Introduction to TETRIX®

LEGO® Education and Pitsco Education are pleased to bring you this TETRIX® Getting Started Guide.

This resource has been created to:
- Help new users become familiar with the TETRIX Education Base Set and how it can be used to create original robot designs with LEGO MINDSTORMS®.
- Provide an initial four-hour introductory experience, allowing users to build and move a robot with instant success.
- Provide educators with up to 20 hours of standards-based, hands-on activity resources for the classroom.
- Build confidence and generate enthusiasm for the fields of engineering and robotics.

The TETRIX System:
- Uses elements made from heavy-duty, aircraft-grade aluminum to maximize stability and reliability.
- Uses powerful drive motors that drastically increase the capabilities of MINDSTORMS with TETRIX robots.
- Can be combined with LEGO MINDSTORMS and either National Instruments LabVIEW™ for LEGO MINDSTORMS or ROBOTC® to build sophisticated, versatile robots that are able to handle complicated tasks autonomously.
- Offers flexibility in build design and can be expanded using additional materials.
- Gives users the opportunity to master the concepts of wiring, motor control, and much more.
- Fosters creativity and ingenuity amongst students.
- Develops engineering and problem-solving skills.

To learn more about the types of robots that can be created, watch the video, *TETRIX Endless Possibilities*, available on the DVD provided with this guide.

The TETRIX Education Base Set contains essential hardware and tools that allow users to build a robot with just the base set and LEGO MINDSTORMS components.

Additional parts and tools can be added to create bigger or more complicated robots. These can be found at **www.LEGOeducation.com.**
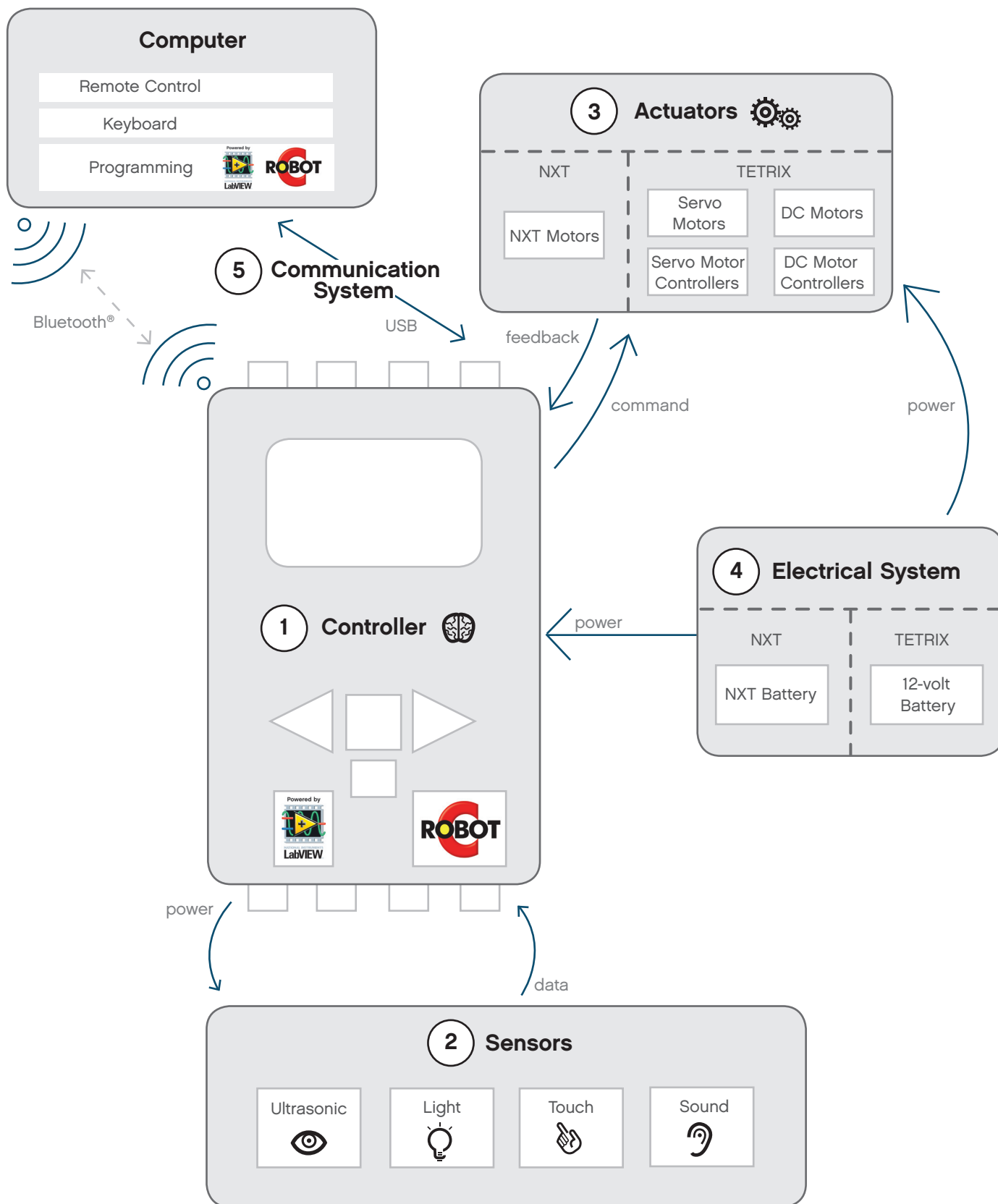
Another resource available to users is **www.TETRIXrobotics.com**. This Web site contains a wealth of knowledge on the TETRIX building system, including sub-builds, technical specifications, classroom project ideas, videos, and more.

