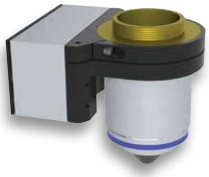
npoint

nanopositioning | motion control

2017

DESIGN
DELIVER
SUPPORT





"nPoint believes that success comes from innovative products, high-quality manufacturing, and the ability to provide superior customer support in its markets worldwide."

Katerina Moloni, Ph.D.
VP Product Development • nPoint, Inc.

Standard Products

PRODUCTS

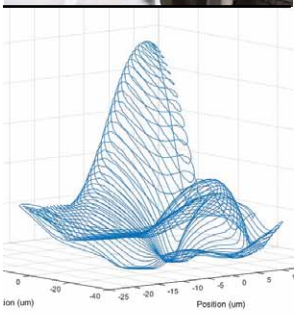
nPoint specializes in piezo-driven flexure-guided nanopositioners and motion control tools. The nanopositioners are available in one-, two-, and three-axes configurations, with ranges up to 1000um.

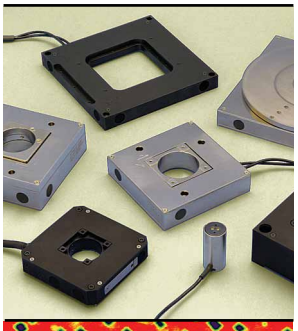
Flexures employ frictionless travel for long-term durability. Flexure-guided nanopositioners can be fabricated from a variety of materials and can be used in various environments, including ultrahigh vacuum and military-spec.

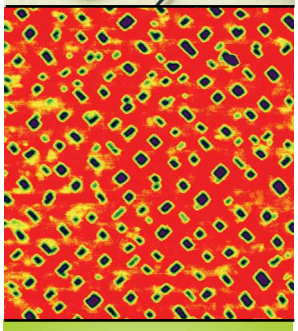
nPoint utilizes capacitive feedback in most of the products to ensure outstanding motion linearity and position accuracy. Capacitive sensors enable direct measurement of the moving platform. Their high bandwidth, coupled with advanced DSP servo control, enables the most demanding metrology applications. Strain gauge sensors are also employed in a variety of products and applications.

Our DSP-based servo control provides high flexibility in optimizing the response of the nanopositioner in a variety of applications. The nPoint windows-based software facilitates easy adjustment of control parameters, step-response verification, and the enabling of advanced control modes. Standard and OEM configurations are available.

When a closed-loop system is not desired or necessary, nPoint offers bench-top piezo drivers that can be operated manually or via BNC analog inputs.







APPLICATIONS

With our advanced mechanical design and the right choice of position sensors nPoint systems can achieve sub-nanometer positional accuracy and repeatability. Closed-loop nanopositioning systems eliminate piezo drift. nPoint nanopositioning systems can achieve motion linearity better than 99.99%. This performance, coupled with the flexibility in the mechanical footprint, makes nPoint nanopositioning systems ideal for a variety of applications including:

- Metrology
- Scanning Probe Microscopy
- Data Storage Metrology
- Photonic Chip Manufacturing
- Nanofabrication
- Semiconductor Test Equipment
- Precision Machining
- Materials Analysis
- Interferometry, optical microscopy and spectroscopy, Raman
- Optical-Image Resolution Enhancement
- Beam Steering and Stabilization
- Life Sciences

RESULTS

Consistent measurements, astonishing image clarity, and unsurpassed precision are the hallmark of nPoint nanopositioning systems. Our products provide the user with the means to achieve results never before possible. nPoint systems make observations at the sub-nanometer routine and reliable.

