LEGO DIGITAL DESIGNER COURSE

ROBOTS GOT TALENTS CLASSROOM COURSES 2021

COURSE STUDENT ZONE

This is Robots Got Talents Students Zone, here you will find all LDD classroom course topics, activities and explanation guides. We hope you enjoy this course (:

Lesson One	Lesson Two
Lesson Three	Lesson Four
Lesson Five	Topic Selector

LEGO DIGITAL DESIGNER CLASSROOM COURSE

ROBOTS GOT TALENTS™ CLASSROOM COURSES

This Course is created and published by Robots Got Talents, Robots Got Talents is a volunteer-based Educational Platform founded in 2017 aiming to spread Robotics and Coding Knowledge all over the world by creating and publishing online free STEM educational content for Educational institutes and Individuals. In 2020 Robots Got Talents had a total of 523 Classroom Events in 80 countries. Learn More About RGT

THIS COURSE IS AVAILABLE ON:

CLASSROOM ROBOTICS
BY ROBOTS GOT TALENTS

ROBOAPP
ACTIVATING CREATIVITY MODE

ROBOTS GOT TALENTS

COURSE INTRODUCTION:

LEGO DIGITAL DESIGNER [LDD] Course is a free Classroom Course by Robots Got Talents, for elementary and Middle school students. Throughout this course, students will learn the basics of robotics and LEGO modelling, as they understand all the LDD software features and tools, and create different LEGO models and LEGO MINDSTORMS robots. LDD Classroom Course consists of six lessons that covers all the topics mentioned below in addition to 7 LDD exercises.

- The story of LEGO
- LEGO System & LEGO Technic
- LEGO timeline
- Basics of LEGO Digital Designer
- LDD operation modes
- LDD Build Mode
- Brick palette
- Building tools
- Build mode controls
- LDD Keyboard shortcuts
- Importing and Exporting Models
- Grouping

- Introduction to Robotics
- Characteristics of robots
- Components of a robot
- MINDSTORMS Robotics
- LEGO MINDSTORMS EV3 set
- MINDSTORMS EV3 set contents
- Templates
- LDD View Mode
- LDD View Mode tools
- Building Guide mode
- Building Guide mode tools
- Tips and Tricks tutorials

LEGO DIGITAL DESIGNER CLASSROOM COURSE

PLEASE CHECK THAT YOUR DEVICE CONTAIN THE FOLLOWING SOFTWARE/S:

LEGO DIGITAL DESIGNER SOFTWARE

DOWNLOAD

Introduction to LDD
Book page/s: 3-4

Discover the software

LDD build mode
Book page/s: 5

LDD Build mode tools
Book page/s: 6-7

Exercise one

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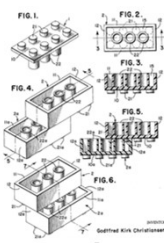

LEGO DIGITAL DESIGNER CLASSROOM COURSE

LEGO System® & LEGO Technic®

All the LEGO pieces found in different sets could be grouped into two categories; LEGO System and LEGO technic. The LEGO system line was first developed in 1955 by Godtfred Kirk Christianse and since then it had many changes and modifications, but the massive update was in 1958, when the LEGO System Pieces changed to the shape that we all know now. Although LEGO did not produce any sets under the name of LEGO System after the 1999, different lines like the LEGO City, LEGO Architecture, LEGO Creator, LEGO Classic and LEGO Ideas uses the original LEGO System bricks.

LEGO DIGITAL DESIGNER CLASSROOM COURSE

Old sets including LEGO System building blocks

New sets including LEGO System building blocks

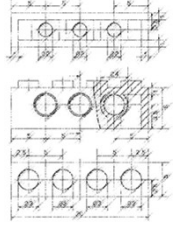_____

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LEGO System® & LEGO Technic®

The LEGO Technic line was developed to introduce more advanced LEGO models with complex technical functions, compared to the simpler LEGO system line. The concept was firstly introduced as the Expert Builder series and originally Technical Sets in 1977, and was renamed Technic in 1982. Technic sets are made up of beams, connecting pegs, cross axels, gears, and plates, some sets also contains electrical parts like motors in the LEGO PowerUp line, or sensors in the LEGO MINDSTORMS line. Some LEGO sets may also include building pieces from both LEGO System and LEGO Technic, like the LEGO Boost Set released in 2017 or the LEGO MINDSTORMS RCX Sets released in 1998 and the Spike Prime Education set.

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Old sets including LEGO Technic building pieces

New sets including LEGO Technic building pieces

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LEGO® DIGITAL DESIGNER

LEGO Digital Designer (LDD) is a freeware computer software produced by the Lego Group as a part of LEGO Design byME project in 2005. It is available for macOS and Windows. The software allows users to build models using virtual Lego bricks, in a computer-aided design like manner. Until January 16, 2012, these could be uploaded, along with instructions and a box design, to the Lego Design byME website, from where the models could be ordered for delivery as a real, packaged set. Users can also take screenshots of their models as .PNGs and store the models on their computer in an.LXF file.

LEGO DIGITAL DESIGNER CLASSROOM COURSE

WELCOME SCREEN:

Each time you open LEGO Digital Designer or start a new model, you will see the Welcome Screen, which includes the following modes:

LEGO DIGITAL DESIGNER [1.1]
Used to build Static LEGO Models using the official LEGO pieces form most basic LEGO Sets.

