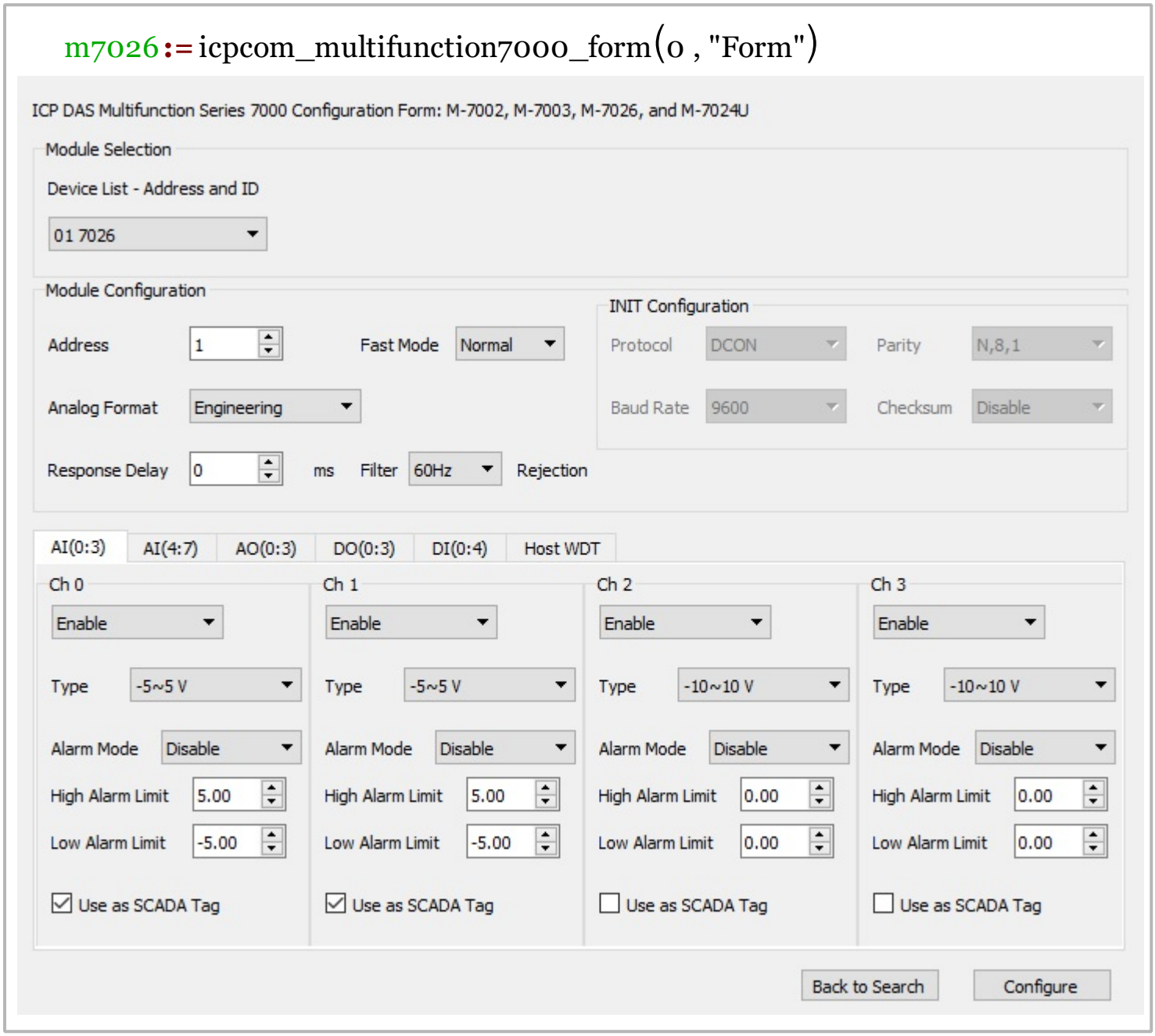
MatDeck Easy SCADA with ICP DAS Devices

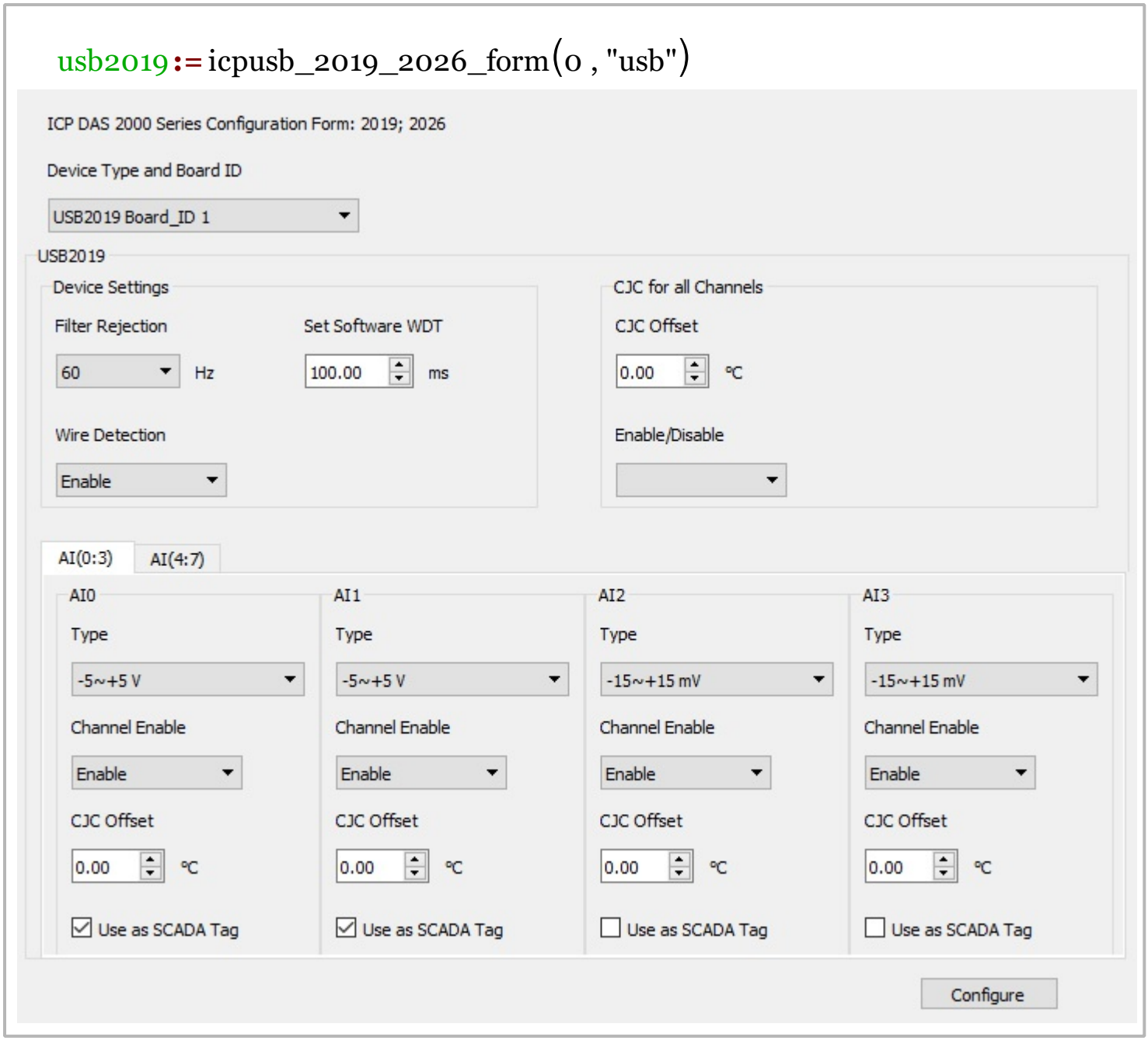
MatDeck Easy SCADA offers users the ability to build industrial applications with ICP acquisition devices. The MatDeck Easy SCADA is easy to use as well as being able to integrate with ICP DAS configuration forms. Here, we illustrate how Easy SCADA can be used through a simple scenario using two ICP DAS devices, M-7026, and USB-2019, and virtual instruments provided by MatDeck.

ICP Configuration using GUI Forms

The first steps in building SCADA applications is device selection and channel configuration. Here, we use M-7026, and we initiate icpcom_multifunction7000_form() in order to configure AO0, AO1, AI0 and AI1. The form generates a .txt files which is imported by SCADA and tags are generated automatically.



In a similar manner, we use icpusb_2019_2026_form() to configure AI0 and AI1 of USB-2019. The configuration is exported to a .txt file, and used by SCADA to generate tags.