The TETRIX Getting Started Guide includes sample build instructions, sample programs, and other support resources, including lesson plans and guidance on how to use LabVIEW for LEGO MINDSTORMS and ROBOTC to get robots up and running quickly.
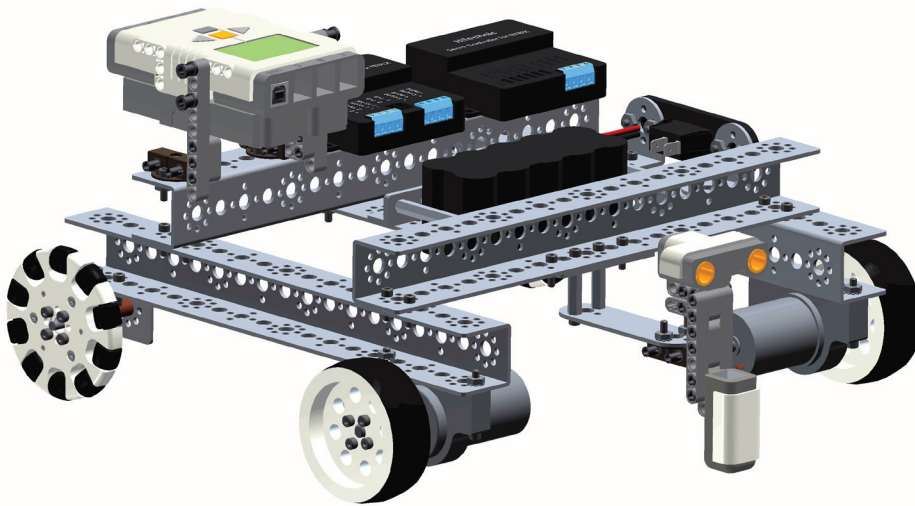
The first time opening the TETRIX Base Set, users will notice a white cardboard box sitting atop additional kit contents. This box contains all of the TETRIX elements necessary to complete Lessons 1-3 in this Getting Started Guide.

The limited number of elements in the box is intended to encourage first-time users to focus on a set of core components without feeling overwhelmed by the hundreds of parts contained in the Base Set. It is suggested that users remove the white box and utilize only its contents and the MINDSTORMS set for the first three lessons. Once users have attained that level of success, they will then be ready to explore the additional set elements.