LEGO MINDSTORMS DESIGNER [1.2]
Used to build LEGO MINDSTORMS Models using pieces from Mindstorms Ev3, Mindstorms NXT, WEDO 2.0, WEDO and Power Functions

LEGO DIGITAL DESIGNER EXTENDED [1.3]
Used to build up LEGO Models using Customizable LEGO Pieces from all the LEGO Sets

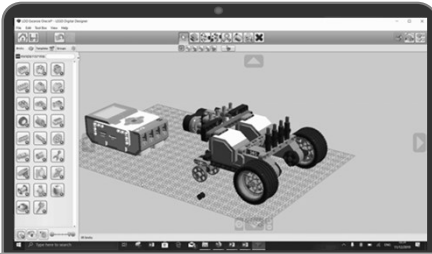LEGO DIGITAL DESIGNER CLASSROOM COURSE

LEGO Digital Designer has three operation modes:

1. Build mode

2. View mode

3. Building guide mode

You can switch between modes by clicking one of the three mode icons . located in the bar at the top of the software window. The operation modes could also be referred to as modes.
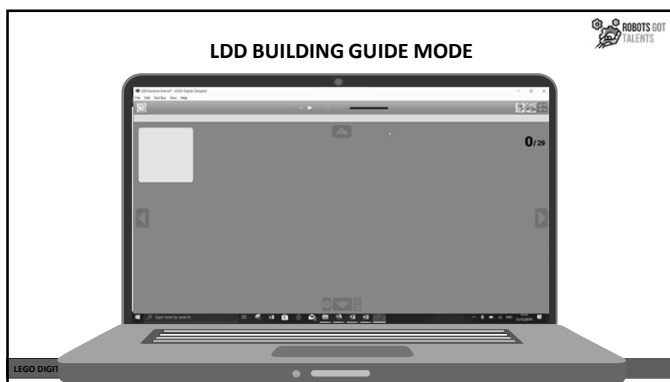
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LDD BUILD MODE

LEGO DIGIT

LDD VIEW MODE

LDD BUILDING GUIDE MODE

DISCOVER THE SOFTWARE

The best way to understand the user interface of any software is to try it by your own, please download this LDD Model, by pressing the button below. Unzip the file, then click on the .lxf file to open it on the LEGO Digital Designer software.

Try moving the pieces, or adding new ones, and check all the tools available in the three modes and try guessing, what it could be used for (:

Download LDD Model

Download LDD

Opening .zip files

LDD BUILD MODE:

In this session we will learn about the Lego Digital Designer Building Mode, The Building Mode is the main mode you need to learn for using the LDD, here is the user interface for the Building Mode.
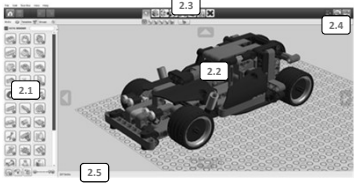
2.1 Brick palette: The Brick palette includes all bricks and pieces from the different LEGO sets.

2.2 Model Building Area: It is the area, where you put bricks together to build up your model.
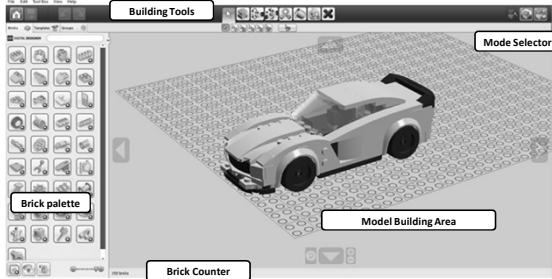
2.3 Building Tools: The Building Tools are tools that will help you build and modify your model.

2.4 Mode Selector: Buttons you will use to select the mode your going to work with

2.5 Brick Counter: The Brick Counter Shows how many pieces are included in the model.

BRICK PALETTE

The Brick palette includes all bricks and pieces from different LEGO sets. Choose and click on the brick you want to use, then drag it your model.

Show group/Hide group: Shows or hides bricks in the group within the palette. Each group includes different types and shapes of bricks.

Filter Bricks by LEGO® sets: Click this icon to choose a LEGO® set. Your brick list will display only the bricks contained in the selected set. It will count down to zero as you use the bricks. If the number of bricks used exceeded the bricks in the set chosen the number would turn to red with a negative sign.

Scale Divider: Resizes the dividers and their contents to better fit your screen resolution.

Find bricks by colour: This will filter the brick list so it only shows bricks of the color or material you have selected.

Search field: Searches for the brick you need by Typing Keywords.

BUILDING TOOLS

The Building Tools are Tools included in the LEGO DIGITAL DESIGNER Build Mode, that will help you in building, customizing your model in LDD , below you can see all the LDD building tools, If you do not know the shape of any tool, you can highlight it to see its name.

SELECTION TOOL
Used to select brick/s in your model

FLEX TOOL
Used to bend and twist flexible elements

CLONE TOOL
Used to duplicate brick/s from the model

PAINT TOOL
Used to change the color or material of bricks in the model

HINGE TOOL
Used rotate bricks that are connected with a hinge or a single stud connection.

