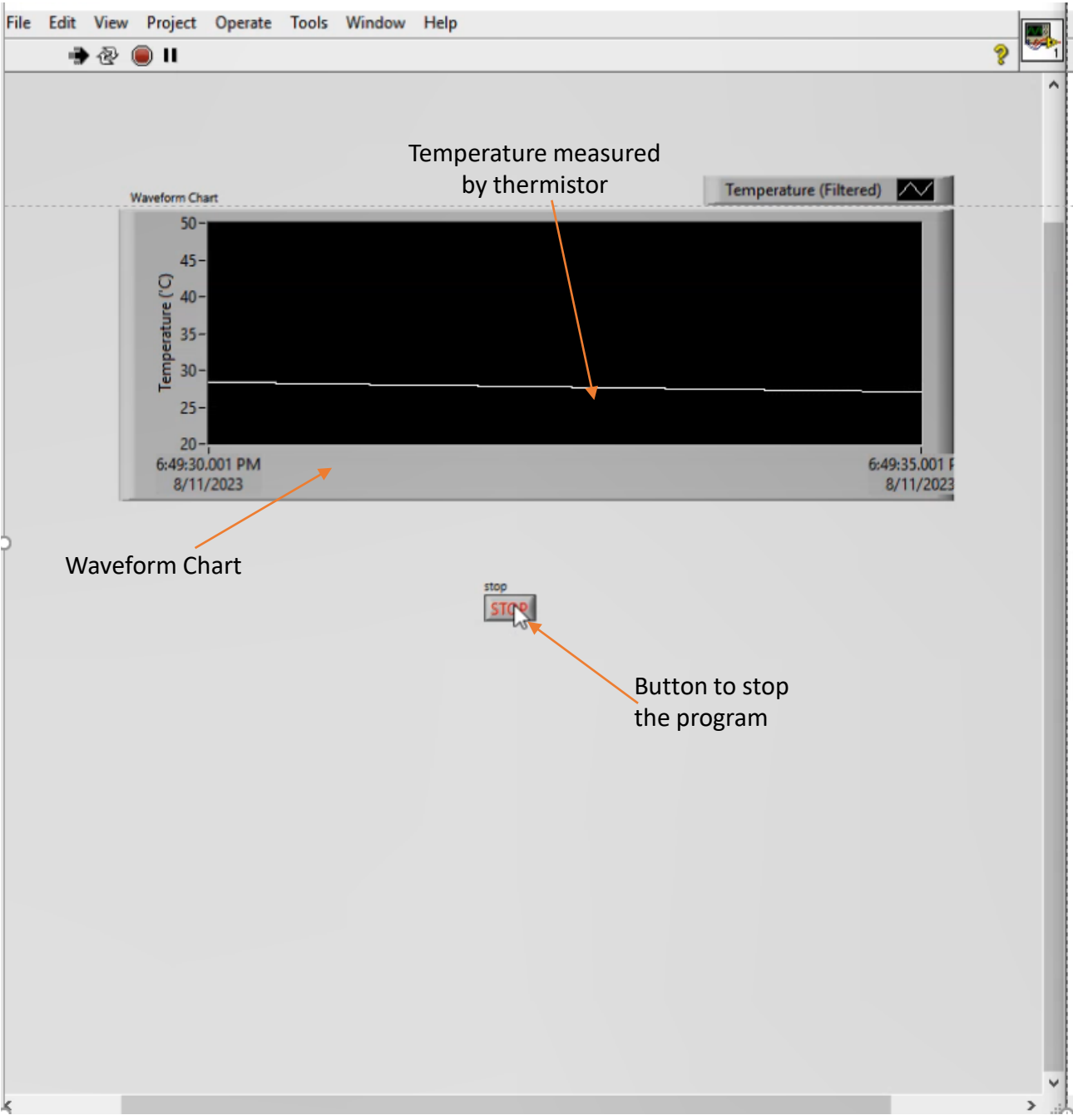
Fourier transform of the audio signal:

