NXTway-GS Building Manual
Author (First Edition)

Yorihisa Yamamoto

y_yama@cybernet.co.jp

Application Engineer
Advanced Support Group 1 Engineering Department
Applied Systems First Division
CYBERNET SYSTEMS CO., LTD.

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Introduction

This document describes the required products for NXTway-GS and how to build it. NXTway-GS is a self-balancing two-wheeled robot built with LEGO Mindstorms NXT.

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1 What is NXTway-GS?

NXTway-GS is a self-balancing two-wheeled robot built with LEGO Mindstorms NXT. The figure below is its externals.

NXTway-GS has the following features.

- Balance control by using DC motors and a gyro sensor.
- Autonomous drive or remote control by using analog stick of PC game pad.
- Obstacle avoidance by using ultrasonic sensor.

You can see the NXTway-GS movie at the URL [http://www.youtube.com/watch?v=4ulBRQKCw4](http://www.youtube.com/watch?v=4ulBRQKCw4).
2 Required Products

This chapter describes the required products for building NXTway-GS. Contact LEGO Mindstorms Education distributor in your country for consultation and estimation about the products. The following information is described at the North America LEGO Education site http://www.legoeducation.com/store/.

LEGO Products

- LEGO Mindstorms Education NXT Base Set
  Product ID : W979797
  This is a LEGO Mindstorms NXT base set.

- Education Resource Set
  Product ID : W979648
  This includes large wheels required for NXTway-GS.
  It is not required if you have large wheels included in LEGO Mindstorms RCX Set.

- AC Adaptor
  Product ID : W979833
  This is required for NXT Rechargeable Battery.

- NXT Bluetooth Dongle
  Product ID : W979847
  This is a USB dongle for Bluetooth communication.
  It is required for NXT GamePad utility.
HiTechnic Product

- Hitechnic Gyro Sensor for NXT
  - Product ID: W991380
  - This is a gyroscopic sensor that returns rotation speed.

Other Product

- PC Game Pad with Analog Stick
  - This is required for remote control.
  - You can use a game pad which confirms Windows HID spec.
3 Building Procedure

This chapter describes the building procedure of NXTway-GS.

Step.1  Put an axle to a motor. The figure below is left side motor in the front of NXTway-GS.

Step.2  Make a motor base assembly.
Step.3  Put the motor base assembly to the motor.

Step.4  Make a wheel.
Step.5  Put the wheel to the motor.

Step.6  Make a joint part between the motor and NXT Intelligent Brick.
Assembly of left side motor is completed.

Step.7 Make right side motor in the same way as left one.

Step.8 Put both motor to NXT Intelligent Brick.
Step.9  Connect the left motor to port B and the right one to port C.
Put reinforcement blocks to the motor and the back of NXT Intelligent Brick for keeping rigidity.
Step.10 Make a joint part between an ultrasonic sensor and NXT Intelligent Brick. Put gyro sensor to the ultrasonic sensor assembly.

Step.11 Put the ultrasonic sensor and the gyro sensor to NXT Intelligent Brick. Connect the ultrasonic sensor to port 2 and the gyro sensor to port 4. Put a reinforcement block for suppressing gyro fluctuation.
NXTway-GS Overview