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Temperature Sensor TC-01 in Visual Studio

Visual Studio/C# Code Examples

Hans-Petter Halvorsen

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Introduction

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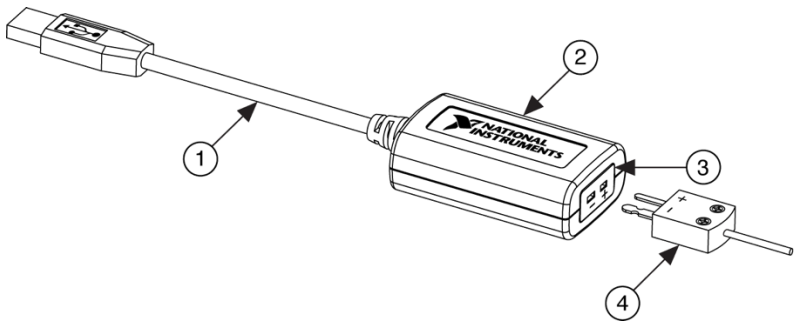
TC-01 Temperature Sensor

- TC-01 is a Temperature Sensor from NI/Emerson
- You connect it to your PC using a built-in USB A cable
- To use it in LabVIEW, C#, Python or MATLAB you need to install the **NI-DAQmx** driver. Free download from Internet.
- We will use Visual Studio/C#