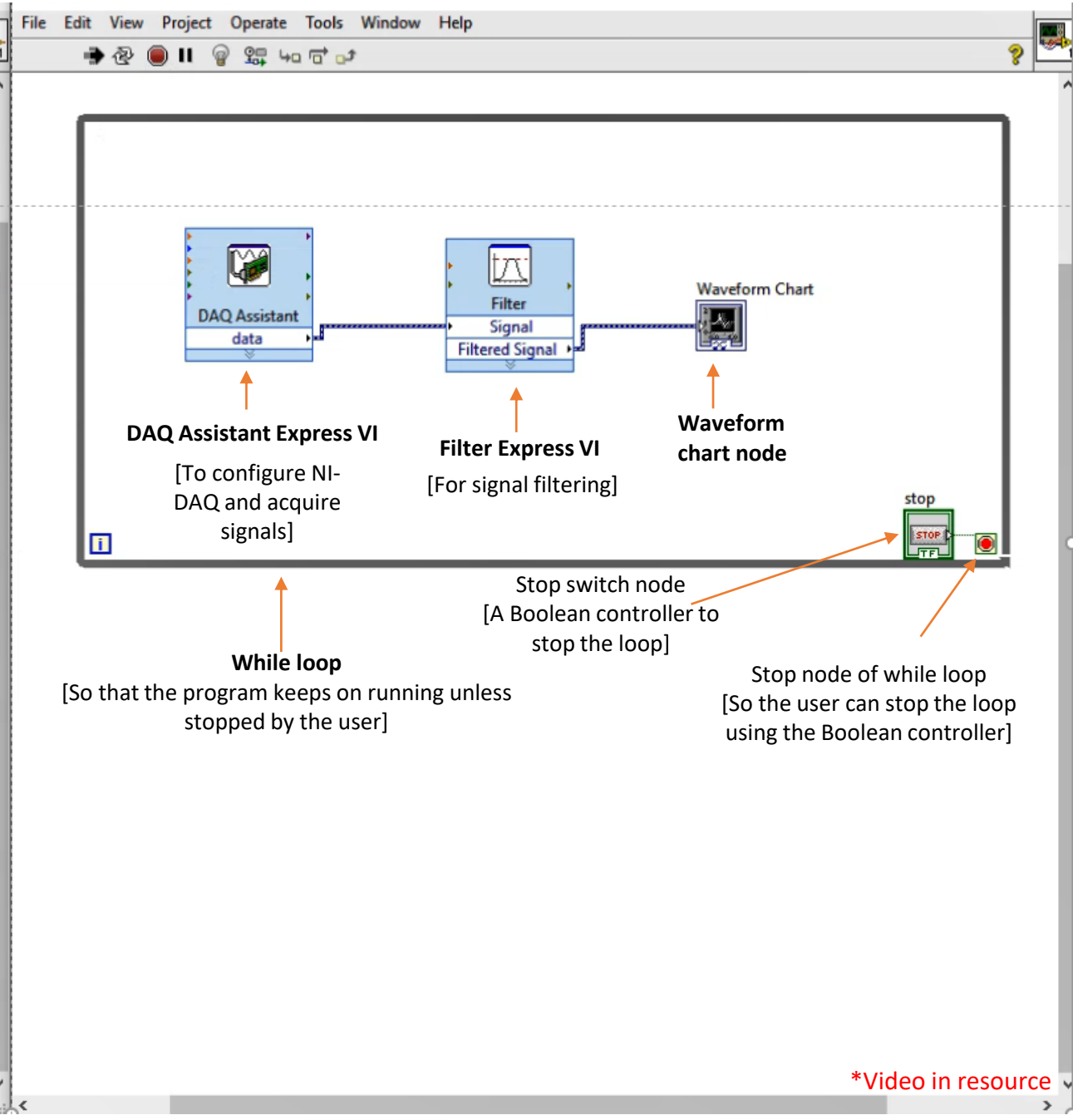


Signal after filtering



Video: A VI to read