

Elektronski merni sistemi

Laboratorijska vežba 2

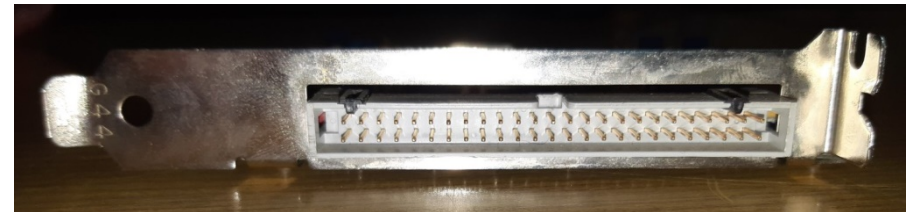
MAX – Measurement &
Automation Explorer

Vladimir Rajović, 2020/21

MAX– Measurement & Automation Explorer

- MAX – Measurement & Automation Explorer je softverska aplikacija alatka koja omogućava integraciju – povezivanje hardverskih i softverskih modula firme National Instruments u jedinstvenu funkcionalnu celinu.
- Primer kojim se ilustruju te mogućnosti je instalacija realne i simulirane NI-DAQ 6025E kartice, i kreiranje globalnog kanala i taska.

- Primer ISA akvizicione kartice

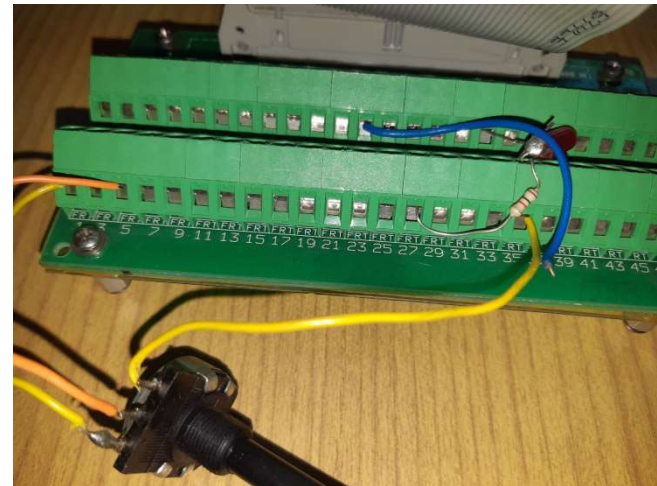
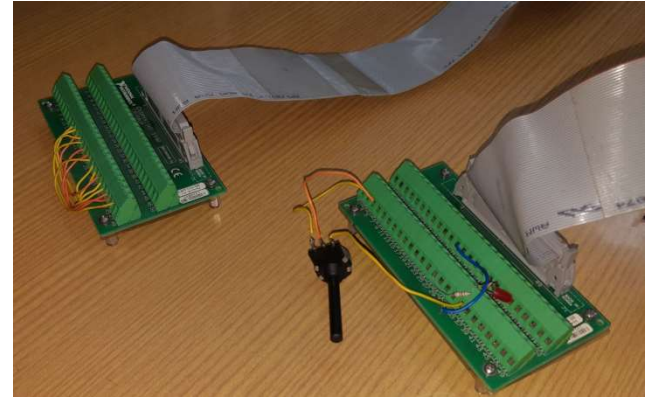


NI-DAQ 6025E



NI-DAQ 6025E - povezivanje

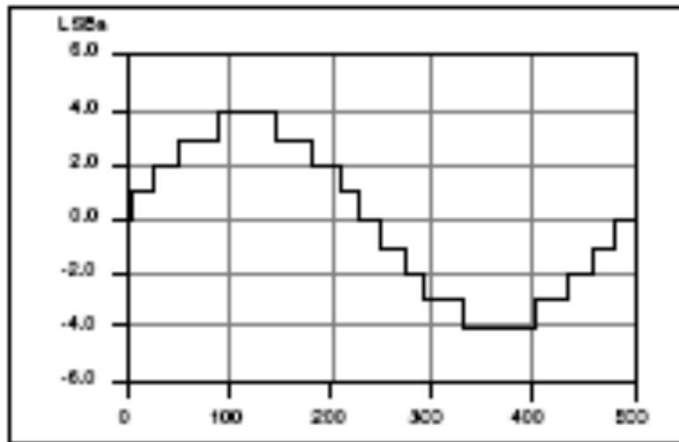
- Veza na standardni PCI bus personalnog računara