TC-01 Temperature Sensor

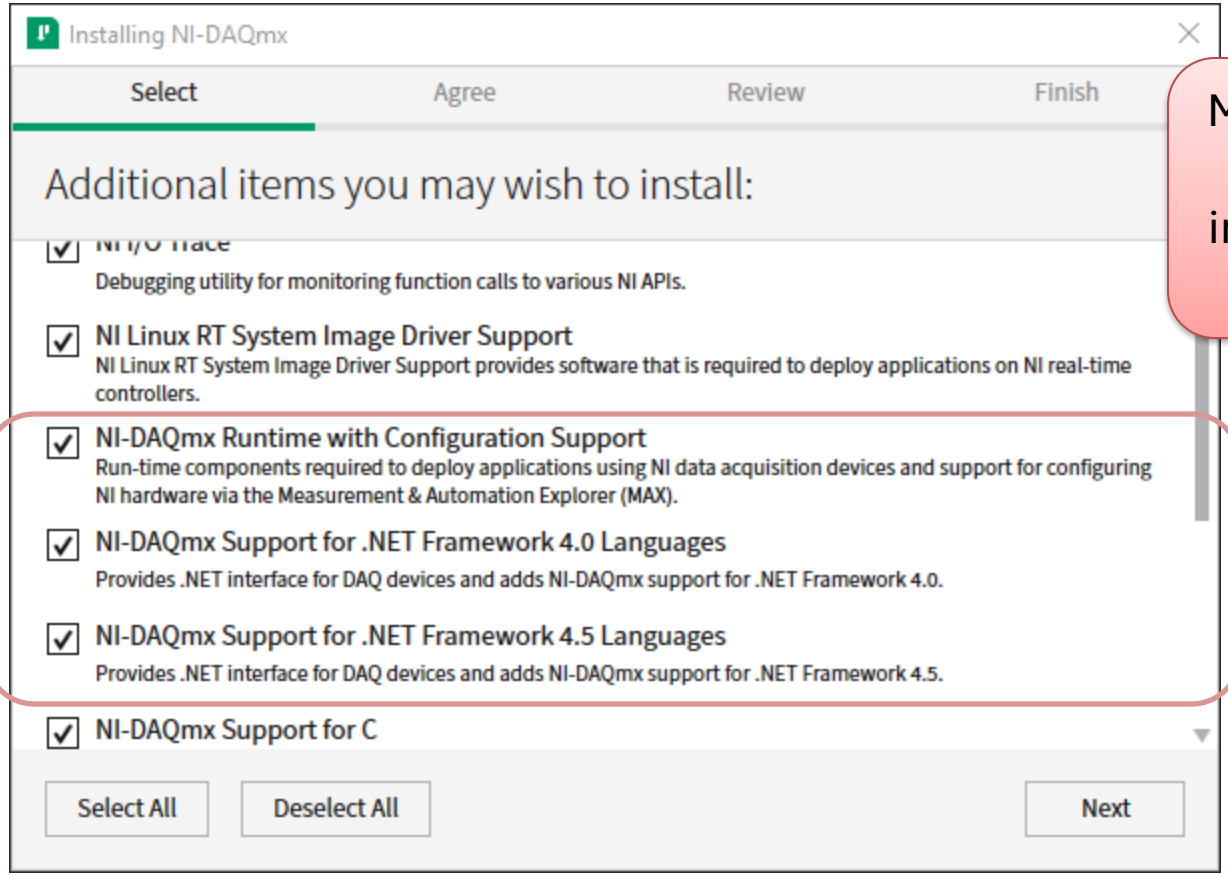


1. USB Cable
2. NI USB-TC01 Device
3. Thermocouple Input
4. Thermocouple Sensor

NI-DAQmx

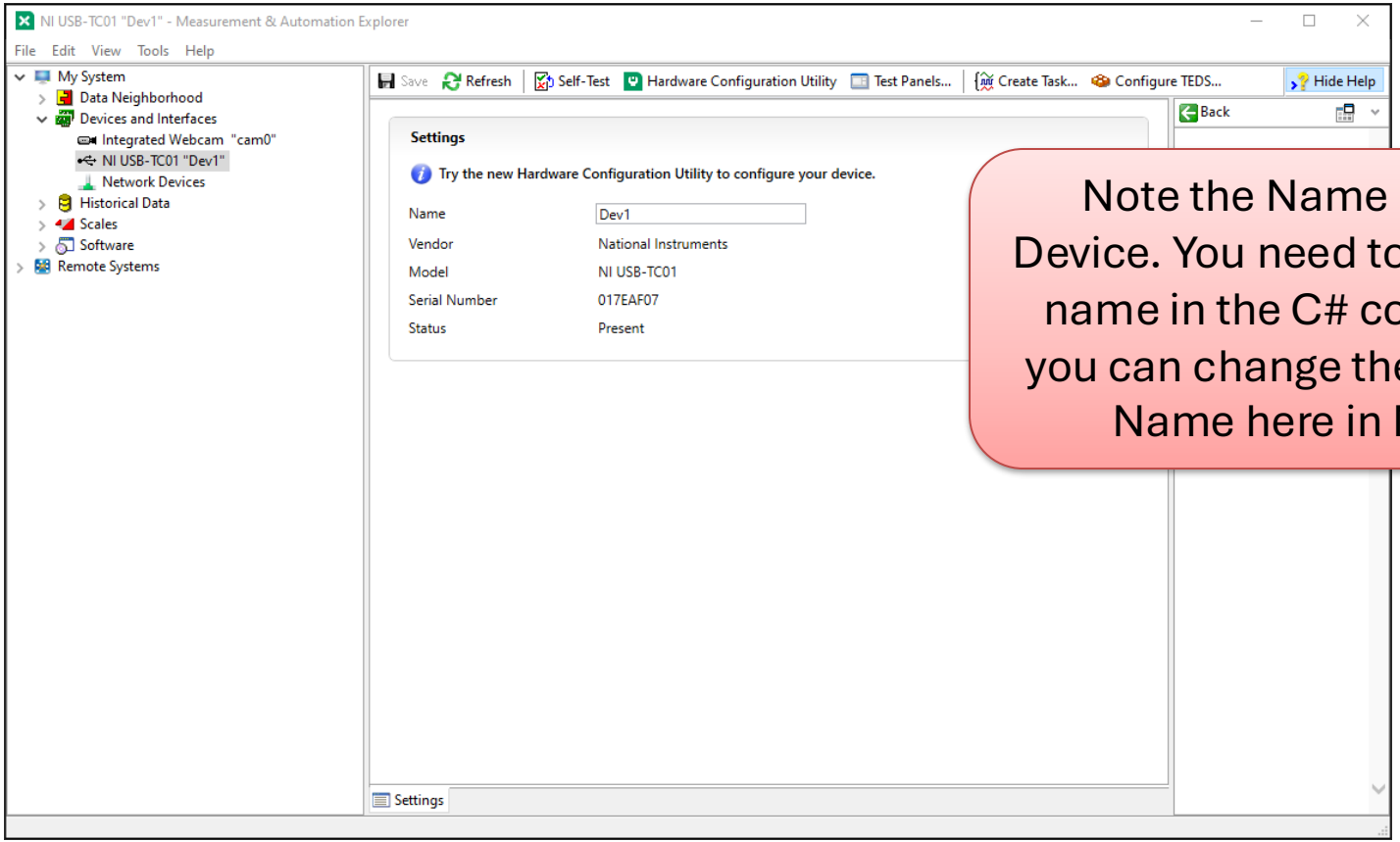
- NI-DAQmx is the driver software you use to communicate with and control your DAQ devices made by NI
- NI-DAQmx can be used with LabVIEW, Visual Studio/C#, Python, MATLAB, etc.
- NI-DAQmx can be downloaded for free (but you need of course to buy a NI-DAQmx compatible DAQ device, such as TC-01 Thermocouple Temperature Sensor.
- www.ni.com/downloads