One Axis

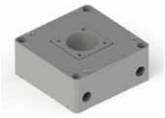
	PRODUCT	PART NUMBER	DESCRIPTION	Travel Range(µm) X	Travel Range(µm) Z	X or Z (nm) Resolution	(Hz) Resonant
	nPX100 nPX300 nPX600	3715248 3715256 3715261	Compact stages with up to 600µm of range. nPX product line.	100 300 600		0.3 0.8 2	1000 440 250
	nPFocus100C nPFocus250C nPFocus400C nPFocus1000	3715210 3715211 3715184 3715250	Microscope objective scanners with up to 1000µm range. Capacitive sensors for the best resolution.		100 250 400 1000	0.3 0.7 1.5 5	450 300 230 135
	nPFocus100SG nPFocus250SG nPFocus400SG	3715297 3715298 3715304	Microscope objective scanner with strain gauge sensors for closed-loop control.		100 250 400	3 5 7	450 300 230
	nPFocus100SL	3715262	A compact, closed-loop, microscope objective nanopositioner with 100µm travel.		100	3	240
	nPFocus100HD	3715414	Ultra-fast objective nanopositioner. High stiffness allows for use with heavy microscope objectives.		100	0.5	1150
	NPZ100-209	3715209	Unique piezo slide-holders for upright microscopes.		100	3	400
	NPX25-105	3715105	Compact, ultra-fast stage.	25		0.1	4000
	NPZ25-206 NPZ70-207	3715206 3715207	Compact, flexure-guided actuator made of Super Invar.		25 70	0.1 0.5	4000 2000
	NPX60-223	3715223	Compact, high-speed stage with sub-nm resolution.	60		0.2	1200
	NPZ25-027	3715027	Compact, high-speed Z stage with aperture.		25	0.2	1600

One Axis Continued ——

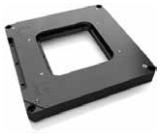
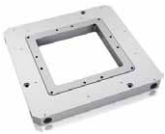
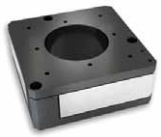
One Axis

	PRODUCT	PART NUMBER	DESCRIPTION	Travel Range(µm) X	Travel Range(µm) Z	X or Z (nm) Resolution	(Hz) Resonant Frequency
	NPZ100-403	3715403	Fast Z stage that can be configured to carry a microscope objective.		100	0.5/3	1000
	NPZ100-220 NPZ300-221	3715220 3715221	Low-profile Z stages developed for integration with standard, large-range stages for inverted microscopes.		100 300	0.5 1	400 300
	NPZ300-222	3715222	Low-profile Z stage developed for integration with standard, large-range stages for inverted microscopes. Its large aperture can easily accomodate microplates.		300	3	160

Two Axis

	PRODUCT	PART NUMBER	DESCRIPTION	Travel Range(µm) XY	XY (nm) Resolution	(Hz) Resonant Frequency
	NPXY10-263	3715263	UHV compatible, compact, fast, ultra-precise stage.	10	0.2	1200
	NPXY30-148	3715148	Ultra-fast, direct-drive XY stage developed for metrology applications.	30	0.1	2500
	NPXY50-286	3715286	XY piezo stage with high resonant frequency and compact design.	50	0.2	1400
	NPXY60-258	3715258	A non-magnetic, UHV compatible stage with a small footprint.	60	0.4	750
	NPXY60-448	3715448	Low-profile, fast stage developed for optical imaging and resolution enhancement applications.	60	0.2	1400
	NPXY80-253	3715253	Compact, XY stage developed for AFM applications.	80	0.3	550
	NPXY100-100	3715100	Ultra-precise XY stage developed for metrology applications.	100	0.3	700

Two Axis

	PRODUCT	PART NUMBER	DESCRIPTION	Travel Range(µm) XY	XY (nm) Resolution	(Hz) Resonant Frequency
	NPXY100-114	3715114	Ultra-fast XY stage developed for metrology applications.	100	0.5	1000
	NPXY100-126	3715126	Low-profile, large aperture XY stage developed for microscopy applications.	100	0.3	850
	NPXY100-216	3715216	Low-profile, very large aperture XY stage developed for microscopy applications.	100	0.3	400
	NPXY200-401	3715401	Low-profile, large aperture XY stage developed for microscopy applications.	200	0.7	700
	NPXY200-101	3715101	Ultra-precise XY stage developed for metrology applications.	200	0.5	400
	NPXY250-405	3715405	Flexible, economical XY piezo stage. Standard aperture allows for integration in various optics and microscopy applications.	250	4	300/230
	NPXY300-291	3715291	Fast, large aperture, 300 micron XY piezo stage.	300	1	240
	NPXY400-132	3714132	Large-range XY stage developed for AFM applications. It integrates easily with optical microscopes.	400	1.5	250

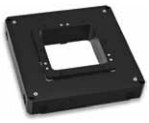
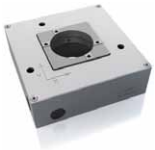
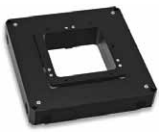
Tip/Tilt