HIDE TOOL
Used to hide brick/s in your model

HINGE ALIGN TOOL
Used to automatically connect two separate connection points.

DELETE TOOL
Used to delete brick/s from the model

LDD CONTROLS

Mouse Controls
Left mouse: selects a brick or move it around on the scene if clicked & dragged.
Right mouse: rotates the scene's camera view.
Mouse wheel scroll: Used to zoom in and out in the scene.

Camera Controls
Rotate view: (Num Lock, numbers 8, 2, 4, 6). You can rotate the camera view using either the buttons on the Camera control or your keyboard
Zoom view: (Num Lock, + and keys). Select the + and keys on your keyboard or the + and buttons on the Camera control to zoom in or out.
Reset view: (Num Lock, number 5). Click Reset to return the view point to its standard position, with all bricks and models visible and centered on the scene.
Pan view: (shortcut only) (Shift+right click). Hold down the Shift key and click the right mouse button to pan your model from the left, right, top or bottom.

EXERCISE ONE

Now you have learned almost everything in the LEGO DIGITAL DESIGNER Build mode, and you are ready to build models by your own on LDD. The button Below includes a building instructions sheet, your first exercise is to build the **first three models** in the Building Instructions Sheet 1.

Tips:

• Follow the Building Instructions Sheet

• Use the Building Tools

• The Search field may help you if you can not find a block

• Make sure you are in the LEGO DIGITAL DESIGNER main mode

• Search for a piece in it's group and if it is totally missing you can replace in with a similar one

Download Instructions Sheet 1

EXERCISE 1 (Building Model A)
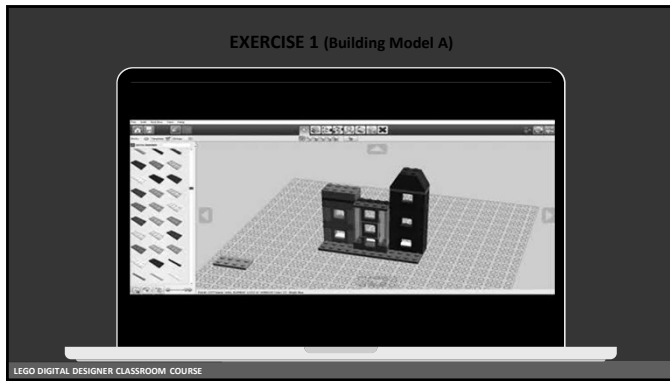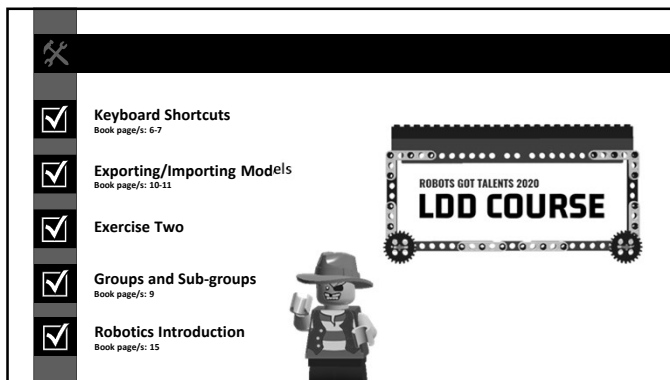
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Keyboard Shortcuts
Book page/s: 6-7

Exporting/Importing Models
Book page/s: 10-11

Exercise Two

Groups and Sub-groups
Book page/s: 9

Robotics Introduction
Book page/s: 15

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KEYBOARD SHORTCUTS

TASK	WINDOWS OS	MAC OS
Rotate view left	4 Key (NumLock: ON)	4 Key (NumLock: ON)
Rotate view right	6 Key (NumLock: ON)	6 Key (NumLock: ON)
Rotate view up	8 Key (NumLock: ON)	8 Key (NumLock: ON)
Rotate view down	2 Key (NumLock: ON)	2 Key (NumLock: ON)
Reset view	5 Key (NumLock: ON)	5 Key (NumLock: ON)
Hinge tool	HKey	HKey
Hinge Align tool	Shft+H	Shft+H
Clone tool	CKey	CKey
Paint tool	BKey	BKey
Hide tool	LKey	LKey
Delete tool	DKey	DKey

LEGO DIGITAL DESIGNER CLASSROOM COURSE

KEYBOARD SHORTCUTS

TASK	WINDOWS OS	MAC OS
Group	Ctrl+G	Cmd+G
Create a template	Ctrl+Alt+G	Cmd+Alt+G
Open	Ctrl+O	Cmd+O
Save	Ctrl+S	Cmd+S
Print	Ctrl+P	Cmd+P
Undo	Ctrl+Z	Cmd+Z
Redo	Shft+Ctrl+Z	Shft+Cmd+Z
Upload to Gallery	Shft+Ctrl+B	Shft+Cmd+B

EXPORTING & IMPORTING MODELS

The LEGO DIGITAL DESIGNER allow users to import and export models, that means that you can import any LEGO Model to your Software, or output your own model from the LDD in different formats.

