

## INDUSTRY 4.0 in EDUCATION



# INDUSTRY

# 4.0



## in EDUCATION

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 Dobot Catalogue

1.0 Industry 4.0 Movement .....	01
2.0 DOBOT Introduction .....	02
3.1 DOBOT Product / DOBOT Magician .....	03
3.2 DOBOT Product / DOBOT MOOZ .....	05
3.3 DOBOT Product / Solutions for STEAM & Industry 4.0 Education .....	07
4.1 DOBOT x Industry 4.0 / Volkswagen Production Line .....	09
4.2 DOBOT x Industry 4.0 / Industrial Application .....	10
5.1 Training in Action/in Education .....	11
5.2 Training in Action/Industry 4.0 Training Topics .....	12
6.0 Case References .....	13
- University, Secondary, Primary	
7.0 Future Lifestyle .....	17





## Industry 4.0 Movement

**"Industry 4.0 is the movement given to the gradual process of combining traditional manufacturing and industrial practices with the progressively technological world."**

The beginning of industrial revolution has transformed mankind. The first industrial revolution begins in the 19th Century which turns farming to factory production, the second revolution introduced steel, electrification and mass production; and the third industrial revolution changes analogue, mechanical, and electronic technology to computing technology.

### Coming to the fourth revolution of industry, how will this movement impact human beings?

Industry 4.0 is the movement towards digitisation. Industry 4.0 will use the Internet of Things (IoT) and cyber-physical systems to collect data for manufacturing and production. Factories will be more automated and self-monitored as the machines analyse and communicate among each other. Self-optimisation, self-configuration and artificial intelligence for completing complex tasks will be executed to deliver vastly superior cost efficiencies and better quality goods or services. Further, with the effective machine-human communication, more tasks will be handle by machine, making available workers for other human essential tasks.

### DOBOT and Industry 4.0

When the globe is shifting rapidly and the communication between human and machine has its growing importance, Dobot is here to open an intelligent era, to bridge the gap between mankind and steels. This is why, in DOBOT, we believe in the communication between robots and human.



### We focus on our product, and the human interaction with robot.

On one hand, DOBOT focuses on our product. We know the easier one can operate a robot, the more likely the robot will be accepted. DOBOT makes industrial robotic arms intelligent and user friendly, bringing machines closer to life for everyone to experience the convenience and the value of producing and creating using robots.

On the other hand, DOBOT focuses on the human element. When the technology is advancing every minute in this digital and technological age, we believe it is essential to equip the young generation for the upcoming challenges. Advocating digital technology in K12 and bringing various Industry 4.0 learning solutions into the education sector, DOBOT aims to penetrating every learning space and shining new light in STEM education.





DOBOT Product / DOBOT Magician

International awards winner

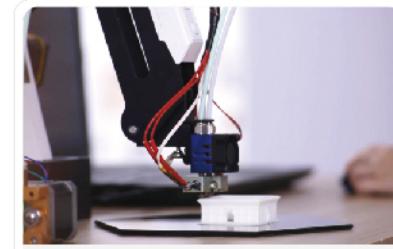


## DOBOT MAGICIAN

Precise and Intelligent Industrial-grade Practical Training Robot for Education



DOBOT Product / DOBOT Magician



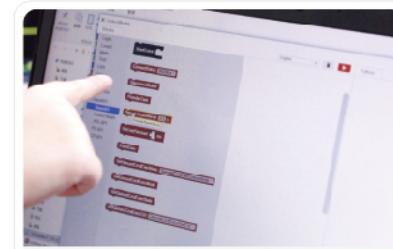
3D Printing



Laser Engraving



Writing & Drawing



Graphical Programming



Picking & Placing



Extensible Interfaces

DOBOT Magician is a multifunctional desktop robotic arm for practical training education. Installed with different end-tools, DOBOT Magician can realize interesting functions such as 3D printing, laser engraving, writing and drawing. It supports secondary development by 13 extensible interfaces and over 20 programming languages, which really makes your creativity and imagination increase without any limitation.

As the good performance both in hardware design and software application, DOBOT Magician has won the CES 2018 Innovation Award, Red Dot Design Award 2018 and iF Design Award 2018.



### 3.3 DOBOT Product / Solutions for STEAM & Industry 4.0 Education

DOBOT Magician has many ready applications available by its family products, and there will be more. They can be applied to educational topics like Industry 4.0, intelligent manufacturing, intelligent logistics, artificial intelligence, big data, etc.