	PRODUCT	PART NUMBER	DESCRIPTION	Travel Range(mrad) Tip/Tilt	(µrad) Resolution	(Hz) Resonant
	RXY3-276	3715276	Ultra-fast tip-tilt stage with 3mrad range of motion. It is optimized for 1″- 3″ mirrors.	3	0.05	3500
	RXY3-410	3715410	Accurate tip-tilt piezo stage, designed for larger mirrors 2″ and above.	3	0.2	1400
	RXY6-212	3715212	Fast tip-tilt stage with 6mrad range of motion. It is optimized for 1″-3″ mirrors.	6	0.1	2900
	RXY14-254	3715254	Compact tip-tilt stage with large range of motion.	14	1	1000

Three Axis

	PRODUCT	PART NUMBER	DESCRIPTION	Travel Range(µm) XY	Z	XY/Z (nm) Resolution	(Hz) Resonant Frequency
	nPCube	3715247	Compact XYZ stage with 100µm range.	100	100	3/3	250/280/250
	nPBio200 nPBio300	3715245 -200 3715245 -300	XYZ piezo stage developed for easy integration with inverted microscopes. nPBio product line.	200 300	200 300	1/1 2/2	250/250 200/200
	NPXY10Z5-187	3715187	UHV compatible, high-speed AFM scanner	10	5	0.2/0.1	1200/2000
	NPXY50Z50-204	3715204	High-speed, large aperture XYZ stage developed for easy integration with inverted microscopes.	50	50	0.5/0.5	1000/600

Three Axis

	PRODUCT	PART NUMBER	DESCRIPTION	Travel Range(µm) XY	Travel Range(µm) Z	XY/Z (nm) Resolution	(Hz) Resonant Frequency
	NPXY60Z20-257	3715257	Compact AFM scanner.	60	20	0.4/0.2	750/2000
	NPXY80Z5-272	3715272	Compact AFM scanner.	80	5	0.3/0.07	400/2000
	NPXY100Z15-163	3715163	Ultra-precise XYZ stage developed for metrology applications and easy integration with Dimension AFMs.	100	15	0.3/0.1	500/3000
	NPXY100Z10-128	3715128	Large aperture XYZ stage developed for scanning probe and optical microscopy applications.	100	10	0.3/0.1	600/900
	NPXY100Z25-264	3715264		100	25	0.3/0.2	600/750
	NPXY100Z50-244	3715244		100	50	0.3/0.3	500/550
	NPXY100Z100-135	3715135		100	100	0.3/0.3	600/500
	NPXY100Z25-102	3715102	Ultra-precise XYZ stage developed for metrology applications. Available also in Super Invar.	100	25	0.3/0.1	500/1600
	NPXY200Z15-268	3715268	Ultra-precise XYZ stage developed for metrology applications and easy integration with Dimension AFMs.	200	15	0.7/0.1	350/5000
	NPXY200Z10-269	3715269	Large aperture XYZ stage developed for scanning probe and optical microscopy applications.	200	10	0.7/0.1	400/450/900
	NPXY200Z25-260	3715260		200	25	0.7/0.2	450/750
	NPXY200Z50-270	3715270		200	50	0.7/0.3	450/550
	NPXY200Z100-271	3715271		200	100	0.7/0.3	450/500
	NPXY200Z25-103	3715103	Ultra-precise XYZ stage developed for metrology applications. Available also in Super Invar.	200	25	0.5/0.1	350/1600
	NPXY400Z100-117	3715117	Large range stage developed for metrology applications and easy integration with Dimension AFMs.	400	100	1.5/0.5	200/700

LC.400 Series Controllers

The LC.400 series controllers provide closed-loop operation for up to three channels and are compatible with capacitive and strain gage sensing technology. Their many interfaces and advanced features makes them a great value in demanding nanopositioning applications. The nPControl PC software provides a user-friendly interface to explore the full range of controller capabilities.

- Up to three axes control
- Capacitive or Strain Gage sensor
- Multiple advanced control profiles to choose from
- Stage ID chip compatible
- Built-in function generator
- Analog and digital control inputs
- 32-bit floating point DSP
- 20-bit resolution
- 24 µsec servo-loop interval

Communication/Interfaces

STANDARD ANALOG & USB

Each channel is equipped with analog control and sensor monitor BNC connectors. The standard USB interface can also be used to command and monitor the position of a stage. LabVIEW and DLL drivers facilitate the integration of nPoint nanopositioning systems with a variety of customer applications.