temperature from a thermistor



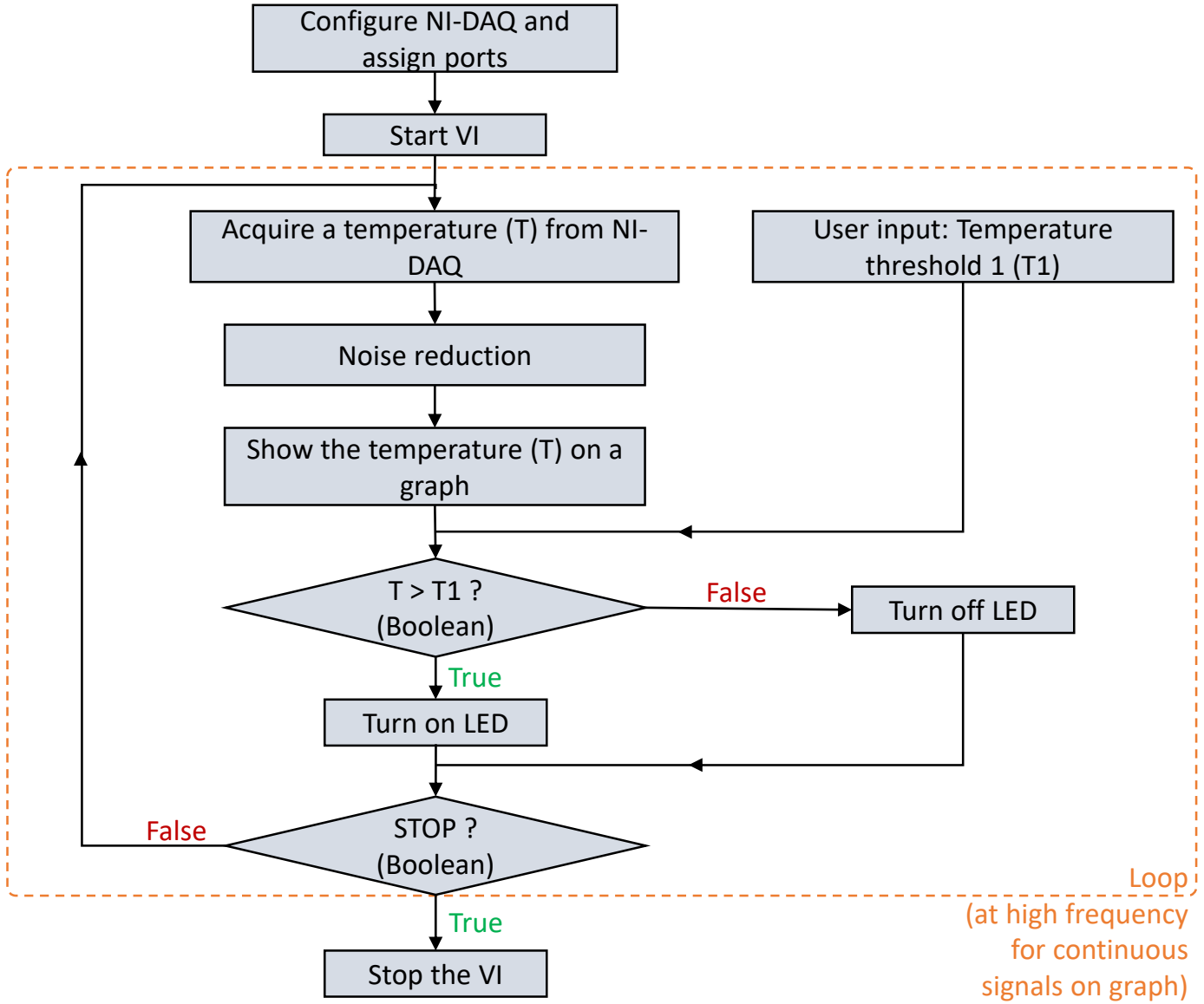


*Video in resource