NI-DAQmx Installation



Make sure to add support for Visual Studio/.NET during installation of the NI-DAQmx software

MAX



Note the Name of the Device. You need to use that name in the C# code. But you can change the default Name here in MAX

Code Examples

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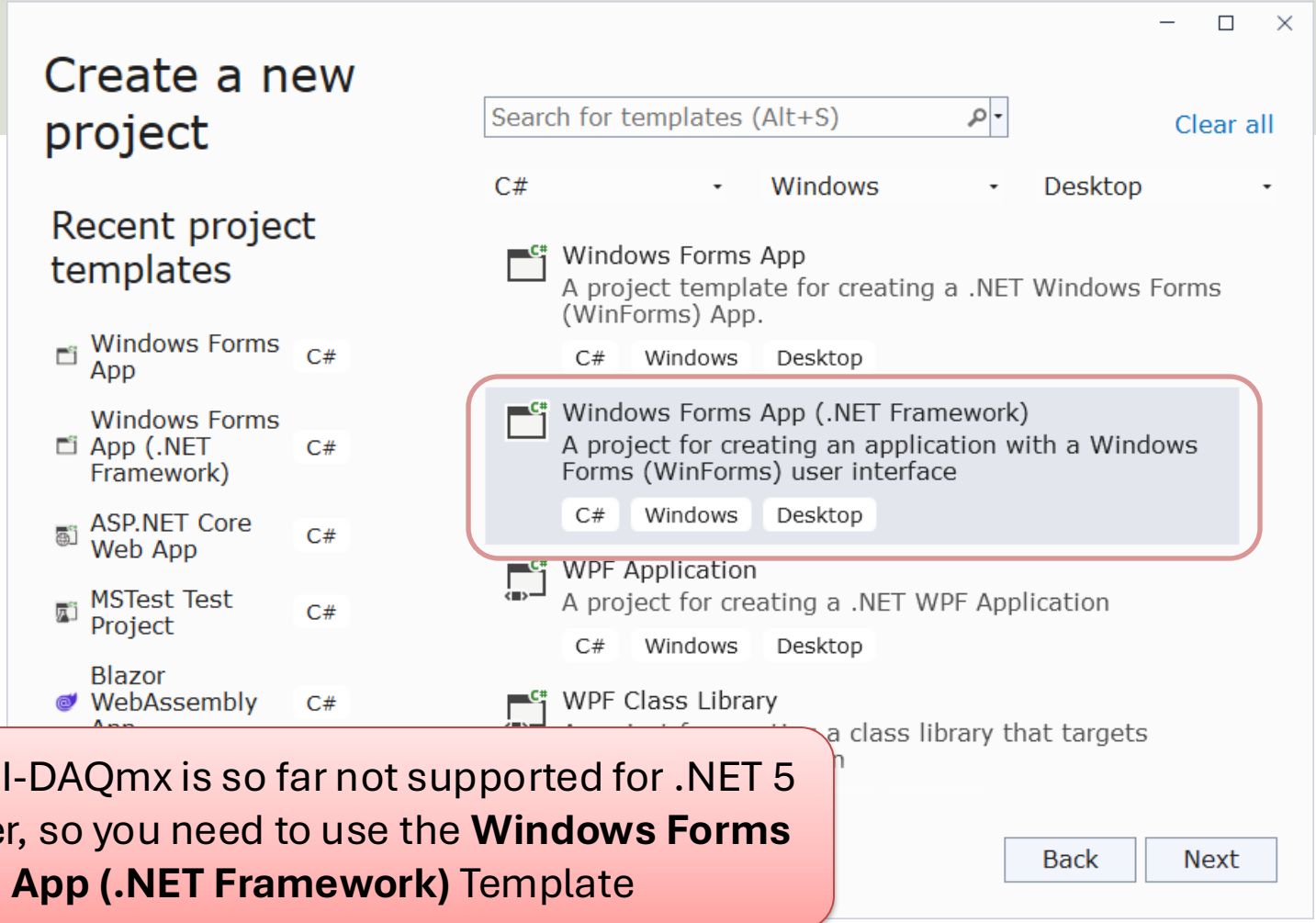
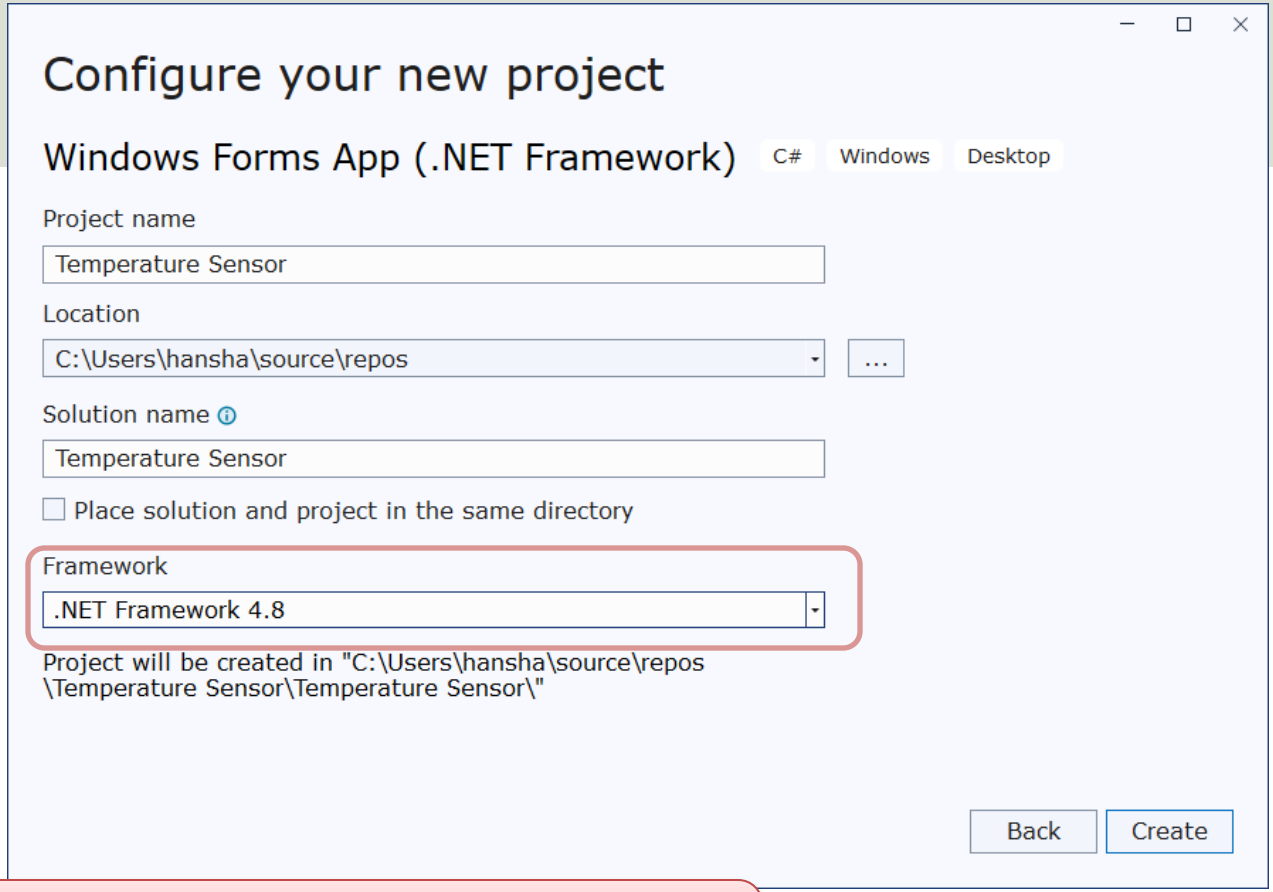