To Import a model to LDD you should follow these steps:

1. Press File, then choose Import Model or press Ctrl + L
2. Choose the folder containing the file
3. Type in the file Name or Select it
4. Press Open

To Export a model you should follow these steps:

1. Press File, then choose Export Model or press Ctrl + E
2. Choose the folder you want to export your project in
3. Type in the file Name
4. Press Save

File Edit Tool Box View Help

New (Ctrl+N)
Open (Ctrl+O)

Import model (Ctrl+I)
Export model (Ctrl+E)

Save (Ctrl+S)
Save As... (Ctrl+Shift+S)

Print (Ctrl+P)
Export BOM (Ctrl+B)

Exit (Ctrl+Q)

EXERCISE TWO

After you have learned the LDD shortcuts, Building LEGO Models would be much easier, Now please build the models included in this Instructions sheet, you need to build each model separately and export it in a folder named LDD Exercise two, also after finishing this task you need to import the model in the button named Model 4.

Tips:

- Follow the Building Instructions Sheet
- Use the Building Tools and Shortcuts
- The Search field may help you if you can not find a block
- Make sure you are in the LEGO DIGITAL DESIGNER main mode
- Search for a piece in it's group and if it is totally missing you can replace in with a similar one

Download Instructions Sheet 2

Model 4

GROUPING:

In the left side of the Build Mode, you will find the Grouping palette, Use groups to save a selection of bricks for later use. Groups make it easy for you to access groups of bricks that you often need to select, such as car wheels, or rooftops.

Create group (Ctrl+G/Cmd+G)
To create a group, first select the bricks you want to group, and then click the press the Group button or use the shortcut.

Add to group
Use this function to add selected brick/s to an existing group, first select the group you want to edit then press Add to group button and select the pieces you want to add.

Remove from group
Use this function to remove selected brick/s from an existing group, first select the group you want to edit then press Remove from group button and select the pieces you want to remove.

Create Sub-Group
Use this function to link one or more group under a main group, First Select the main group then press the Sub-Group button and markup the pieces you want to add to the subgroup.
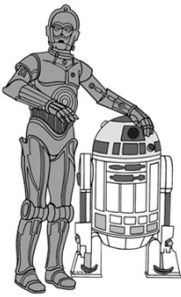
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HOW TO TAKE A SCREENSHOT IN LDD?

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WHAT IS THE FIRST THING THAT COMES TO YOUR MIND WHEN YOU THINK OF A ROBOT?

For many people, it is a machine that imitates human begins or has superpowers like the androids in Star Wars or the Terminator. However most of these robots which capture our imagination, only inhabit Science Fiction Movies, and it is impossible to find them wandering in the streets anytime soon, although many organizations from all over the world are working on creating similar humanoid robots like Honda's Asimo, Pepper by Softbank, and Atlas by Boston Dynamics, but, of course, no one has reached the level of Awesomeness we see in SCI-FI Movies or read about in novels, yet. The types of robots that you will encounter most frequently are robots that are developed for doing tasks that are too dangerous, boring, onerous, or repetitive. Let's take for example the robots that work in factories (Industrial Robots), some of these robots were designed for lifting heavy objects, while others were developed for doing operations that need a very high accuracy level, in that case, although these two robots work in the same application/use, each one comes up with a certain design, shape and size. It is very important to understand that robots have unlimited applications and uses, from Space Exploration to Entertainment.

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A ROBOT HAS THESE ESSENTIAL CHARACTERISTICS:

You might now be asking what is the standard definition for a robot? or how could I define the word robot? Although we have been dealing with robots for decades, there is no standard definition for the word robot. However, there are some essential characteristics that a robot must-have, which would help you decide whether a certain machine is a robot or not and It will also help you decide what features or parts does a machine needs to be counted as a robot.

Sensing: A robot must be able to sense its surroundings using one or many methods, this is done using electronic devices names sensors

Movement: A robot must be able to move in its environment, either moving all its parts or moving any of them, of course mechanical movements could be done using different types of motors.

Energy: A robot must also be able to power itself, which could be done using a new power source, wired or wireless power source

Intelligence: A robot must be able to take decisions and do tasks correctly according to its code/program, this is done using the Microcontroller, which is considered the brain of the robot.

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MAIN COMPONENTS OF A ROBOT:

6V Rechargeable Battery

Power source: In order to function a robot must have power. For example human beings get their energy from food, the food is broken down and converted into energy by our cells. Most robots get their energy from electricity. Stationary robotic arms like the ones that work in car factories can be plugged in like any other appliance. Robots that move around are usually powered by batteries. Our robotic space probes and satellites are often designed to collect solar power.

Microcontroller: The Microcontroller is the main part of the robot which coordinates all motion of the mechanical system by delivering power from the power source to the motors according to the program/code, The Microcontroller also receives and uses inputs from the environment through the sensors.

ATMEGA328 Microcontroller

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MAIN COMPONENTS OF A ROBOT:

Ultrasonic Sensor

Sensors: A sensor is a device, module, machine, or subsystem whose purpose is to detect events or changes in its environment and send the information to the Microcontroller, giving your robot sensors as light sensors (eyes), touch, pressure and force sensors (hands), chemical sensors (nose), hearing and sonar sensors (ears), and taste sensors (tongue) will give the robot awareness of its environment.