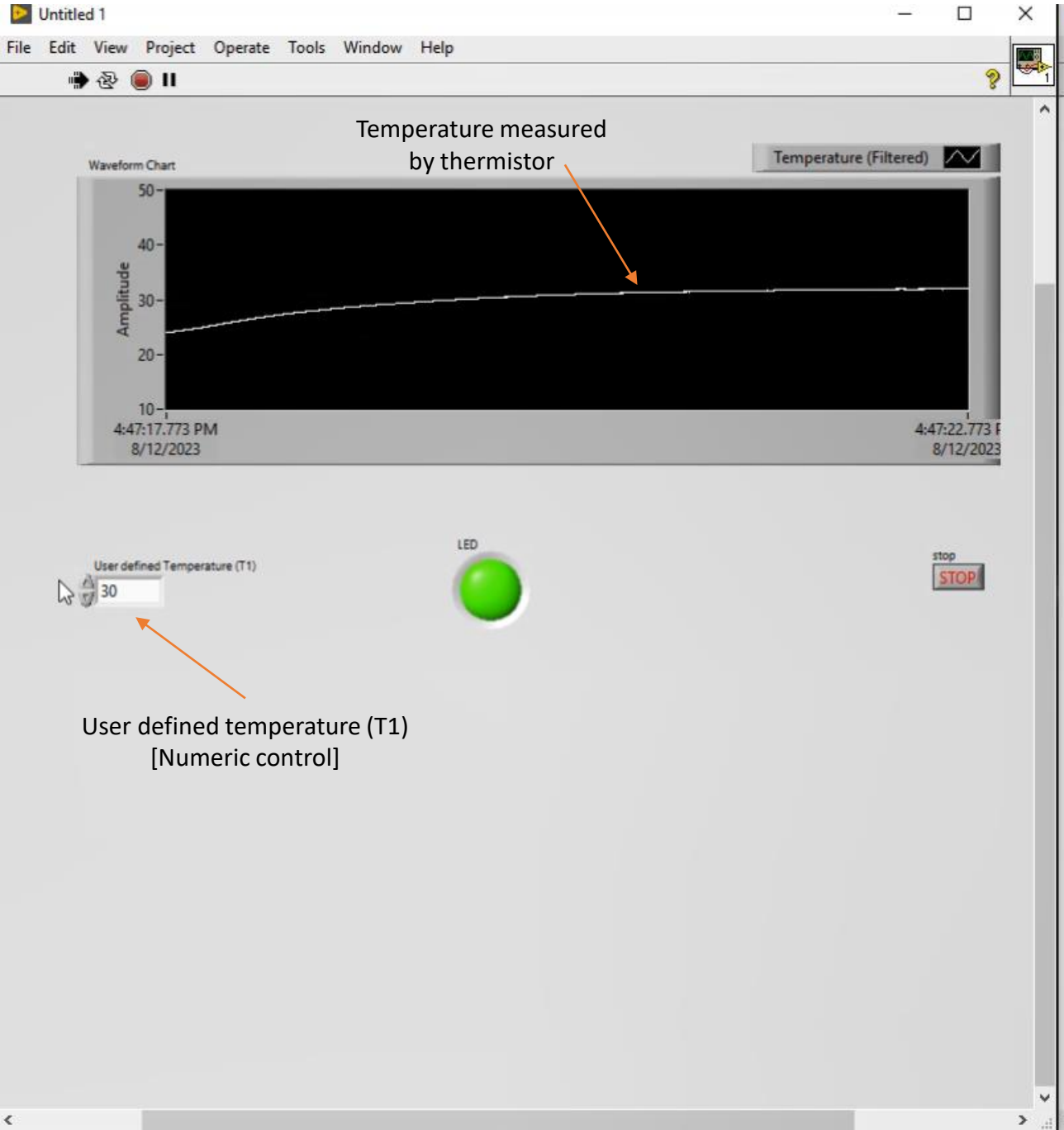
A combination of temperature measurement VI with LED VI