#### DOBOT Magician - Basic Plan



Provides basic functions of a robot arm to experience

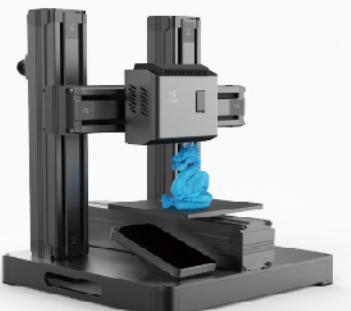


#### DOBOT Magician - Education Plan



Includes all functions of Basic Plan and advanced functions : laser, Bluetooth connection, wifi connection, Joystick control.

#### DOBOT MOOZ



Multi-functional 3D printer with 3D printing, laser engraving and CNC.



#### DOBOT Magician - Conveyer Belt Kit

##### Intelligent Logistics

Build an intelligent mini-production-line with DOBOT Magician, color sorting and sensor functions included.



#### DOBOT Magician - Linear Rail Kit

##### Intelligent Manufacturing

Largely extends the working range of DOBOT Magician, ready software function integrated.



#### DOBOT Magician - Visual Kit

##### Artificial Intelligence

Allows you to build a real Visual sorting system with DOBOT Magician. A developer library included to help you build more visual applications with DOBOT.



DOBOT Product / DOBOT MOOZ

International awards winner



## DOBOT MOOZ

Industrial Grade Transformable Metallic Fast-Protoype 3D Printer



MOOZ-1

### MOOZ with Singular Vertical Axis

Simple and cost-effective, support 3D Printing, CNC carving and laser engraving.



MOOZ-2

### MOOZ with Double Vertical Axis

More stable and precise, also support 3D printing, CNC carving and laser engraving.



MOOZ-3

### The Delta Printing Mode

Special for mix-color printing and extremely efficient.



Laser Engraving Head



3D Printing Head



CNC Carving Head



DOBOT MOOZ, the industrial grade transformable metallic 3D printer, which takes all-in-one design with interchangeable heads for 3D printing, laser engraving and CNC carving. The industrial grade linear guideway, stepper motor and CNC-machined body keeps MOOZ stable and precise. Open-source on firmware, quick assembly, protective case, easy-to-use controller, and intuitive guide make MOOZ suitable for beginners, makers and educators.

DOBOT MOOZ has won the iF Design Award 2018 and Red Dot Design Award 2018 for the innovative design and multiple functions. Creating your vivid life with MOOZ from now on!

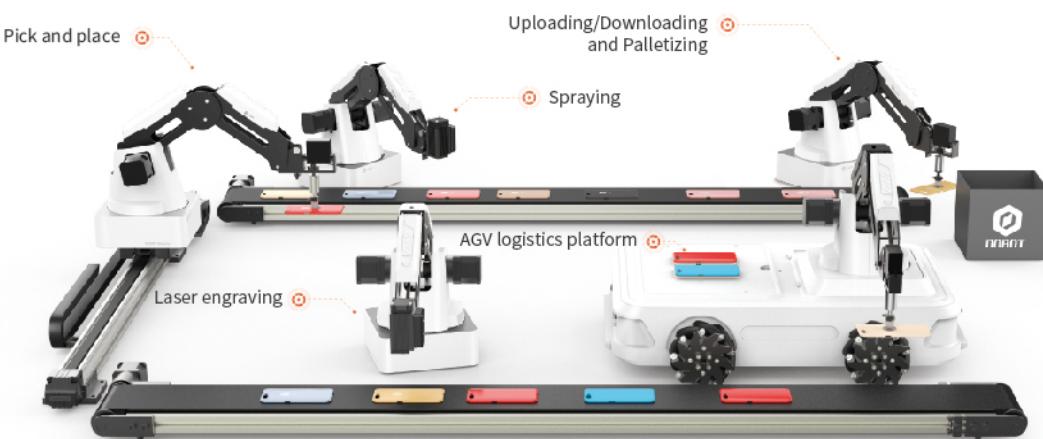


#### 4.1 DOBOT x Industry 4.0 / Volkswagen Production Line

### Volkswagen Production Line with Dobot



DOBOT MAGICIAN EDUCATIONAL  
PRODUCTION LINE IN VOLKSWAGEN  
GERMANY.



#### DOBOT x Industry 4.0 / Industrial Application

This is the whole product line for cellphone case displayed with 5 x Dobot Magician – Educational Plan plus 2 x Conveyor Belt Kit plus 1 x Sliding Rail Kit plus 1 x AGV Logistics Platform. From picking and placing to uploading/downloading and palletizing to second operation with laser engraving.