DIGITAL I/O

The user can assign different triggering functions to the 9-pin digital I/O interface through the front panel software. This facilitates the integration with other instruments and the customization of experiments.

OPTIONAL HIGH SPEED PARALLEL INTERFACE

The high speed parallel interface offers communication with the controller at full loop speed. It allows the user to set the position and read the sensor data for up to three channels every 24 microseconds at 20 bit resolution.

OPTIONAL PFM (PULSE FREQUENCY MODULATION) INTERFACE

The nPoint PFM Interface is designed to receive position commands and output position data in real-time. The position command data is received as standard Pulse/Direction differential signals. The position monitor data is output as standard differential quadrature signals. The PFM interface facilitates the integration of the nPoint controllers with industry-standard motion controllers.

OPTIONAL ETHERNET INTERFACE

The Ethernet interface a 100Base-T interface and is currently available only in the LC.403 enclosure. It offers the full functionality of the standard USB interface.

OPTIONAL DIGITAL ENCODER INTERFACE

The nPoint Digital Encoder Interface enables integration of an nPoint nanopositioning system with a quadrature encoder. The encoder signal is used instead of an internal sensor signal (such as capacitive or strain gage sensor) thus maintaining the functionality of the LC.400 series controllers. This interface is intended to allow the use of optical or interferometric encoders as the sensor input to an nPoint nanopositioning system.

OPTIONAL AFM INTERFACE

nPoint nanopositioning systems are often integrated into commercial AFMs to provide closed-loop scanning functionality. nPoint facilitates the integration for Bruker or Agilent AFMs by providing a built-in AFM interface. The AFM interface is only available in LC.403 enclosure.

SOFTWARE COMPATIBILITY

• Epics • ScanImage • Labview • Nikon Elements • µManager

C.400 Series Controllers

- Up to six axes control
- Capacitive or Strain Gage sensor
- Multiple advanced control profiles to choose from
- Stage ID chip compatible
- Built-in function generator
- Analog and digital control inputs
- 32-bit floating point DSP
- 20-bit resolution
- 24 µsec servo-loop interval

The C.400 series controllers provide closed-loop operation for up to six channels. They are compatible with capacitive and strain gage sensing technology and provide the same functionality as the LC.400 series.

LC.300 Series OEM Controllers

- Up to three axes control
- Strain Gage sensor (Capacitive optional)
- Stage ID chip compatible
- Analog and digital control inputs
- 32-bit floating point DSP
- 20-bit resolution
- 24 µsec servo-loop interval

The LC.300 series OEM controllers provide economical closed-loop operation for up to three channels. nPoint's nPControl Basic Software offers the ability to easily change control parameters via a Windows-based GUI. Controllers are available with either capacitive or strain gage sensing technology. Their small footprint allows for simple integration into OEM equipment.

D.200 Series Piezo Drivers

- Available in one- or two- channel configurations
- Adjustable input voltage range
- Output voltage range from -30V to 150V
- Adjustable DC offset setting
- Adjustable voltage gain setting
- Output voltage noise < 0.4mV RMS

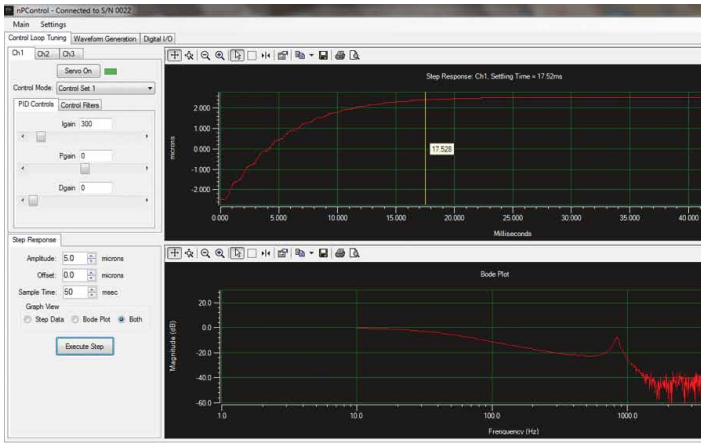
The D.200 series is the newest addition to the nPoint piezo drivers. They are available in one and two-channel configurations as a bench-top piezo driver that can be operated manually or via the BNC analog input.