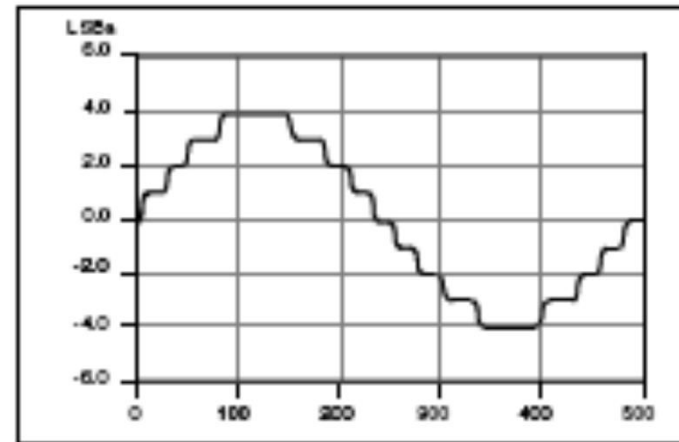
NI-DAQ 6025E – analogni ulazi

- 16 analognih ulaznih kanala sa 12-bitnom rezolucijom i učestanošću 200kS/s
- Ulazni opseg napona od -10V do +10V
- Programabilno pojačanje kako bi se dobio ceo opseg na ulazu
- Ulazni kanali mogu biti konfigurisani na tri načina:
 - single-ended prema masi
 - single-ended prema pinu AISENSE
 - diferencijalni
- Dozvoljene su sve kombinacije konfiguracija

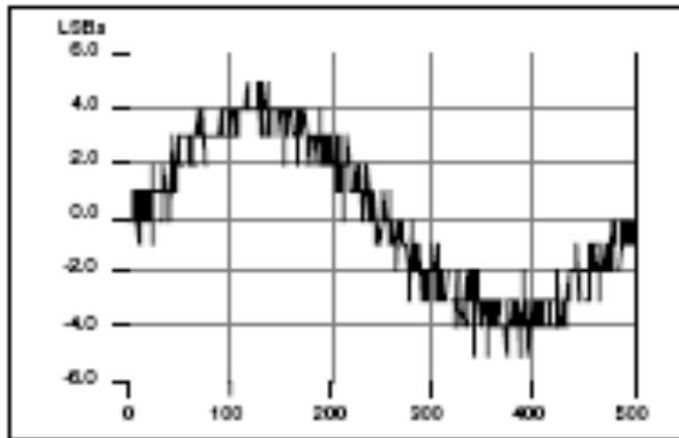
Namerno dodavanje šuma na analognim ulazima



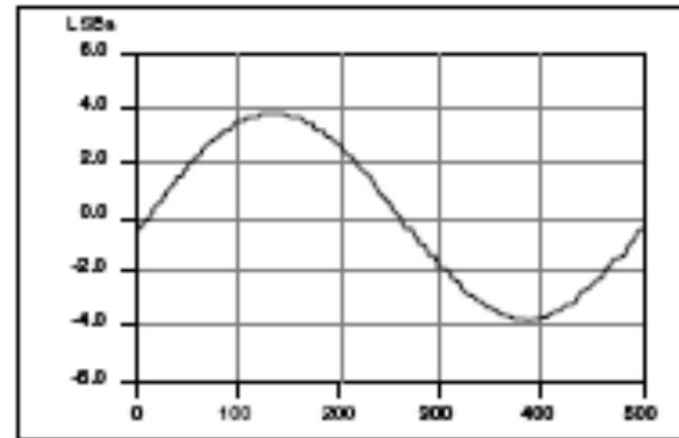
a. Dither disabled; no averaging



b. Dither disabled; average of 50 acquisitions



c. Dither enabled; no averaging



d. Dither enabled; average of 50 acquisitions

NI-DAQ 6025E – analogni izlazi

- 2 12-bitna analogna izlaza opsega od -10 do 10V

NI-DAQ 6025E – digitalni ulazi / izlazi

- 8 linija koje mogu biti bilo koja kombinacija ulaza i izlaza
- tri dodatna porta sa 24 linije – bilo koja kombinacija ulaza i izlaza na nivou **porta**