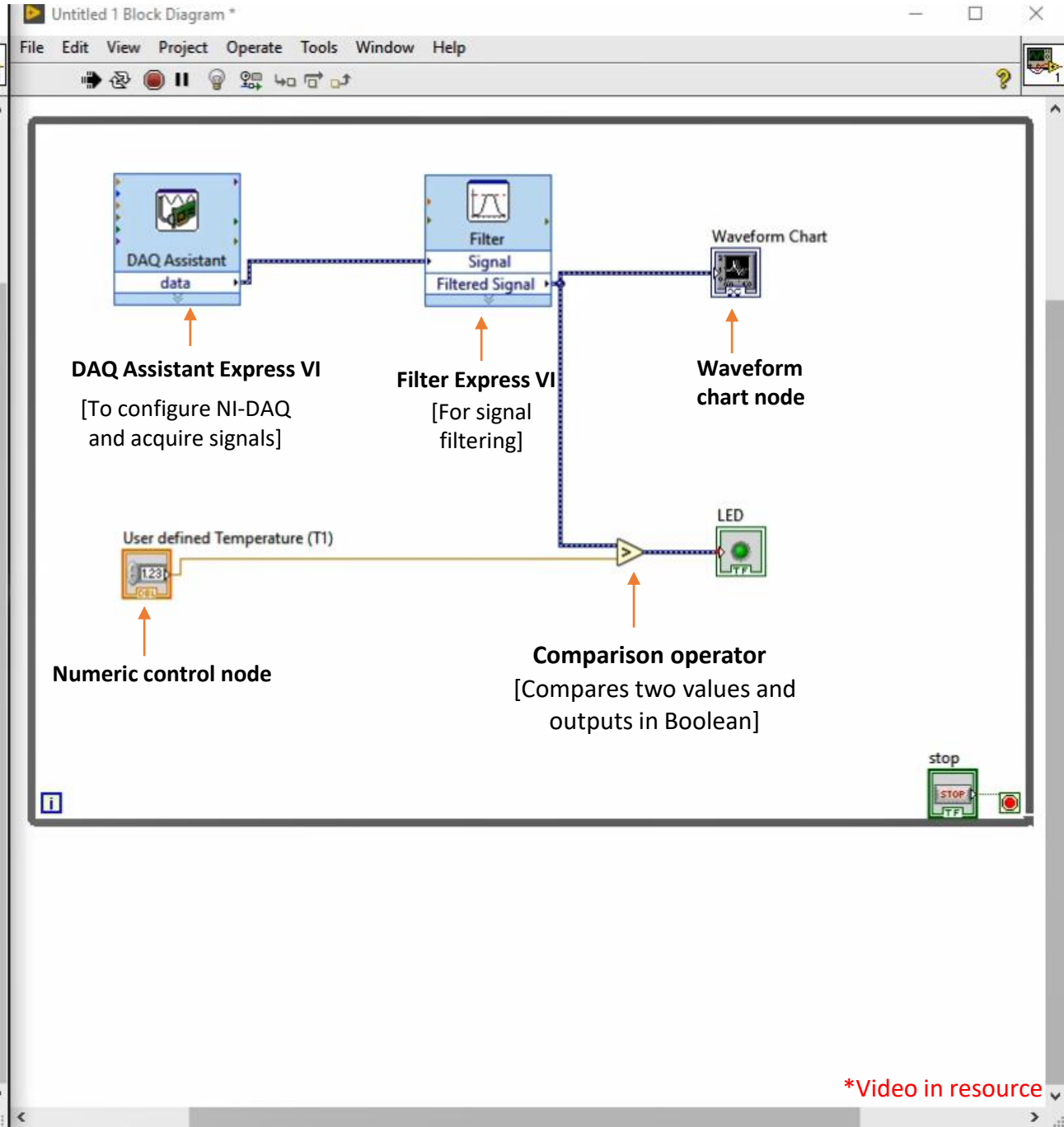
Objective: To turn on an LED when measured temperature (T) is greater than a user defined temperature (T1)

The Logic that our VI should follow:



VI to turn on LED when thermistor temperature > user defined Temp





*Video in resource

Assignment

Objective: To turn on an LED when measured temperature (T) is greater than a user defined temperature (T1) and turn on another LED of a different color when the measured temperature (T) is less than a user defined temperature (T2).