Motors: Robot bodies consist of metal, plastic and similar materials. Inside these bodies are small motors, which mimic the action of human muscle to move parts of the robot's body. The simplest robots consist of an arm with a tool attached for a particular task. Robot vehicles need to move around on wheels or treads. Humanoid robots have arms and legs that mimic human movement. There are many types of motor each has its own use.

12V DC Motor

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SENSING   **INTELLIGENCE**   **MOVEMENT**   **POWER**

Ultrasonic Sensor   ATMEGA328 Microcontroller   12V DC Motor   6V Rechargeable Battery

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MINDSTORMS ROBOTICS:

The LEGO®MINDSTORMS® robots may not be a type of robots that will go buy the breakfast every day or take care of your grandfather, but it could teach many things that will help you in your life from computational thinking to building LEGO® models. Since the creation of the MINDSTORMS Platform in 1998, Each version of the system includes an intelligent brick: A computer that controls the system or in other words a microcontroller, a set of modular sensors and motors, and LEGO® parts from the Technic line.

History of MINDSTORMS: There have been four generations of the MINDSTORMS® platform: the original Robotics Invention System (RCX), NXT, EV3, and finally the New MINDSTORMS Robot Inventor 51515 that will be published in 2020-2021. With each platform release, the motor and sensor capabilities expanded. The latest available system, LEGO®MINDSTORMS® EV3, was released on September 1, 2013. Since MINDSTORMS NXT, LEGO usually creates two versions of each new MINDSTORMS platform, the Retail Edition and the Educational Edition.
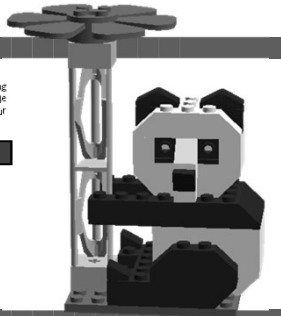
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☑   **Exercise Three**

☑   **LEGO MINDSTORMS EV3**
Book page/s: 15-16

☑   **Main MINDSTORMS Parts**
Book page/s: 17

☑   **MINDSTORMS Building Pieces**
Book page/s: 18-19

☑   **Exercise Four**

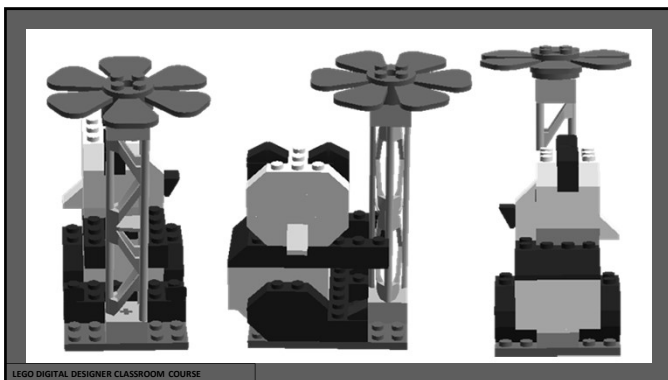ROBOTS GOT TALENTS 2020
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EXERCISE THREE

Try Building this model using the LDD Basic mode without following any building instruction, then you can download the original .lxf file using the button below and compare both designs, to understand your mistakes. More images are available in the next pages.

Download Model

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LEGO MINDSTORMS EV3

LEGO® MINDSTORMS® EV3 is the third generation robotics kit in LEGO®'s MINDSTORMS® line. It is the successor to the second generation LEGO® MINDSTORMS® NXT 2.0 kit. The "EV" designation refers to the "evolution" of the MINDSTORMS® product line. "3" refers to the fact that it is the third generation of the MINDSTORMS® series. It was officially announced on January 4, 2013, and was released in stores on September 1, 2013. The education edition was released on August 1, 2013. The LEGO®MINDSTORMS® EV3 Education set consists of 1X Smart Brick, 2X Large Motors, 1X Medium Motor, 1X color sensor, 1X ultrasonic sensor, 2X touch sensor, 1X Gyro Sensor and 540+ LEGO® technic pieces.

The LEGO®MINDSTORMS® EV3 has the 4 main characteristics of robots mentioned before, so you can guess that motors are responsible for movement, sensors are responsible for sensing, batteries are responsible for power and the Smart Brick is responsible for Intelligence.

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LEGO MINDSTORMS EV3 Main Pieces

Intelligence	Sensing	Movement	Power
LEGO®MINDSTORMS® EV3 Smart Brick	MINDSTORMS® EV3 Touch Sensor	MINDSTORMS® EV3 Motors	MINDSTORMS® EV3 Battery

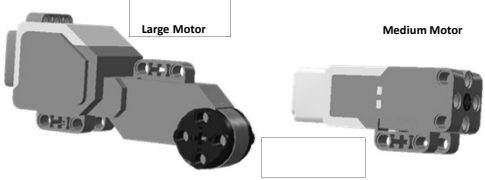LEGO DIGITAL DESIGNER CLASSROOM COURSE

THE EV3 BRICK:

The main component in the set is a brick-shaped microcontroller called the EV3 Smart Brick. It can read inputs from up to four sensors and control up to four motors. Motors (Outputs) are plugged in letters (A, B, C, D) and sensors (Inputs) are plugged in numbers (1,2,3,4) via a modified version of RJ12 cables. Moreover, the brick features an illuminated six-button interface that changes color to indicate the brick's active state, a high-resolution black and white display, built-in speaker, USB port, a mini SD card reader. The EV3 brick also supports Bluetooth and Wi-Fi communication with other devices and has a programming interface that enables programming and data logging directly from the brick.