NI-DAQ 6025E – sinhronizacioni (brojački) ulazi

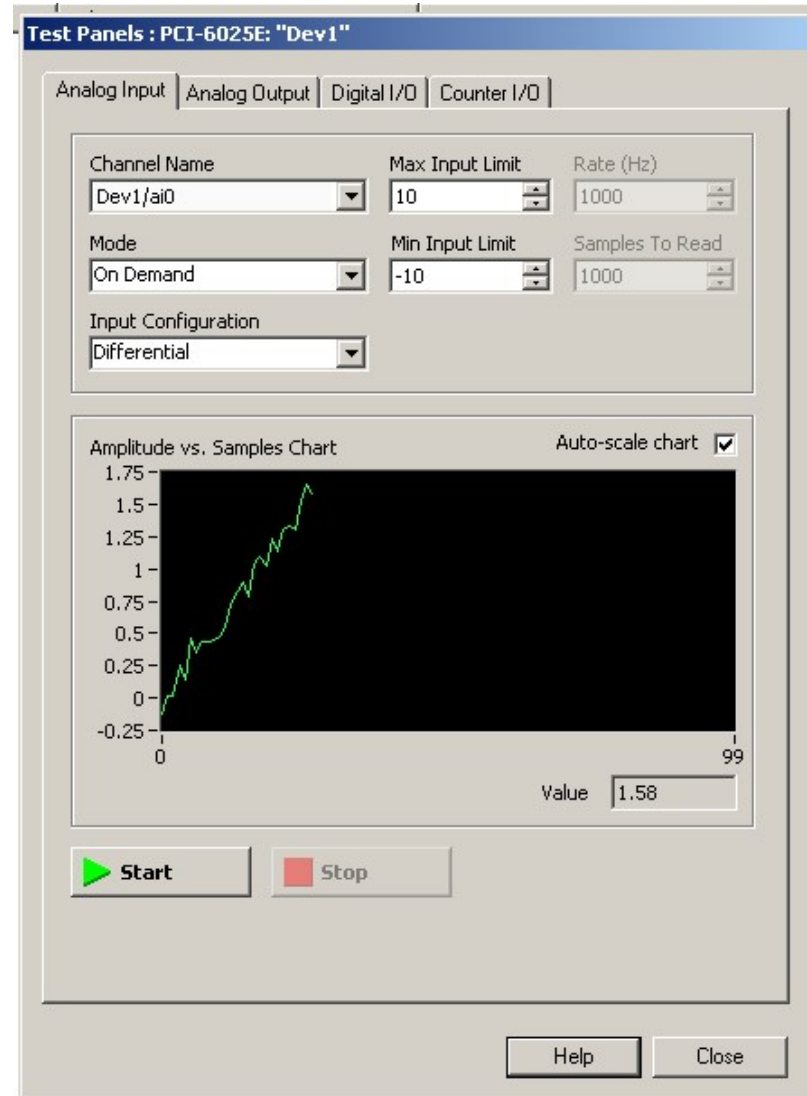
- Fleksibilni interfejs za povezivanje vremenskih signala, čime se može uspostaviti sinhronizacija između više akvizicionih kartica, ili kartice i spoljašnjih elektronskih sklopova.
- Na ovaj način kartica može i da kontroliše i da bude kontrolisana od strane drugih kartica i/ili spoljašnjih elektronskih sklopova

NI-DAQ 6025E – konektor

AIGND	1	51	PC7
AIGND	2	52	GND
ACH0	3	53	PC6
ACH8	4	54	GND
ACH1	5	55	PC5
ACH9	6	56	GND
ACH2	7	57	PC4
ACH10	8	58	GND
ACH3	9	59	PC3
ACH11	10	60	GND
ACH4	11	61	PC2
ACH12	12	62	GND
ACH5	13	63	PC1
ACH13	14	64	GND
ACH6	15	65	PC0
ACH14	16	66	GND
ACH7	17	67	PB7
ACH15	18	68	GND
AISENSE	19	69	PB6
DAC0OUT	20	70	GND
DAC1OUT	21	71	PB5
RESERVED	22	72	GND
AOGND	23	73	PB4
DGND	24	74	GND
DIO0	25	75	PB3
DIO4	26	76	GND
DIO1	27	77	PB2
DIO5	28	78	GND
DIO2	29	79	PB1
DIO6	30	80	GND
DIO3	31	81	PB0
DIO7	32	82	GND
DGND	33	83	PA7
+5 V	34	84	GND
+5 V	35	85	PA6
SCANCLK	36	86	GND
EXTSTROBE*	37	87	PA5
PFI0/TRIG1	38	88	GND
PFI1/TRIG2	39	89	PA4
PFI2/CONVERT*	40	90	GND
PFI3/GPCTR1_SOURCE	41	91	PA3
PFI4/GPCTR1_GATE	42	92	GND
GPCTR1_OUT	43	93	PA2
PFI5/UPDATE*	44	94	GND
PFI6/WFTRIG	45	95	PA1
PFI7/STARTSCAN	46	96	GND
PFI8/GPCTR0_SOURCE	47	97	PA0
PFI9/GPCTR0_GATE	48	98	GND
GPCTR0_OUT	49	99	+5 V
FREQ_OUT	50	100	GND