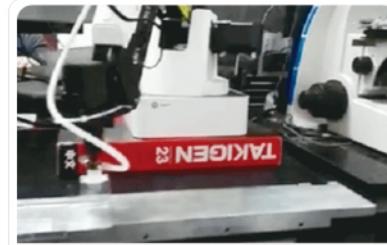
#### 4.2 DOBOT x Industry 4.0 / Industrial Application

### Industrial Application

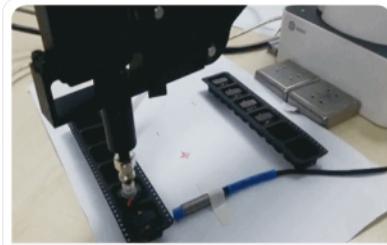
With high accuracy and stability, DOBOT Magician also applies many light industrial applications.



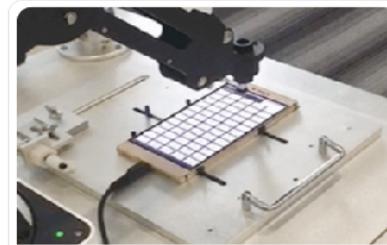
Gold and Jewelry Weighing  
and Sorting



Glass Slides Uploading and  
Downloading (Microscope Assisted)



Chip Sorting and Testing



Phone Screen and Button Testing



Intelligent Filling System



Robot Spraying



## Training in Action / in Education

### MADE FOR ROBOT-RELATED TRAINING IN EDUCATION SECTOR WITH BREAKTHROUGH LOW COST

**High Standard** — DOBOT Magician applies to major international standards like CE, RoHS, ERP, FCC, KC, PSE, TELEC, etc.

**Multi-Robot Collaboration** — You can control several DOBOT Magician by the same device only, which allows Multi-Robot Collaboration.

**Cost-Effective** — With a fair and reasonable price, DOBOT Magician has 0.2mm repeatability which can simulate almost all real factory robot applications.

**Training Curriculum** — Multiple applications and training curriculum available. An open platform for robot education like Industrial 4.0, Automation, PLC, etc.

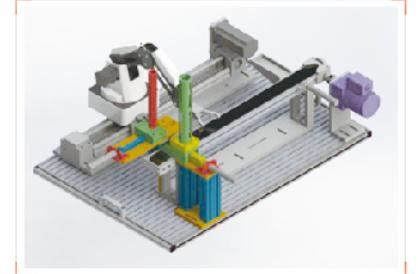
**Free Combination** — DOBOT Magician is compatible with multiple accessories such as linear rail kit, conveyor belt kit, visual kit, and crawler robot to apply different training projects.

**Secondary Development** — DOBOT Magician is compatible to develop user applications with its 13 I/O ports, API, released protocols. It can be developed with over 20 programming languages, ROS, PLC, Microcontroller and Arduino.

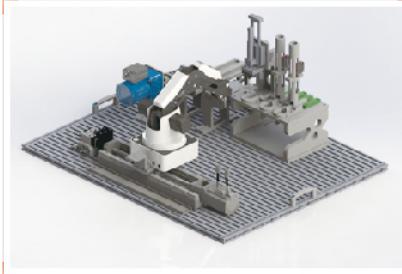
**Hands-on Experience for Everyone** — DOBOT Magician is low cost, small size, and easy operation, which allows every student to practice on their own. It improves the teaching efficiency dramatically. It can be controlled by Programming, APP, Bluetooth, WiFi, Mouse, Joystick, and more.



Automatic Production Training



Motion Follow Control System Training



Automated Assembly Line Training



## Training in Action / Industry 4.0 Training Topics

### APPLICABLE TRAINING TOPICS

#### Entry

##### Basic Programming:

C, C++, JAVA, Python, Blockly, Coding with Arduino, Coding with Scratch

##### Understanding of Industrial Robots:

Manipulator pose, kinematics and control

Understanding on active and passive sensing and feedback control techniques

Engineering and Robot Safety

##### Intermediate programming:

Major programming languages, labview, matlab

Electronic and Electrical Measurement Control

Mechanical Design Control

Embedded System Control

CIM(Computer Integrated Manufacturing)

Secondary Development

Engineering and Robot

Robot Maintenance And Repair

Production Line Simulation

##### Robotic Visual System

Aluminum Frame Type, Metal Processing

##### Multiple application building

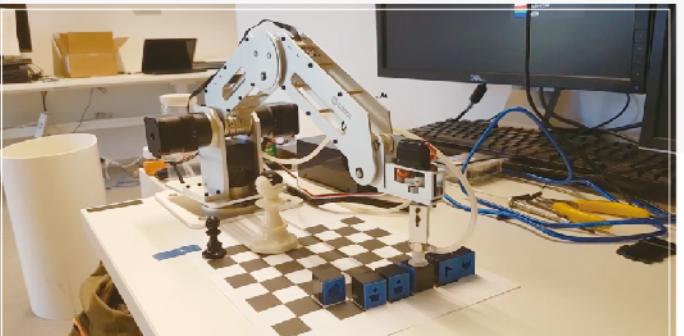
Robotic Competition

#### Basic

#### Advanced



DOBOT is devoted to improve education by bringing “real” robot applications into classrooms. With many successful cases with top colleges all over the world, we are ready to help more.