Bottom View   **Top View**   **Side Views**

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EV3 MOTORS:

The MINDSTORMS® EV3 set includes two large motors and a medium motor, but you can add an additional motor in the empty port as the brick has four output ports (A, B, C, D). A motor is an electrical machine that converts electrical energy distributed by the battery in the Brick into mechanical energy, also the MINDSTORMS Motor includes an encoder, which determines the degrees turned by the motor, and that is the main reason we cannot refer to the EV3 motors as Outputs, as they do also send an input to the Brick.

Large Motor

Medium Motor

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MINDSTORMS EV3 SENSORS:

ULTRASONIC SENSOR

The EV3 Ultrasonic Sensor measures distance in centimetres and inches. It is able to measure distances from 0 to 255 centimetres with a precision of +/- 1 cm. The Ultrasonic Sensor generates sound waves and reads their echoes to detect and measure the distance from objects. Using the same scientific principle as bats: it measures distance by calculating the time it takes for a sound wave to hit an object and return – just like an echo.

IR REMOTE & BEACON

The digital EV3 Infrared Seeking Sensor detects proximity to the robot and reads signals emitted by the EV3 Infrared Beacon. Students can create remotely-controlled robots, navigate obstacle courses and learn how infrared technology is used in TV remotes, surveillance systems and even in target acquisition equipment. Cables sold separately: Proximity measurement of approximately 50-70 cm, Working distance from the beacon of up to two meters. Note: The IR Remote and Beacon are only available in the EV3 Home Edition set.

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COLOUR SENSOR

The digital EV3 color Sensor distinguishes between seven different colors and can also detect the absence of color. It also serves as a light sensor by detecting light intensities. To detect the color the Sensor activates a built-in light source to illuminate the material surface, a surface whose color has to be detected and the receivers which can measure the reflected wavelengths.

GYRO SENSOR

The EV3 Gyro Sensor detects rotational motion indicated by the arrows on the top of the sensor. The digital EV3 Gyro Sensor measures the robot's angular velocity (degrees/second), how fast does a change in angle occur using, which is then calculated using a certain formula to give the final sensor turning value in degrees.

TOUCH SENSOR

The EV3 Touch sensor gives the robot the ability to detect touch, when it is being pressed or released. The Touch sensor uses a circuit to detect whether the button or the orange part is pressed. When the button is pressed it completes the circuit and when the circuit is broken the sensor is in its default state and position (released).

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EV3 BUILDING PIECES:

BEAMS: Beams are used to hold cross-axles and other LEGO® components together, so they are the framework of most TECHNIC and MINDSTORMS® models. There are 2 main types of beam: Straight and Angular. Straight beams are usually found only with circular holes in them while angular beams have a mixture of circular and cross-shaped holes, normally with the cross-shaped ones at either end. The straight beams come in sizes from 2 to 15M. These two groups can then be condensed down again into half-beams, beams and bricks.

CONNECTOR PEGS: Connector pegs are used to hold many LEGO® TECHNIC constructions together. There are 3 types of connector pegs:
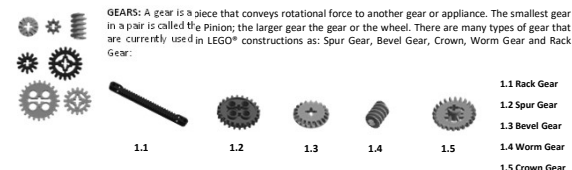• Round Pegs
• Cross-shaped Pegs
• Half-half Pegs

The round pegs can be used to connect beams together so that they can both swing freely. The second cross-shaped peg can be used to hold two beams together so that they cannot move, and the last peg can be used to connect a free-spinning beam to a fixed beam. There are also longer versions of the round pegs that can be used to connect multiple beams together. A longer version of the cross-shaped peg is an axle. Some pegs might also be different colours. The black and blue connectors are friction connector pegs, while the other pegs are smooth.

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CROSS AXLES: Cross-Axles are cross-shaped rods that can be used to hold wheels, gears beams etc. They are colour coded by their length or you can measure it using a counting the holes of a beam the same size, even numbered lengths (2M,4M,6M etc) are black while odd numbered lengths (3M,5M,7M etc) are grey. You can place a cross-axle through a circular hole so it can spin freely. This is a handy connection for building with gears and wheels.