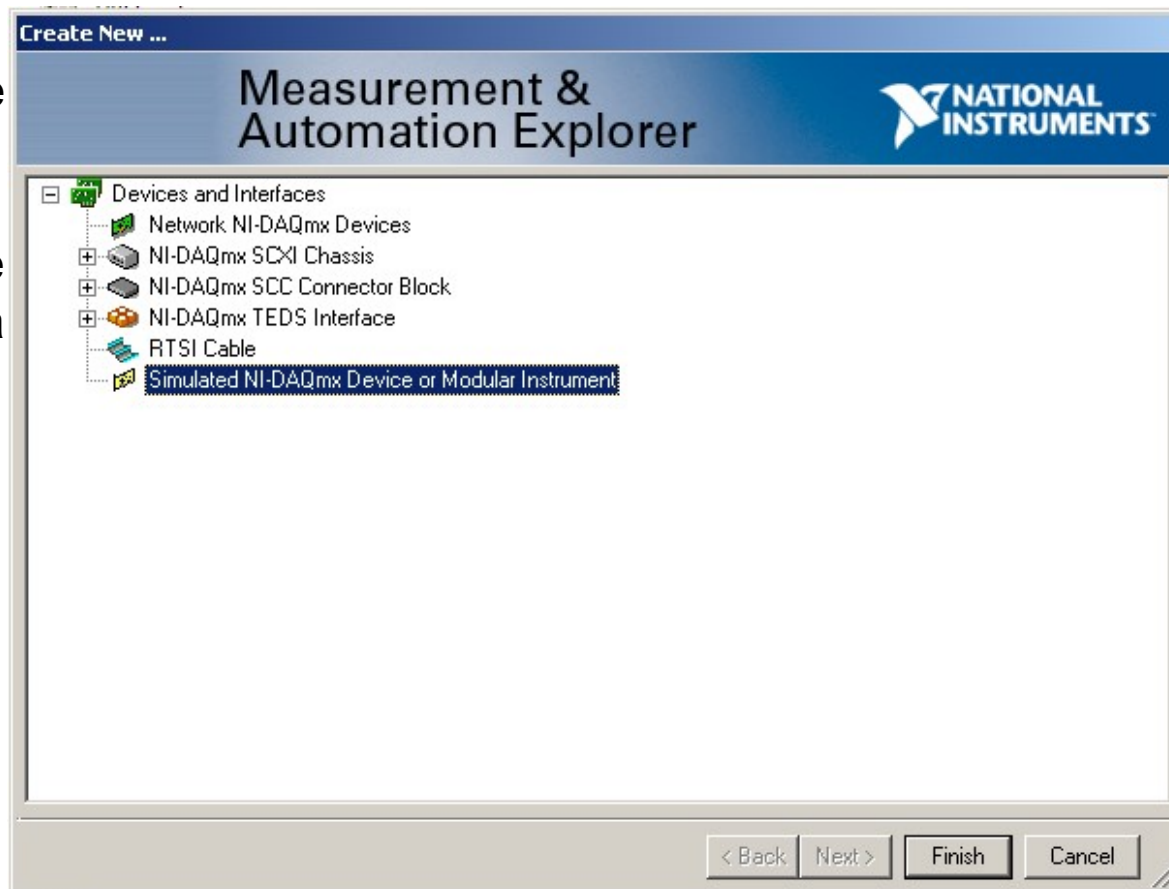
Testiranje kartice NI-DAQ 6025E

Nakon instalacije,
funkcionalnost
kartice se može
proveriti
korišćenjem Test
Panela



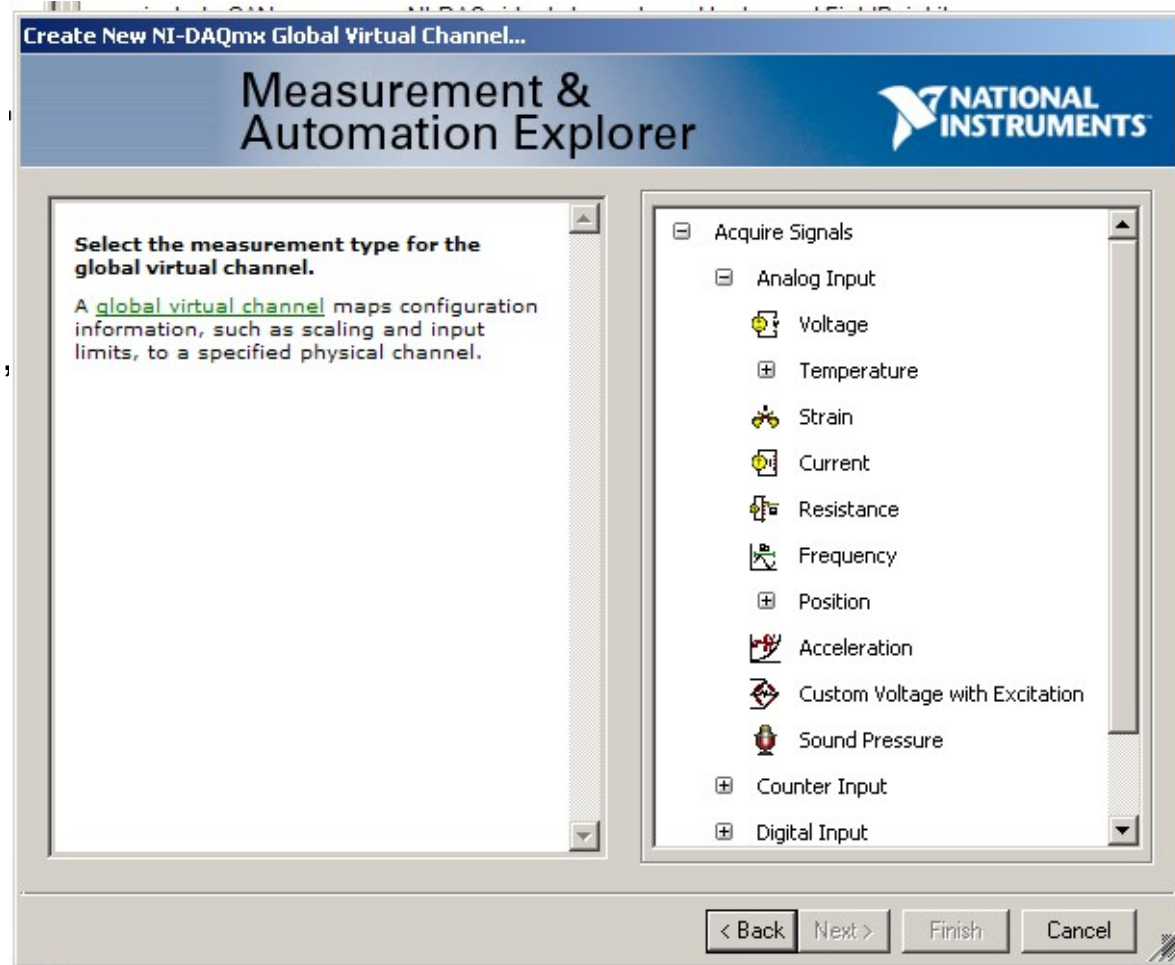
Kreiranje simulirane kartice za potrebe razvoja aplikacije