The configuration functions are used to generate configuration files:

```
1 //icpcom_multifunction7000_form_configure(m7026)
2 //icpusb_2019_2026_form_configure(usb2019)
```

SCADA Configuration

The first step is to define the database which will store the SCADA tags and relevant information. Next, the SCADA form is initiated by using the scada_form() function as seen in line two. The SCADA form is a intuitive GUI to build SCADA applications as illustrated below.

```
3 base := doc_dir() + "/" + "ScadaExampleMP.db"
4 scada := scada_form(0, "scada1", base)
```

SCADA Scenario

In the SCADA Scenario under consideration, ICP M-7026 is used as a signal generator. The channel AO0 is used to generate a sinusoidal signal, and channel AO1 is used to generate a sawtooth signal. The frequency of the sinusoid is controlled by using Slider1, while the frequency of the sawtooth at AO1 is controlled by Slider 2. The analog input channels, AI0 and AI1, are connected to AO0 and AO1 respectively. AI0 and AI1 are also connected to Gauge1 and Gauge2, which show the current value of the read signal. The values of AO0 and AO1 are displayed in Graph1 and Graph2.

USB-2019 AI0 is used to follow M-7026 AO0, and USB-2019 AI1 is used to read M-7026 AO1. USB-2019 AI0 is also connected to Digit meter1, and USB-2019 AI1 is connected to Digit meter2, which shows the current values.

Additionally, there are two indicators, Indicator2 and Indicator3, which are related to events:

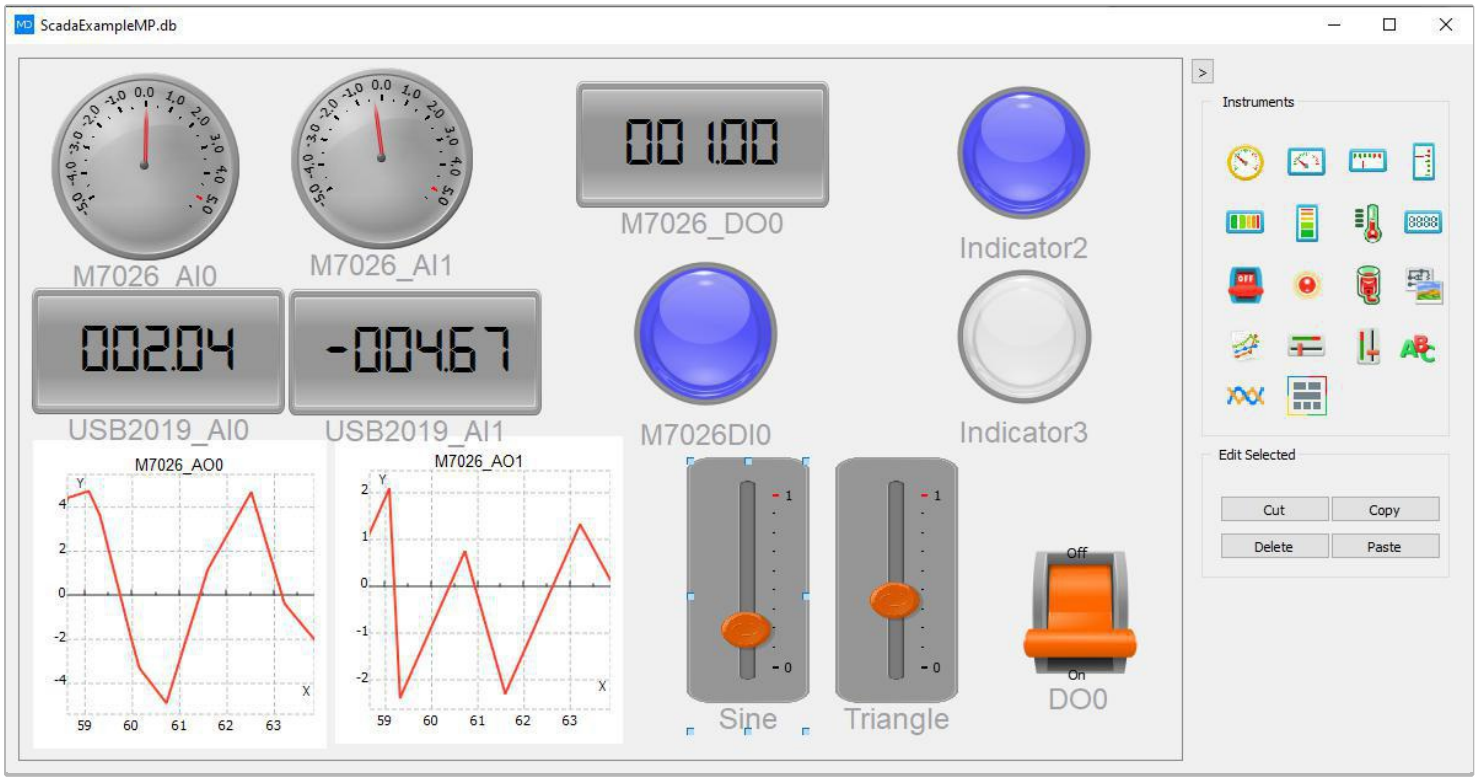
- If 2V<M-7026 A0I<3V Indicator2 ON
- If 0V< M-7026 AI1<3V Indicator3 ON