GEARS: A gear is a piece that conveys rotational force to another gear or appliance. The smallest gear in a pair is called the Pinion; the larger gear the gear or the wheel. There are many types of gear that are currently used in LEGO® constructions as: Spur Gear, Bevel Gear, Crown, Worm Gear and Rack Gear:

| 1.1 | 1.2 | 1.3 | 1.4 | 1.5 |

1.1 Rack Gear
1.2 Spur Gear
1.3 Bevel Gear
1.4 Worm Gear
1.5 Crown Gear

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PIECES LIST:

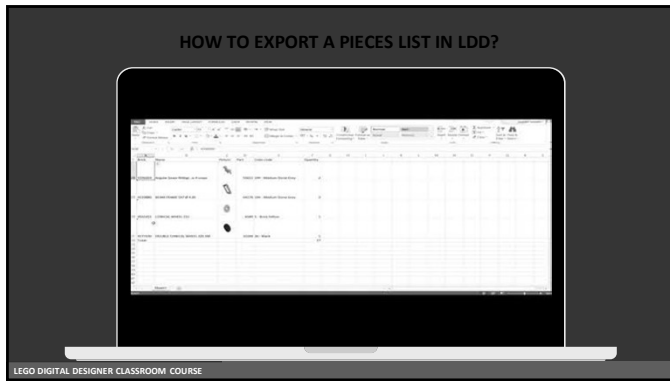MINDSTORMS EV3 Home Edition Set

MINDSTORMS EV3 Education Edition Set

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HOW TO EXPORT A PIECES LIST IN LDD?

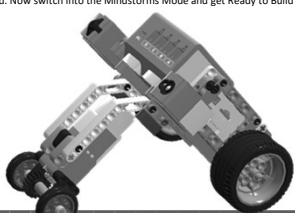LEGO DIGITAL DESIGNER CLASSROOM COURSE

EXERCISE FOUR

Now It is time to try building a MINDSTORMS EV3 Model on LDD yourself, Make sure you remember the MINDSTORMS technic pieces names, so you can search for them if you need. Now switch into the Mindstorms Mode and get Ready to Build your first robot, Follow the Instructions Sheet 3.

Tips:

• Follow the Building Instructions Sheet
• Use the Building Tools and Shortcuts
• The Search field may help you if you can not find a block
• Make sure you are in the LEGO DIGITAL DESIGNER MINDSTORMS Mode

Download Instructions Sheet 3

☑ **Templates**
Book page/s: 10

☑ **Exercise Five**

☑ **LDD View Mode UI**
Book page/s: 12

☑ **View Mode Tools**
Book page/s: 12-13

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LDD COURSE

TEMPLATES

Templates are the last topic we need to cover in the LDD Build Mode. Templates are used to permanently save a group of Bricks, It's similar to grouping, but templates are saved permanently to all the models in the chosen mode, while groups are only saved in the model you are working on, for example if you are working in the Mindstorms mode and saved a template for a part of your robot, you can use this model in any model in the Mindstorms Mode, On the other hand if you have saved this part as a group, you can only access it from the model you are saved it on.

Save to Template
Used to Save the bricks selected as a template. To add a new template, select a bricks you want to save then press the Save template button.

Template Preview
Used to view the content of the saved template, each template would have it's own template preview. To delete a Template press the delete button on the Preview
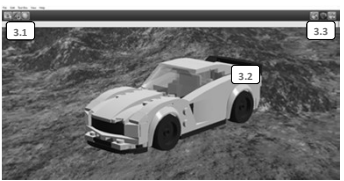
EXERCISE FIVE

In this Exercise you need to built another MINDSTORMS EV3 Robot, which features multiple motors and much more pieces, It might seem a bit harder than the one you built in the previous session, but just follow the Building Instructions sheet and revise the pieces names (:

Download Instructions Sheet 4

LDD VIEW MODE:

The LDD View Mode, is the mode where you can see your model and save its screenshots. This Mode is much easier than the Build mode as it do only include few features and tools.

3.1 View Mode Tools:
It includes all the tools available for the view mode

3.2 Model View Area:
It is the area, where you can see your model, rotate it, zoom in or out

3.3 Mode Selector:
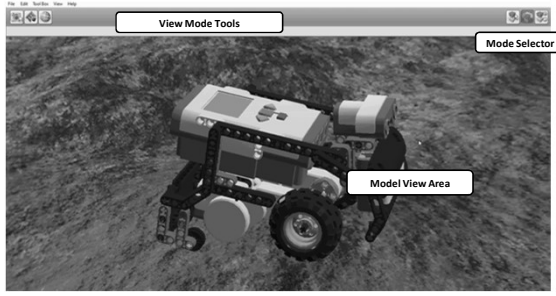Buttons you will use to select the mode your going to work with

VIEW MODE TOOLS

Like the Build Mode, the View Mode also includes some tools, that allows you to do few things with your robot while viewing it, In addition to the Mode Selector there are 3 tools in the View Mode toolbar.

Screenshot:
This Button is used to take a screenshot of your model and save it in your computer, but screenshots in the View Mode are different from screenshots taken using the shortcut Ctrl+K in the Build Mode, as those screenshots include the background and not transparent (.png) as screenshots taken from the Build Mode.

Explode Model:
This Button is used to Explode your model, so you can see all the pieces you have used to build your model.

Change Background:
This Button is used to change the background for your model, there are 4 backgrounds available, which represents 4 different environments Sand, Forest, Sea and Space

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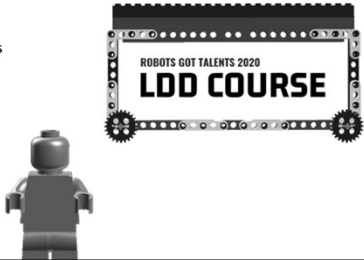LEGO DIGITAL DESIGNER CLASSROOM COURSE

HOW TO SAVE LDD MODELS IN LDRAW FORMAT?