Osim realne, moguće je “instalirati” i simuliranu karticu, koja se sa stanovišta komunikacije sa NI softverom ponaša identično kao i realna kartica.



Globalni kanali

Globalni kanal je apstrakcija, kojom se fizičkom kanalu (naponski signal) dodeljuje fizičko značenje



Globalni kanali

MyTemperature - Measurement & Automation Explorer

File Edit View Tools Operate Help

Configuration

Save Run

Channel	Value
MyTemperature	0

Table Display Type

Configuration

Channel Settings

MyTemperature

RTD Setup

Settings Calibration

Signal Input Range

Max 100 Min 0

Scaled Units deg C

RTD Type Pt 3750 Ro 100 Configuration 2-Wire

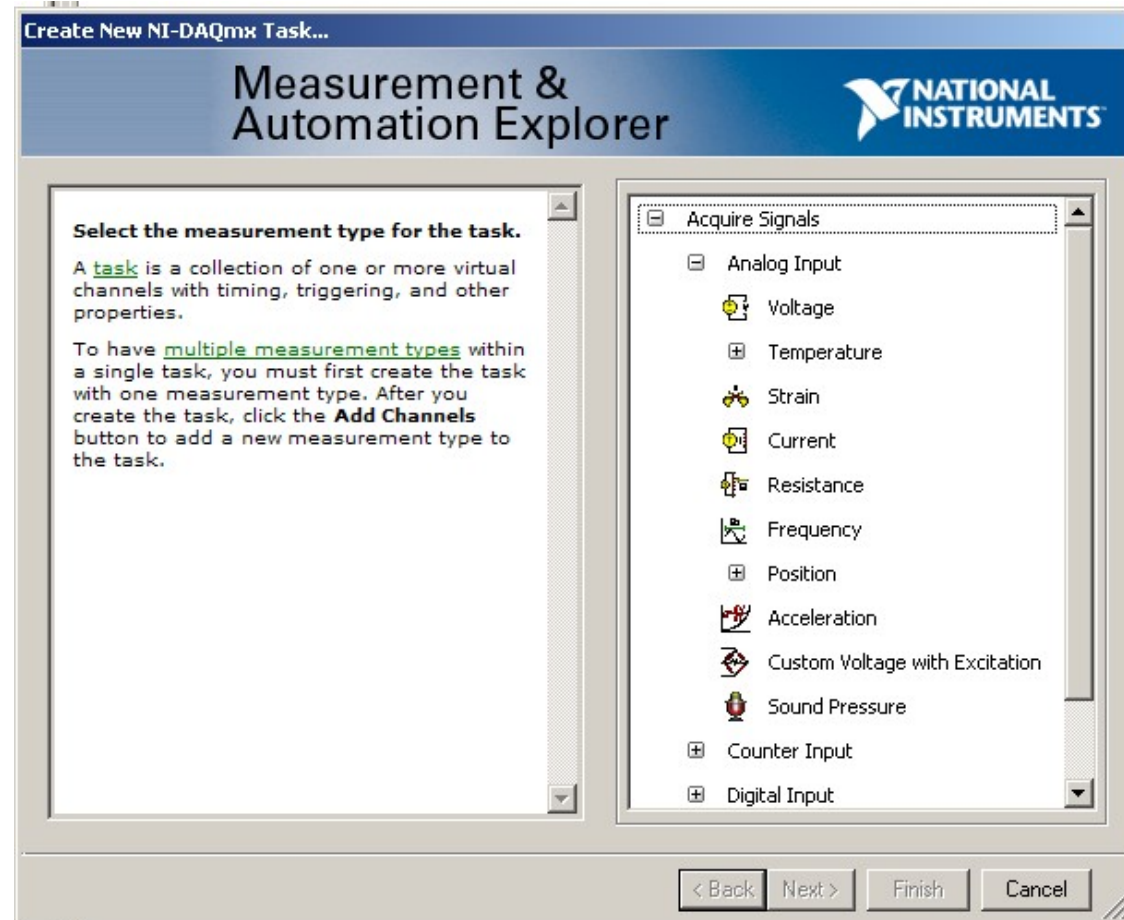
Iex Source External Iex Value (A) 2.5m

NI-DAQmx Global Channel Description Connection Diagram

Taskovi

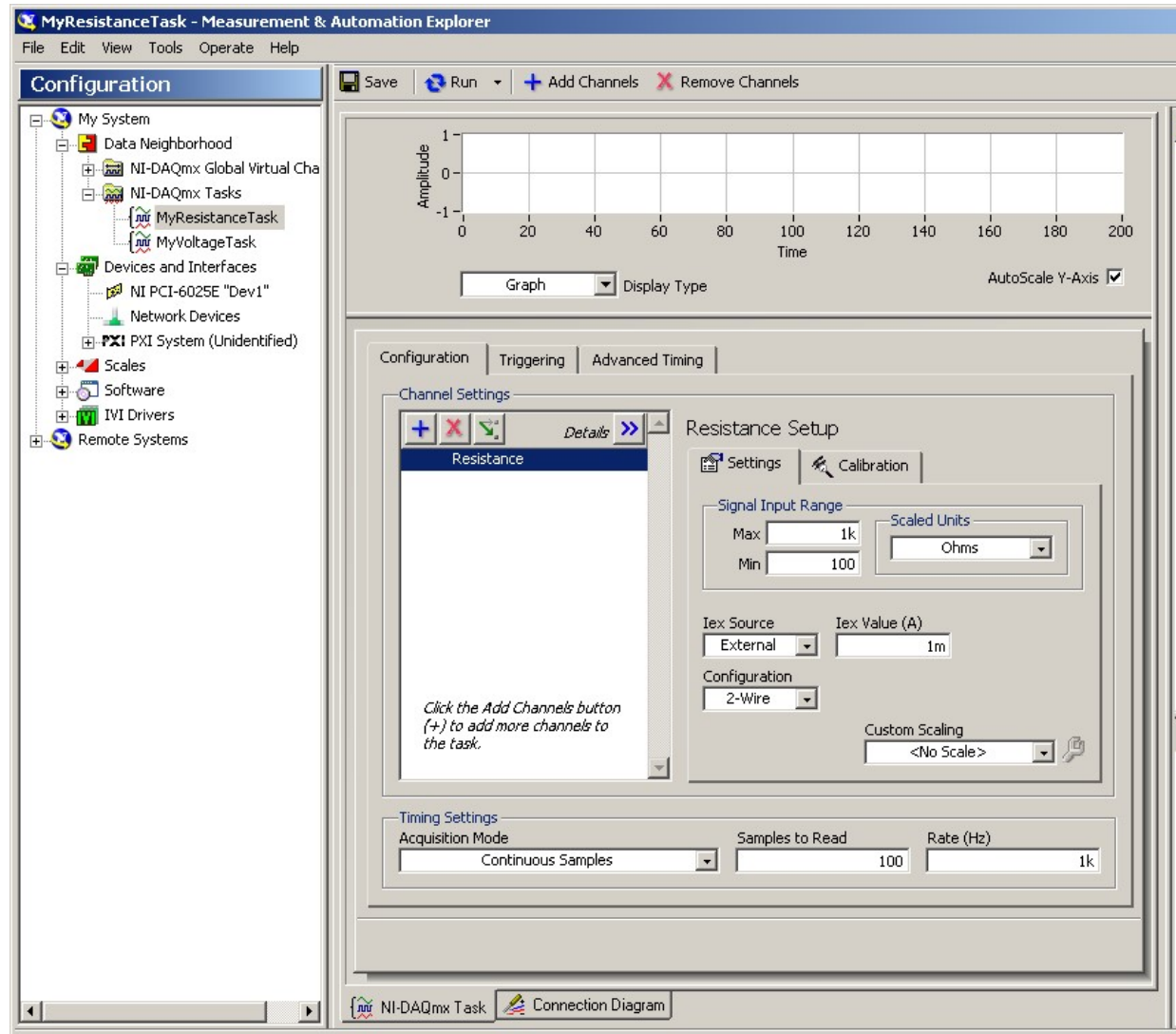
Za merenje nije dovoljna samo informacija sa ulaznog kanala – potrebna je i informacija o vremenu!

Task ili merni zadatak je osnovni organizacioni entitet, koji se sastoji od globalnog kanala i vremenskih parametara merenja.