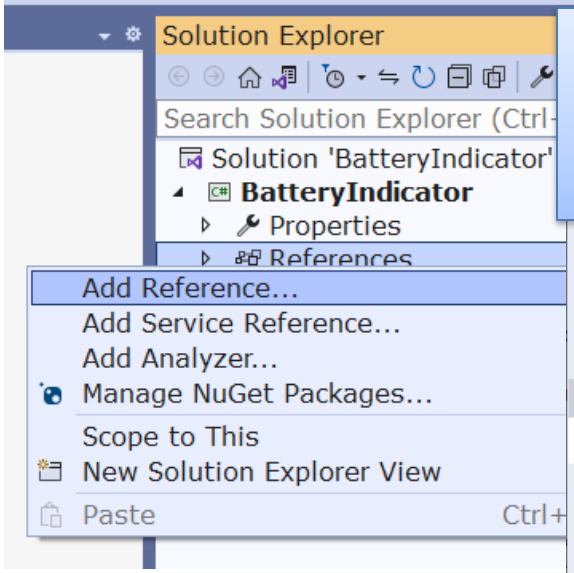
Note! NI-DAQmx is so far not supported for .NET 5 or higher, so you need to use the **Windows Forms App (.NET Framework)** Template



Note! NI-DAQmx is so far not supported for .NET 5 or higher, so you need to select ".NET Framework 4.x"

Add Reference

you need to add the reference **NationalInstruments.DAQmx.dll** by right-clicking in the Solution Explorer and select "Add Reference". This dll is installed by the NI-DAQmx driver and are typically installed within C:/Program Files (x86)/National Instruments/..



C:\Program Files (x86)\National Instruments\MeasurementStudioVS2012\DotNET\Assemblies\Current

