What is DIST-Nx

DIST-Nx is an Optical Distance sensor (uses various SHARP sensors) with digital (I2C) interface for LEGO Mindstorms NXT. This can be used to measure precise distances from an obstacle.

Sensor overview

The distance ranges of sensor variants are as follows, values outside this range are not accurate.

- Long Range: 30 to 150 cm (with highest accuracy in zone 30 cm to 100 cm).
- Medium Range: 10 to 80 cm (with highest accuracy in zone 10 cm to 40 cm).
- Short Range: 6 to 30 cm (with highest accuracy in zone 6 cm to 20 cm).

The sensor detects distance based on angle of arriving reflected IR light. The sensor emits an IR light, and when it receives reflection from the obstacle, the angle at which the light strikes is measured.
This angle is used to determine the distance to the obstacle.
The sensor will not be able to detect an object that does not reflect IR Light (such as clear glass).

Sensor readings outside the range

If the obstacle in front of these sensors is beyond the maximum range, the distance returned is same as maximum range.

Sensor Range	Distance to Obstacle	Readings
Short	> 30 cm	30 cm
Medium	> 80 cm	80 cm
Long	> 150 cm	150 cm

If the obstacle in front of the sensor is closer than minimum range, the distance returned is as follows depending on where the obstacle is.

Sensor Range	Distance to	Readings

	Obstacle	
Short	4 to 6 cm	6 cm
Short	< 4 cm	unpredictable
Medium	7 to 10 cm	10 cm
Medium	< 7 cm	unpredictable
Long	20 to 30 cm	30 cm
Long	< 20 cm	unpredictable

(Obstacles that are very close to the sensor do not yield predictable results).

Connections

Can be connected to any sensor port of NXT by using standard cable from NXT set.

Programming Techniques for reading in I2C mode

NXT-G:

You can use the factory shipped DIST-Nx with DIST-Nx (or DIST-Nx-Lean) sensor block. You can download the sensor block from following location:
http://www.mindsensors.com/index.php?module=documents&JAS_DocumentManager_op=viewDocument&JAS_Document_id=28

RobotC:

You can use example program in C and robotC compiler to use DIST-Nx on your NXT robot. Download sample here:
http://www.mindsensors.com/index.php?module=documents&JAS_DocumentManager_op=viewDocument&JAS_Document_id=73

NXC:

Download the sample programs and library file available at following location, and include the library file it in your program by #include directive.
http://www.mindsensors.com/index.php?module=documents&JAS_DocumentManager_op=viewDocument&JAS_Document_id=49

Data-Logging Experiments

In LEGO Mindstorms NXT Education Version, you can use **DIST-Nx-Lean** block for your Data Logging Experiments. You can download this block from following location:
http://www.mindsensors.com/index.php?

module=documents&JAS_DocumentManager_op=viewDocument&JAS_Document_id=28

Do I need to recalibrate DIST-Nx-v3?

All DIST-Nx-v3 sensors are pre-calibrated to provide reliable high-resolution distance information. You do not need to re-calibrate the sensor.

Energizing/De-Energizing the sensor

By default the sensor is energized. The sensor can be De-energized to conserve battery.

NOTE

When you energize the sensor again, there is 40 milli-seconds transition time for the sensor to get fully energized.

I2C Operations

Distance registers provide Distance information in millimeters. Voltage registers provide the raw voltage in milli-volts.

Supported commands:

Commands		Action
ASCII	Hex	
E	0x45	Energized (Power ON) the sensor Module
D	0x44	De-Energized (Power Off) the sensor Module

I2C Registers:

The DIST-Nx appears as I2C registers as follows:

Register	Read	Write
0x00-0x07	Firmware version – *V3.00*	-
0x08-0x0f	Vendor Id - *mndsnsrs*	-
0x10-0x17	Device ID – DIST-S (Short Range) DIST-L (Long Range) DIST-M (Medium Range)	-
0x41	-	Command
0x42	Distance data LSB	-
0x43	Distance data MSB	-

0x44	Voltage data LSB	-
0x45	Voltage data MSB	-

Current Consumption

Average measured current profile is as follows:

Current Consumption	Condition
38mA	While the sensor is Energized.
5mA	While the sensor is De-energized.

I2C Bus address

Factory Default Address: 0x02

Changing the I2C Bus Address:
The I2C bus address of DIST-Nx can be changed. To set an address different from default address, send sequence of following commands on the command register:

0xA0, 0xAA, 0xA5, <new I2C address>

Note: Send these commands with no break/read operation in between. This new address is effective immediately. Please note down your address carefully for future reference.

You can download the address change and scan functions from our website at www.mindsensors.com. These functions are written in RobotC.
Alternately, you can download NXT executable programs from following location: http://www.mindsensors.com/index.php?module=documents&JAS_DocumentManager_op=viewDocument&JAS_Document_id=91