Software Environment

Control is made easy with nPoint's Windows-based software, **nPControl**. Graphical controls facilitate easy adjustment of control parameters, step-response verification and the use of advanced control mode. Advanced features such as **Raster Scanning, Waveform** and **Trajectory Generation** simplify system integration and enhance the capabilities of the nanopositioning system.

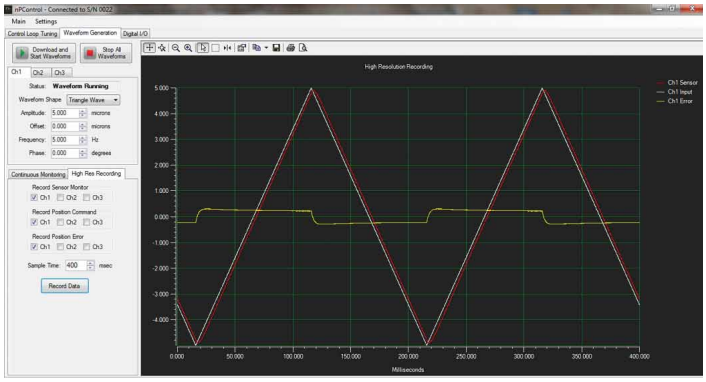
CONTROL OPTIMIZATION

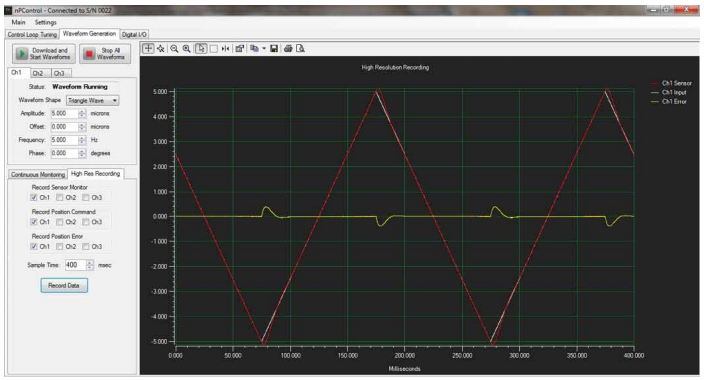
The **Control Loop Tuning** window allows the response of a nanopositioning system to be optimized for various applications via adjustable control parameters. This may be necessary when external factors, such as load, change the dynamic characteristics of the nanopositioning system. The user can adjust the PID gains to achieve the desired step response.



The user can command one axis (channel) while simultaneously monitoring additional axes. Up to four different control modes can be programmed per channel. Each control mode can store up to two notch filters and a 2nd integrator. Applications involving scanning benefit greatly from the use of the 2nd integrator. The tracking error can be minimized.

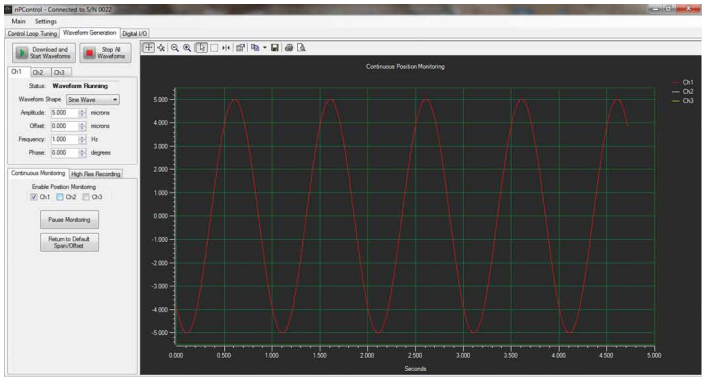
The **High Res Recording** tab allows the user to record up to two seconds of high resolution data. The commanded position, the actual position and the position error for any channel can be recorded simultaneously. Two seconds of data is equivalent to 83333 data points. This allows the user to better understand how the control parameters affect position tracking errors, axes cross-talk, etc.