Basic Example

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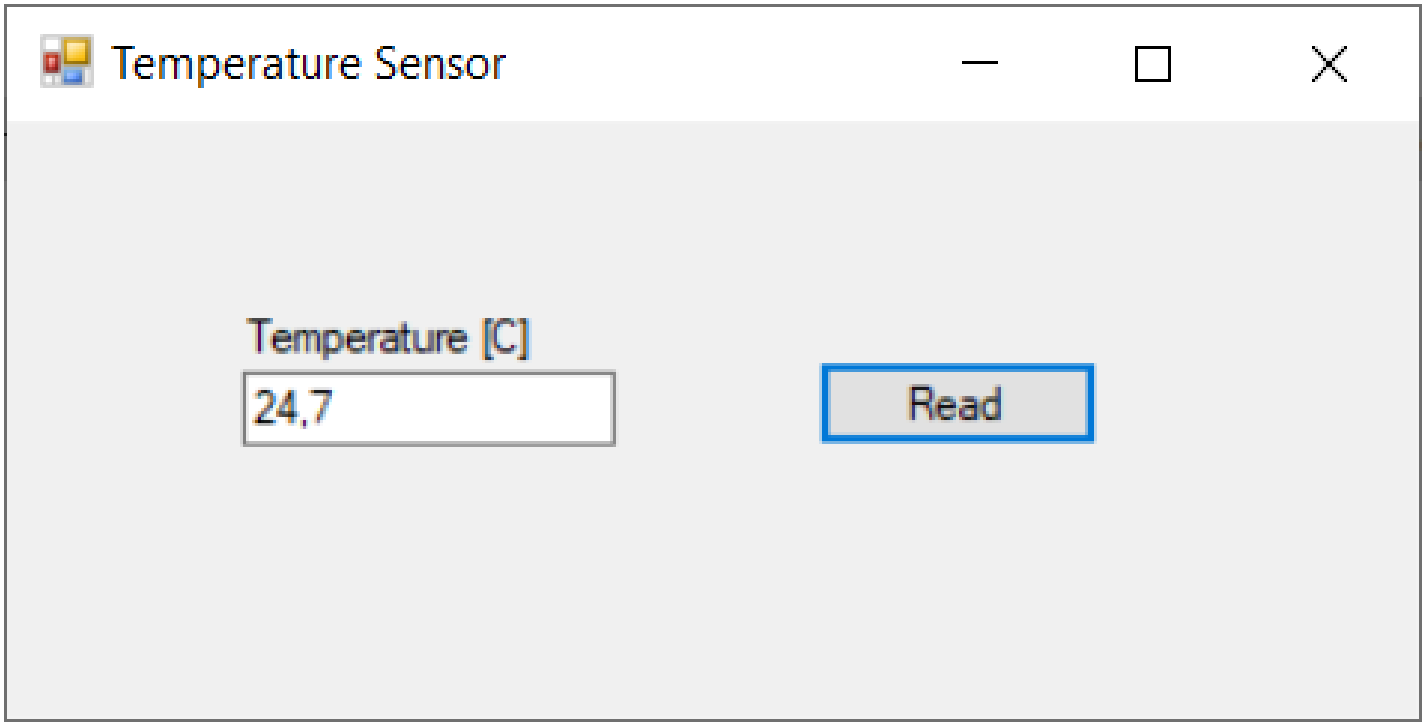
User Interface



Add Namespace

```
using NationalInstruments.DAQmx;
```

ReadTemperature()

```
double ReadTemperature()
{
        Task analogInTask = new Task();
        AIChannel myAIChannel;

        myAIChannel = analogInTask.AIChannels.CreateThermocoupleChannel(
            "dev1/ai0",
            "Temperature",
            0,
            100,
            AIThermocoupleType.J,
            AITemperatureUnits.DegreesC
            );

        AnalogSingleChannelReader reader = new AnalogSingleChannelReader(analogInTask.Stream);

        double temperature = reader.ReadSingleSample();
        return temperature;
}
```

Button Event Handler()

```
private void btnReadTemperature_Click(object sender, EventArgs e)
{
        double temperature;
        temperature = ReadTemperature();
        txtTemperature.Text = temperature.ToString("0.0");
}
```

```
using System;
using System.Windows.Forms;
using NationalInstruments.DAQmx;

namespace Temperature_Sensor
{
   public partial class Form1 : Form
   {
      ..

      private void btnReadTemperature_Click(object sender, EventArgs e)
      {
         double temperature;
         temperature = ReadTemperature();
         txtTemperature.Text = temperature.ToString("0.0");
      }

      double ReadTemperature()
      {
         Task analogInTask = new Task();

         AIChannel myAIChannel;

         myAIChannel = analogInTask.AIChannels.CreateThermocoupleChannel(
            "dev1/ai0",
            "Temperature",
            0,
            100,
            AIThermocoupleType.J,
            AITemperatureUnits.DegreesC
            );

         AnalogSingleChannelReader reader = new AnalogSingleChannelReader(analogInTask.Stream);

         double temperature = reader.ReadSingleSample();

         return temperature;
      }
   }
}
```