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- ☑ **Building Guide Mode UI**
  Book page/s: 14
- ☑ **Building Guide Mode Tools**
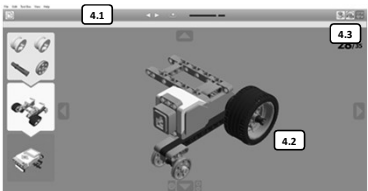 Book page/s: 14
- ☑ **Exercise Six**

BUILDING GUIDE MODE:

The LDD Building Guide Mode, present all the Steps you have done building your model as 3 to 4 bricks per page, also you can save your Building Guide as an HTML and PDF Building Instructions.

4.1 Building Guide Mode Tools:
It includes all the tools available for the Building Guide Mode.

4.2 Building Guide:
It's the area, where you can view all the steps you have done to build your model.

4.3 Mode Selector:
Buttons you will use to select the mode want use.

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Building Guide Mode Tools
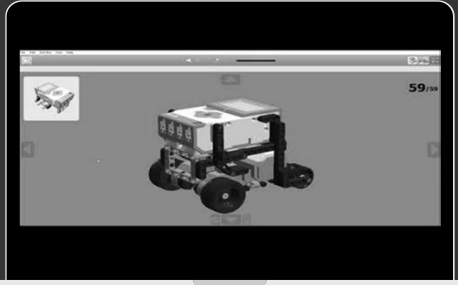
Mode Selector

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Building Guide

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BUILDING GUIDE TOOLS:

There are only 3 Tools available for the Building Guide, Which are the HTML Convertor, Previous/Next Arrows and Repeat Step. Here are the function of each tool.

HTML Convertor:
Turns the Building Guide into a HTML Webpage, so you can print, publish or Share your Model's Building Instructions

Previous and Next Arrows:
Used to move between steps, the Right Arrow moves to the next step, while the Left Arrow turns to the previous step.

Repeat Step:
Repeats the Step again, you can also press the space button for the same function

HOW TO CREATE PDF BUILDING INSTRUCTIONS ON LDD?

59/59
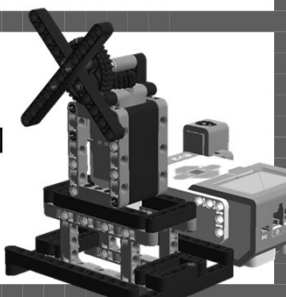
## EXERCISE SIX

Try Building this model using the LDD MINDSTORMS mode/theme without following any building instruction, then you can download the original .lxf file using the button below and compare both designs, to understand your mistakes. More images are available in the next pages.

Download Model

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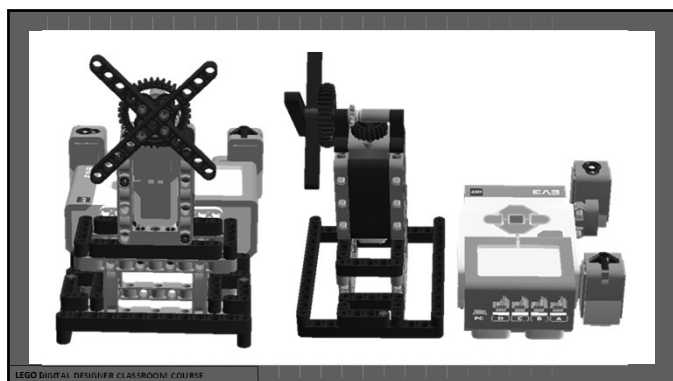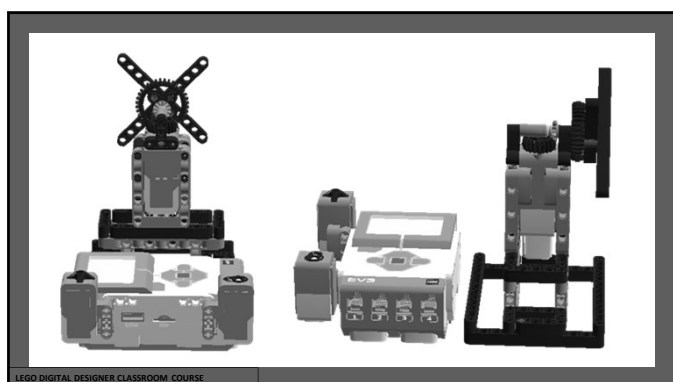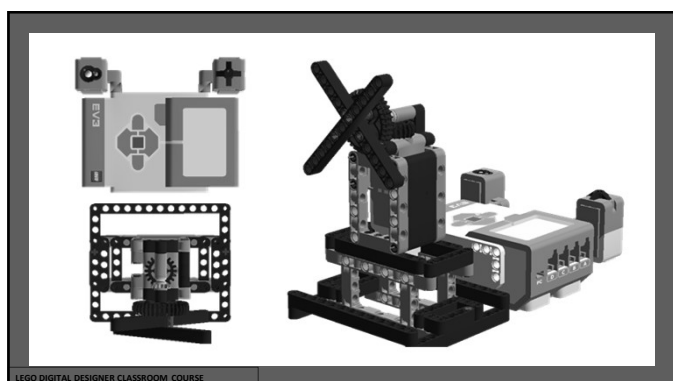
THANK YOU

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