The Fundamentals of Robotics Using TETRIX® and LEGO® MINDSTORMS®

Computer

Remote Control

Keyboard

Programming

3 Actuators

NXT

NXT Motors

TETRIX

Servo Motors

DC Motors

Servo Motor Controllers

DC Motor Controllers

5 Communication System

Bluetooth®

USB

feedback

command

power

1 Controller

4 Electrical System

NXT

NXT Battery

TETRIX

12-volt Battery

power

power

data

2 Sensors

Ultrasonic

Light

Touch

Sound

The Fundamentals of Robotics using TETRIX® and LEGO® MINDSTORMS®

1. Controller

The controller is the brain of a robot. On TETRIX® robots, the controller is the NXT Brick. The NXT Brick uses these components to think for the robot:

NXT Brick

Powered by

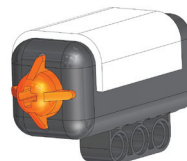**NATIONAL INSTRUMENTS LabVIEW**
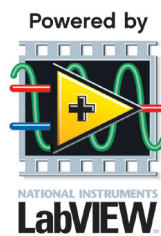
LabVIEW™ for LEGO® MINDSTORMS®

ROBOTC®

2. Sensors

Sensors are used by the controller to make decisions about what to do next. These decisions are based on what is happening around the robot. MINDSTORMS with TETRIX robots use these LEGO sensors:
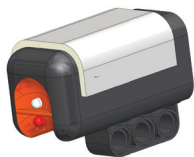
Light Sensor   Ultrasonic Sensor   Touch Sensor   Sound Sensor
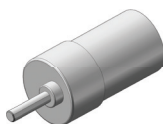
3. Actuators

Actuators allow the robot to move or to move objects in its environment. Actuators in this set include:
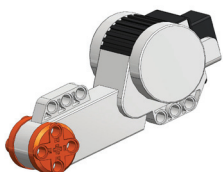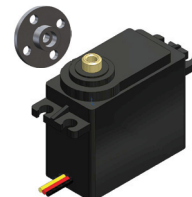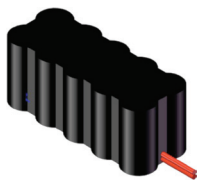

NXT Motors   DC Motor Controller + DC Motors   Servo Controller + 180° Servo Motors with Horn
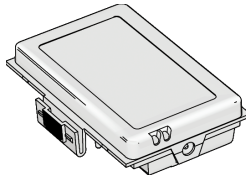
The Fundamentals of Robotics using TETRIX® and LEGO® MINDSTORMS®

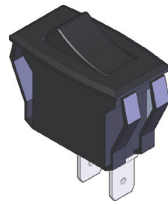### 4. Electrical System

The electrical system provides power to the NXT Brick and the actuators. It includes:

12V Rechargeable Battery Pack   NXT Battery   Power Switch   Fuse   Wires

5. Communication System

The communication system allows the controller to talk with a computer. This allows the computer to program the controller and also allows a keyboard or optional joystick to control the robot. The communication system includes:
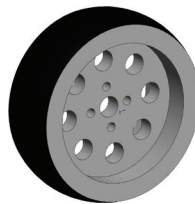

Bluetooth®   USB Cable

6. Building Components

These key components allow the robot to carry out movement and actions, such as driving around and picking up objects.
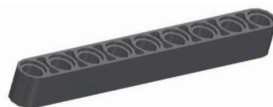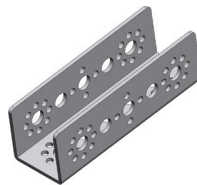
Components include:

Wheels   Omni Wheels
(These can move in any direction.)

Technic Elements from LEGO® MINDSTORMS®
(These plastic elements click together quickly and easily.)

TETRIX® Elements
(These metal elements are stronger and sturdier than plastic elements.)

TETRIX Hard Point Connectors
(These elements allow users to connect TETRIX and LEGO MINDSTORMS elements to create robots with expanded functionality.)