Use a Timer for Continuous Temperature Readings

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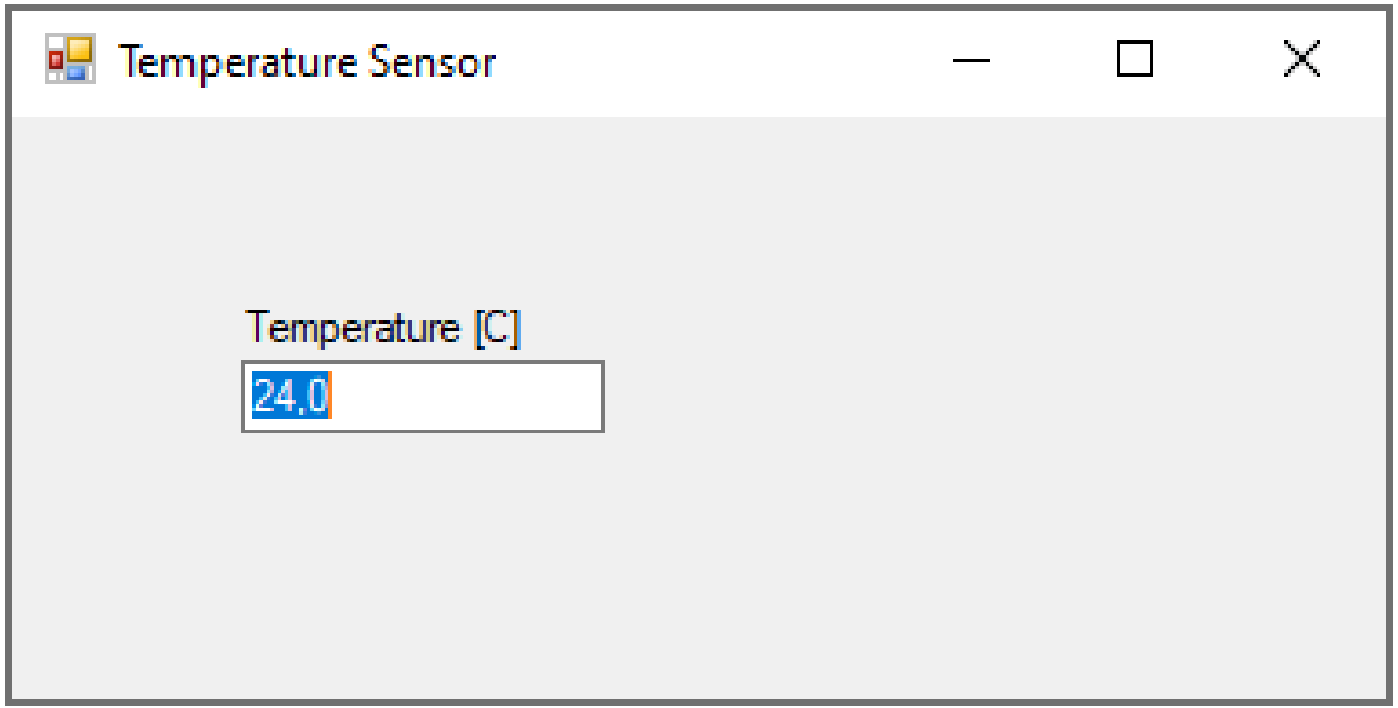
User Interface



Timer

```
private void timer1_Tick(object sender, EventArgs e)
{
   double temperature;
   temperature = ReadTemperature();
   txtTemperature.Text = temperature.ToString("0.0");
}
```

```
using System;
using System.Windows.Forms;
using NationalInstruments.DAQmx;

namespace Temperature_Sensor
{
   public partial class Form1 : Form
   {
      public Form1()
      {
         InitializeComponent();
         timer1.Start();
      }

      private void timer1_Tick(object sender, EventArgs e)
      {
         double temperature;
         temperature = ReadTemperature();
         txtTemperature.Text = temperature.ToString("0.0");
      }

      double ReadTemperature()
      {
         Task analogInTask = new Task();

         AIChannel myAIChannel;

         myAIChannel = analogInTask.AIChannels.CreateThermocoupleChannel(
            "dev1/ai0",
            "Temperature",
            0,
            100,
            AIThermocoupleType.J,
            AITemperatureUnits.DegreesC
            );

         AnalogSingleChannelReader reader = new AnalogSingleChannelReader(analogInTask.Stream);

         double temperature = reader.ReadSingleSample();

         return temperature;
      }


   }
}
```

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