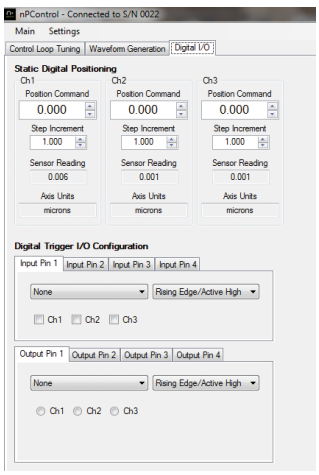
WAVEFORM GENERATION

All nPoint controllers are equipped with a Digital Waveform Generator. The **Waveform Generation** can be used to generate periodic motion on any stage axis. Different periodic waveforms can be selected for each channel. User-defined waveforms can also be uploaded.



DIGITAL I/O

The position of a piezo stage can be set using the **Digital I/O interface**. The sensor reading is continuously monitored. The 400 series controllers are equipped with programmable digital I/O capabilities through the 9-pin D-sub connector located on the back (LC.400 series) or the front (C.400 series) panel. Up to four input and four output trigger configurations can be programmed.



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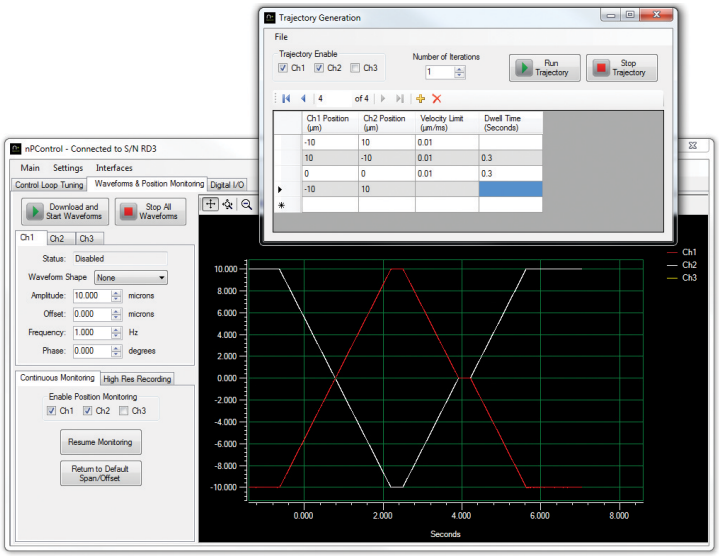
Software Environment



TRAJECTORY GENERATION

The **Trajectory Generation Interface** allows up to 500 position coordinates to be defined with velocity and dwell time specified individually for each move.

RASTER SCANNING

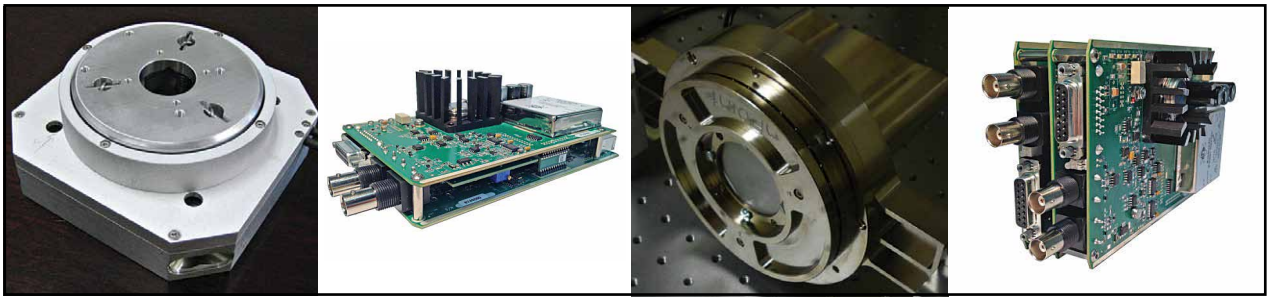
The **Raster Scanning Interface** allows the user to define a raster pattern with up to three axes. TTL signals can be used for data-acquisition synchronization.

OEM & Custom Solutions

nPoint specializes in custom motion control solutions for OEM products in diverse markets. Digital controllers create flexibility necessary for electronics integration. Piezo flexure stages designed with the highest stiffness in the industry provide solutions for high-speed applications. Work directly with our team of engineers to get the speed and precision you require.