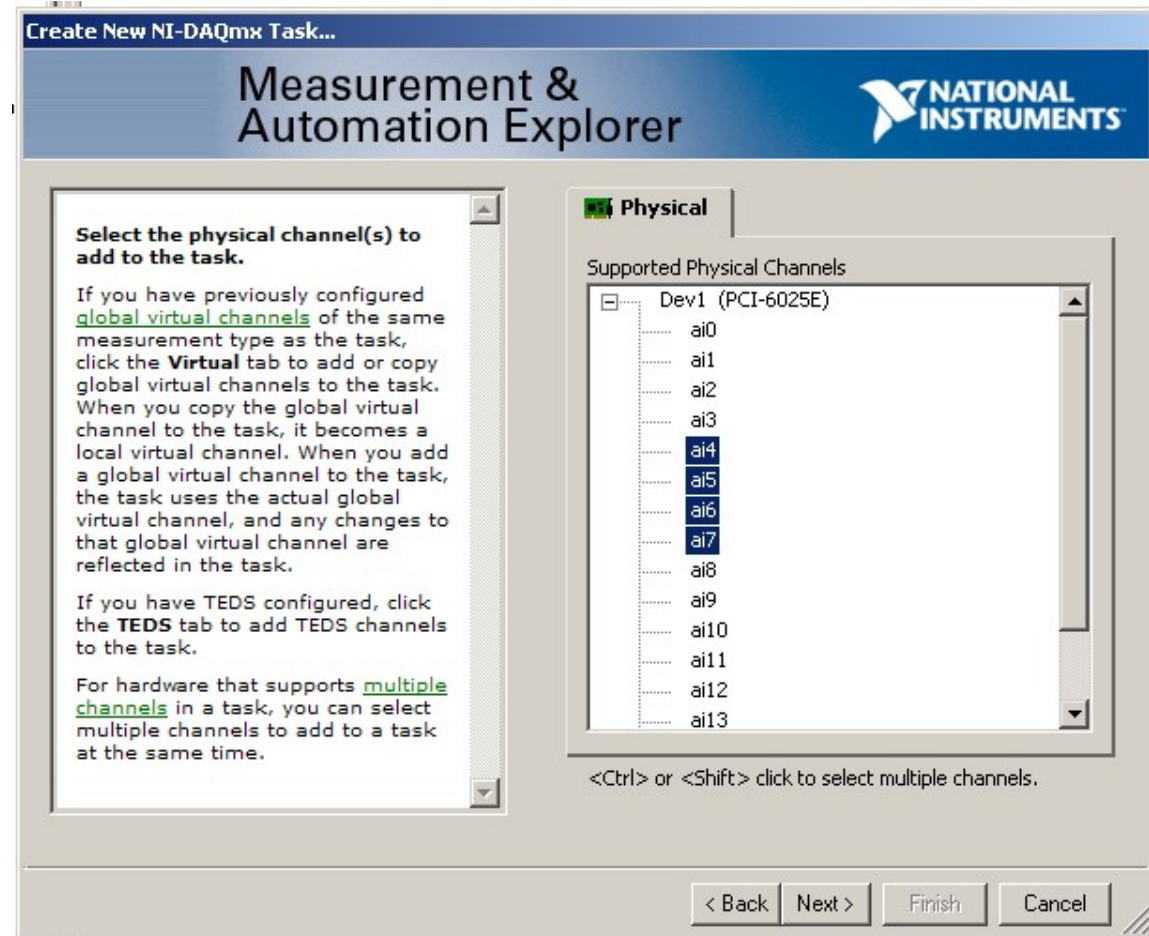
Taskovi

Podaci koje task prikuplja dostupni su NI aplikacijama preko C funkcija.



Taskovi

Jedan task može da se sastoji od merenja / generisanja izlaza po više analognih ili digitalnih kanala



Testiranje taska

The screenshot displays the 'MyResistanceTask' software interface within the Measurement & Automation Explorer. The interface is divided into several sections:

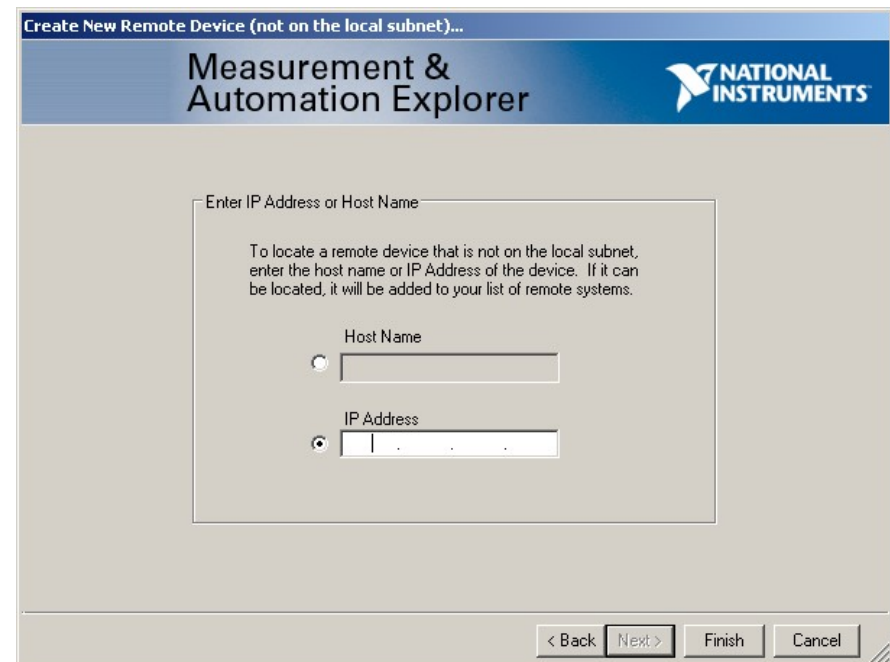
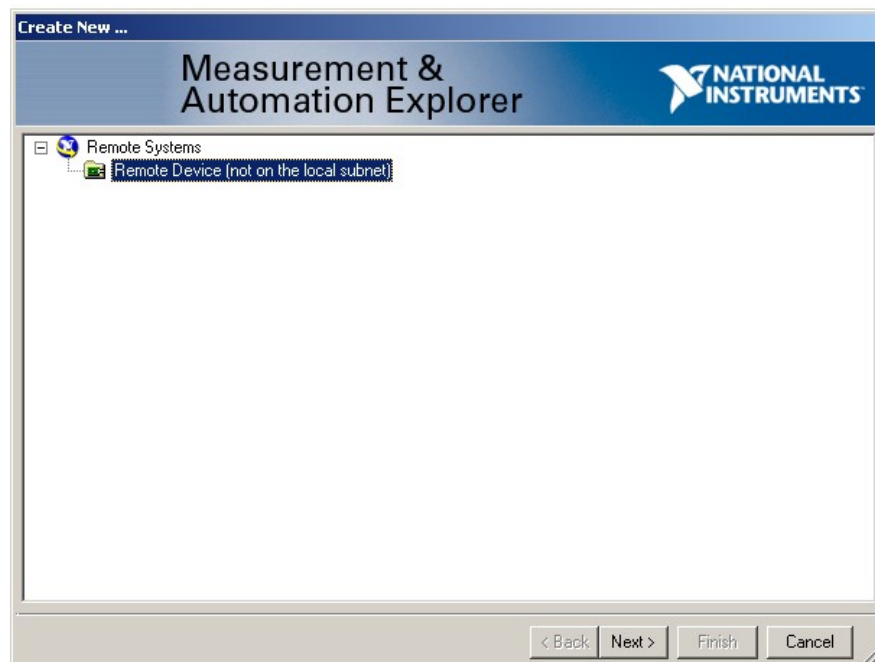
- Configuration Panel (Left):** A tree view showing the system hierarchy. The 'MyResistanceTask' is highlighted under 'NI-DAQmx Tasks'. Other visible items include 'My System', 'Data Neighborhood', 'MyTemperature', 'MyVoltageTask', 'Devices and Interfaces', 'NI PCI-6025E "Dev1"', 'Network Devices', 'PXI PXI System (Unidentified)', 'Scales', 'Software', 'IVI Drivers', and 'Remote Systems'.
- Toolbar (Top):** Contains buttons for 'Save', 'Run', '+ Add Channels', and 'X Remove Channels'.
- Graph (Top Right):** A line graph showing 'Amplitude' on the Y-axis (ranging from 0 to 1k) versus 'Time' on the X-axis (ranging from 0 to 0.09s). The graph shows a smooth, bell-shaped curve peaking at approximately 1000 units around 0.03s. Below the graph, there is a 'Display Type' dropdown set to 'Graph' and an 'AutoScale Y-Axis' checkbox which is checked.
- Configuration Panel (Bottom):** Contains three tabs: 'Configuration', 'Triggering', and 'Advanced Timing'. The 'Configuration' tab is active, showing:
 - Channel Settings:** A list with one channel named 'Resistance'. Below the list is a note: 'Click the Add Channels button (+) to add more channels to the task.'
 - Resistance Setup:** A sub-panel with 'Settings' and 'Calibration' tabs. The 'Settings' tab is active, showing:
 - Signal Input Range:** 'Max' is set to 1k and 'Min' is set to 100.
 - Scaled Units:** A dropdown menu is set to 'Ohms'.
 - Iex Source:** A dropdown menu is set to 'External'.
 - Iex Value (A):** A text box is set to '1m'.
 - Configuration:** A dropdown menu is set to '2-Wire'.
 - Custom Scaling:** A dropdown menu is set to '<No Scale>'.
 - Timing Settings:** Located at the bottom of the configuration panel, showing:
 - Acquisition Mode:** A dropdown menu set to 'N Samples'.
 - Samples to Read:** A text box set to '100'.
 - Rate (Hz):** A text box set to '1k'.

Udaljeni sistemi

- MAX automatski integriše hardver i softver koji se nalaze instalirani / priključeni na nekom drugom računaru koji je povezan na lokalnu mrežu

Udaljeni sistemi

- MAX omogućava manuelnu integraciju hardvera i softvera koji se nalaze instalirani / priključeni na nekom drugom računaru koji nije povezan na lokalnu mrežu



Instalirajte ovim redom:

1. LabWindows/CVI 9.0 na adresi:

[ftp.ni.com/evaluation/cvi/pc/Full/NILWCVIFDS90.exe](ftp://ftp.ni.com/evaluation/cvi/pc/Full/NILWCVIFDS90.exe)

2. NI-DAQmx 9.0.2 na adresi:

https://download.ni.com/support/softlib/multifunction_daq/nidaqmx/9.0.2/NIDAQ902f0.exe