### UNIVERSITY OF TECHNOLOGY SYDNEY

**Name:** DOBOT Magician used in multiple teaching subjects as demonstration and students assignments

**Time:** February 2018

**College Major:** Mechanical and Mechatronics Engineering major, Centre for Autonomous Systems, Mechatronics & Intelligent Systems Group FEIT

#### Summary :

Introduction to industrial robotics and the underlying algorithms and mathematics, theoretical and practical understanding on active and passive sensing and feedback control techniques, ability to select and evaluate sensors, process the sensor data, and apply computer-based tools for practical control system design using the sensory information.



### VOLKSWAGEN WITH DOBOT



**Name:** Volkswagen plant simulation and learning factory

**Time:** September 2017

**College Major:** Industry 4.0, Volkswagen Academy

#### Summary :

Volkswagen has made a full production line simulating the real car assembly line, assembling a model bus. In each station, there is detailed screen demonstrating the real situation. DOBOT Magician works perfectly in the line. Videos available on Youtube.

- DOBOT Magician is integrated with the PLC system.
- DOBOT Magician works in multiple stations performing different functions.
- The whole system is also very high tech.



## Case References (Global) - University, Secondary, Primary

### BACKGROUND

Using DOBOT Robots to Train Our Jr. Astronauts, Scientists and Engineers. Ten students from the Long Beach Unified School District's CAMS (California Academy of Mathematics and Science) High School have received fellowships to study with Bob Barboza and his engineers and scientists working on building Tiger Teams for the Occupy Mars Learning Adventures STEAM++ Program. We have created custom software and training materials to integrate our new astronaut hardware and software tools.

### RESULTS

DOBOT Robots working on Mars, The DOBOT robot allows students to make parts for other robots.



### THE DOBOT ROBOT TRAINING PROGRAM FOR JR.ASTRONAUTS INDUSTRY: MARS LEARNING ADVENTURES STEAM++ PROGRAM

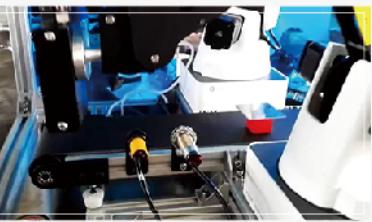
Project Date: 08-Jul-2017

Organization Name: Barboza Space Center

Country: United States

#### Use Cases:

- Experiments for Mars Projects & Tools for Occupy Mars
- Studying Robots for Mass Production
- 3D Printing Robot Parts & Laser Engraving ID Numbers
- Picking and Placing Cargo & Multiple robots working together
- Robot Design, Building & Repair & Drawing Electrical Diagrams
- Science Experiments & Tiger Team training tools



### TSINGHUA UNIVERSITY WITH DOBOT

Name: Industry 4.0 Intelligent System simulating real production line with sand table

Date: June 2016

College Major: Basic Industrial Training Center

#### Summary:

The system simulates a typical cutting-edge robot production line with DOBOT Magician.

#### Bullet points:

- Pick & Place: DOBOT Magician performs basic functions of an industrial robot arm, picking and placing.
- Sort connected with visual system, DOBOT Magician sorts by shapes or colors.
- Assembly: DOBOT Magician can accomplish quick assembly in different positions with a conveyor belt kit.



### K12 EDUCATION - COOPERATION PROJECT WITH FUTIAN PRIMARY SCHOOL

Program: Shenzhen Futian Primary School Maker Experience Event

Date: 2017 March

It uses DOBOT MAGICIAN to identify sorting, convey relay, 3D printing, and other demonstrations of interesting functions to stimulate children's interest in robots and cultivate students' innovative thinking and ability to practice.



7.0 Future Lifestyle -1

## Classroom

- Mechanics, Electronics, Programming, Design...
- Knowledge empowers your life!

## Home

- Smart, fun and reliable!



Future Lifestyle -2



## Workshop

- User friendly, easy to learn, bringing more efficiency.



## Factory

- Fast to equip, easy to maintain, a highly cost effective solution for production line.



LEADING  
ROBOTIC ARM  
SOLUTION  
PROVIDER