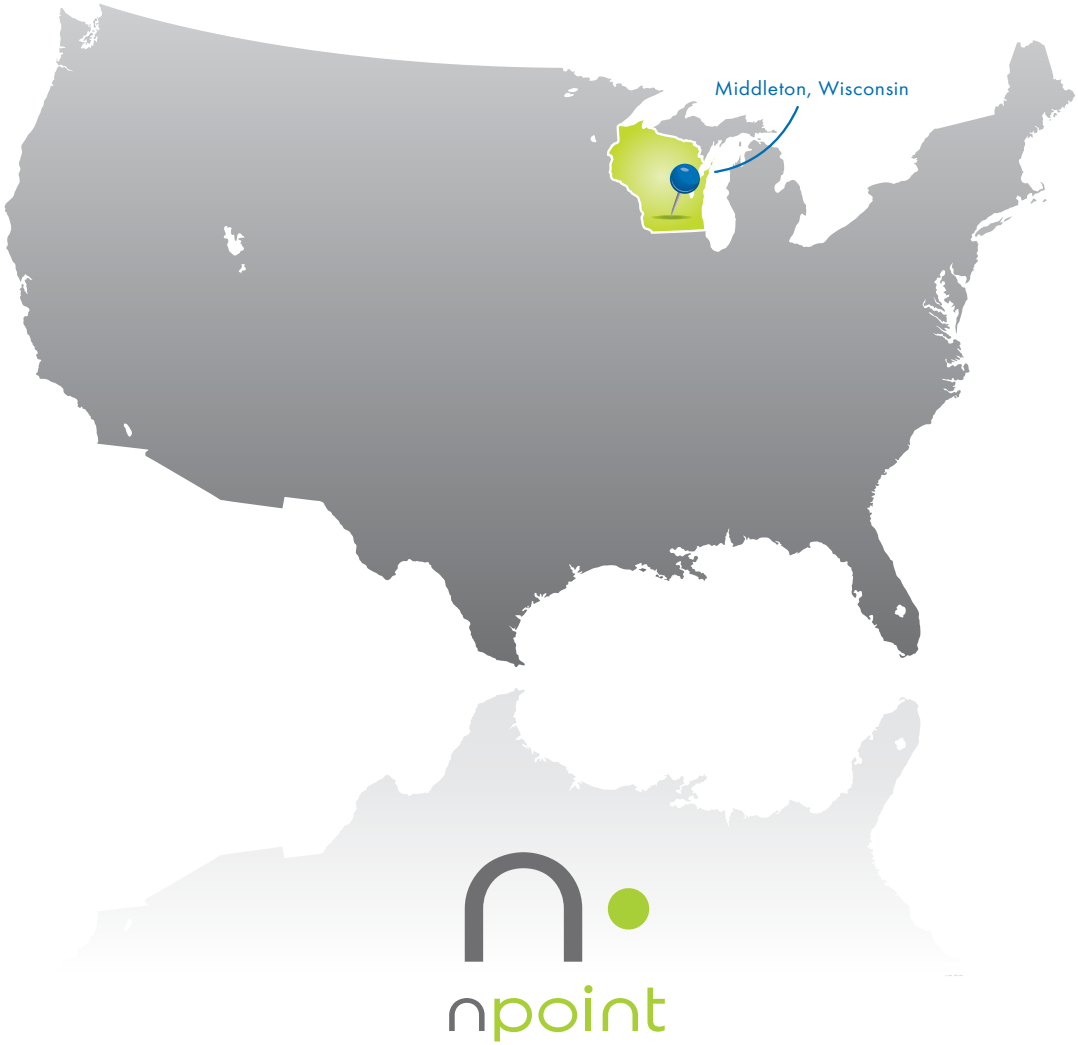
nPoint's in-house engineering team provides the following services for custom nanopositioning applications:

- Mechanical Engineering of Piezo Flexure Stages with FEA Analysis
- Closed-Loop Controller Design from PCBs to Complete Stand Alone Units
- Custom Interface Integration



Since its inception in 1997, nPoint has been providing enabling technologies in nanopositioning and nanomotion control to research laboratories and manufacturers. Our systems are recognized for providing speed, precision, and accuracy at the sub-nanometer level. Today, nPoint products are utilized within the diverse applications of image stabilization, data storage, semiconductor inspection, materials characterization and life sciences.

We pride ourselves on state-of-the-art designs that meet our customers' perfrormance goals. Whether the objective is a single scanner designed by our engineering team or a project requiring hundreds of identical units, nPoint will help you achieve your high-precision, high-resolution, and high-speed motion control goals.



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