Finally, the overall SCADA process is controlled by using a switch connected with DO0 at M-7026. The signal from DO0 is transfered to DI0, and displayed at the indicator M7026DI0. The Scenario is displayed in table. The scenario is also implemented in a SCADA Panel and MatDeck script code.

Device, Channel	Source Device, Channel	Virtual Instrument
M-7026 AI0	M-7026 AO0	Gauge1
M-7026 AI1	M-7026 AO1	Gauge2
USB-2019 AI0	M-7026 AO0	Digit meter1
USB-2019 AI1	M-7026 AO1	Digit meter 2
M-7026 AO0	Slider1	Graph1
M-7026 AO1`	Slider2	Graph2
M-7026 DO0	Switch	
M-7026 DI0	M-7026 DO0	Indicator - M7026DI0

SCADA Panel

The SCADA application defined above is implemented in the SCADA Panel. A image version of the SCADA Panel is shown below.



Script Code

The code which is used to implement the SCADA application scenario is shown below.

```
T0 := timenow()
Frequency1 := 0
Frequency2 := 0
t := timer_create(200)
scada_start(scada)
vec1 := vector_create(10, false, 0)
vec2 := vector_create(10, false, 0)
tim := vector_create(10, false, 0)
count := 0

scada_script()
{
  if(!scada_is_working(scada))
  {
    timer_delete(t)
    return(void)
  }

  Switch1 := scada_tag_value(scada, "Switch1")
  scada_tag_write_value(scada, "M7026_DO0", Switch1)
  M7026_DI0 := scada_tag_value(scada, "M7026_DI0")
  if(Switch1 == 1)
  {
    Slider1 := scada_tag_value(scada, "Slider1")
    Slider2 := scada_tag_value(scada, "Slider2")
    Frequency1 = Slider1
    Frequency2 = Slider2
    currtime := timenow() - T0
    sigs := sin(2 * cpi() * Frequency1 * currtime)
    sawt := currtime * Frequency2 - floor(currtime * Frequency2 + 0.5)
    tim[count] = currtime
    vec1[count] = 5 * sigs
    vec2[count] = 5 * sawt
    //count += 1

    if(count < 9)
    {
          count += 1
    }
    else
    {
      gr1 := join_mat_cols(tim, vec1)
      gr2 := join_mat_cols(tim, vec2)
      scada_tag_write_value(scada, "Graph0", gr1)
      scada_tag_write_value(scada, "Graph1", gr2)
      count = 0
    }
    scada_tag_write_value(scada,"M7026_AO0", 5 * sigs)
    scada_tag_write_value(scada,"M7026_AO1", 5 * sawt)

    USB2019_AI0 := scada_tag_value(scada, "USB2019_AI0")
    USB2019_AI1 := scada_tag_value(scada, "USB2019_AI1")
```

```
57
58      M7026_AI0 := scada_tag_value(scada, "M7026_AI0")
59      M7026_AI1 := scada_tag_value(scada, "M7026_AI1")
60
61
62      if(scada_tag_event_value(scada, "M7026_AI0", "event"))
63      {
64        scada_tag_write_value(scada, "Indicator2", 1)
65      }
66      else
67        scada_tag_write_value(scada, "Indicator2", 0)
68      if(scada_tag_event_value(scada, "M7026_AI1", "event"))
69      {
70        scada_tag_write_value(scada, "Indicator3", 1)
71      }
72      else
73        scada_tag_write_value(scada, "Indicator3", 0)
74
75    }
76  }
77
78  on_event(t, scada_script())
79
```