



DL I4.0 FACTORY

Industry 4.0 Smart Factory

Introduction:

Digitalization of information, combined with high-performance hardware, allows the implementation of more flexible and optimized production architectures. The innovation level is such that today, Industry 4.0 is synonymous with *smart manufacturing*. The adjective *smart* refers to integrated management of information with the aid of digital technology.



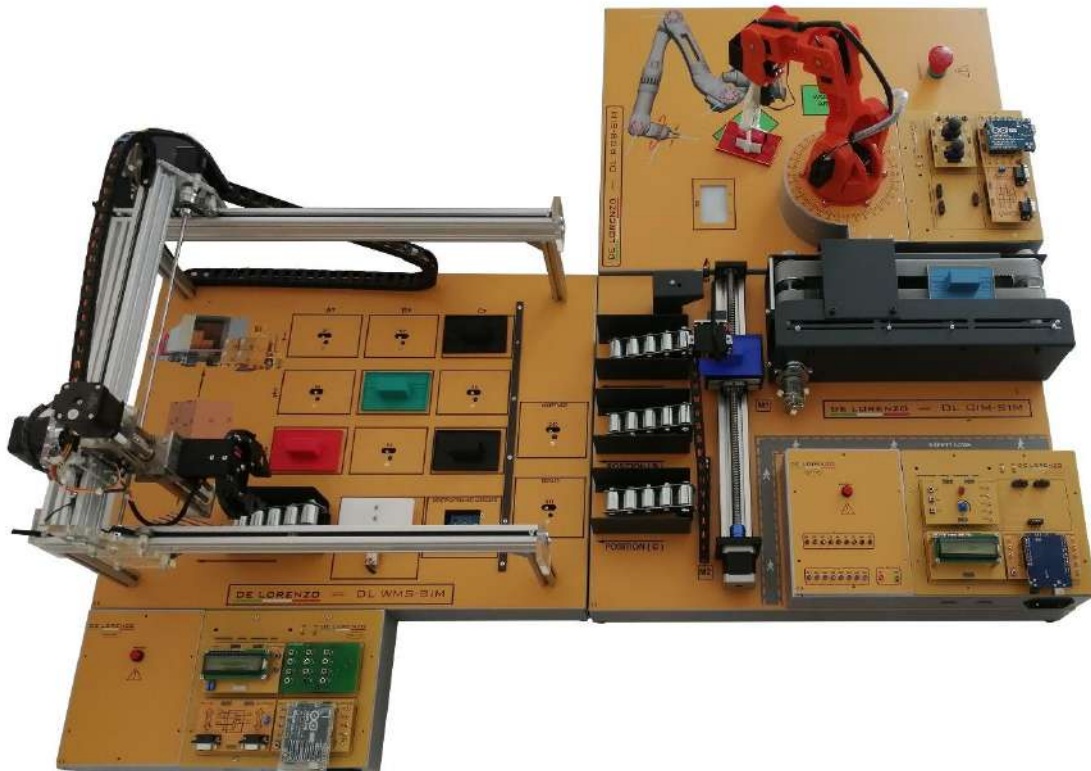
Digitalization of processes fosters integration and cooperation within the company (smart manufacturing) and outside of it (smart supply chain), improving the quality of the information flow and optimizing a product's "time to market."

Thanks to the "internet of things," information is collected and analyzed in real time, which allows many industrial sectors and commercial areas to be smarter and more effective.



Description:

De Lorenzo's solution creates a collaborative environment to study concepts related to Industry 4.0, integrating small-scale subsystems that are typically present in a manufacturing plant.



The trainer is composed of a set of electronic boards and simulators to study the different subsystems that can be found in a real production line. Using an Arduino open-source microcontroller connected to a SCADA software for data acquisition and control, the students will be able to perform practices covering topics that range from the introduction to automation and robotics, communication protocols (IOT), sensors and actuators to a complete study of a productive system.



Main characteristics:

Modularity

- Collaborative environment to study concepts related to Industry 4.0.
- Scale model of the systems that make up a 4.0 factory.
- Reconfigurable modular laboratory.
- Platform for project development.

Open SCADA web

- Software to monitor and control all trainer subsystems.
- Learning platform based on structured software with a didactic approach (CAI).
- Open and customizable software.
- Supervision and control interface remotely accessible.

Didactic approach

- Multidisciplinary laboratory organized by levels ranging from the most basic concepts of electronics and automation to the simulation of an industrial process.
- Hands-on training platform based on experiments.

Skills development

- Through an open source platform, students will be able to develop applications using programming and control techniques.
- The trainer is a platform to simulate real scenarios.
- Development of analytical and problem-solving skills.



Modularity:

The trainer is composed of 4 subsystems. Each one can be studied independently to execute practices covering topics ranging from the operation of sensors and actuators to the introduction of automation and robotics or linked together for the simulation of a more complex Industry 4.0 production line. The student can acquire and analyze the data generated from the interactions between stations to manage and optimize the overall industrial process.



RFID (Radio-Frequency Identification):

Use of RFID in industrial environments
Product traceability



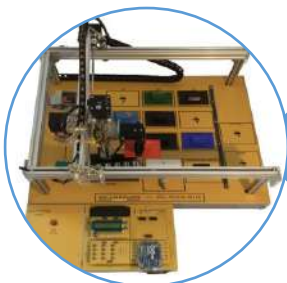
5-axis Robotic arm:

Introduction to robotics



Conveyor belt:

Introduction to automation
PLC programming



Semi-automatic warehouse:

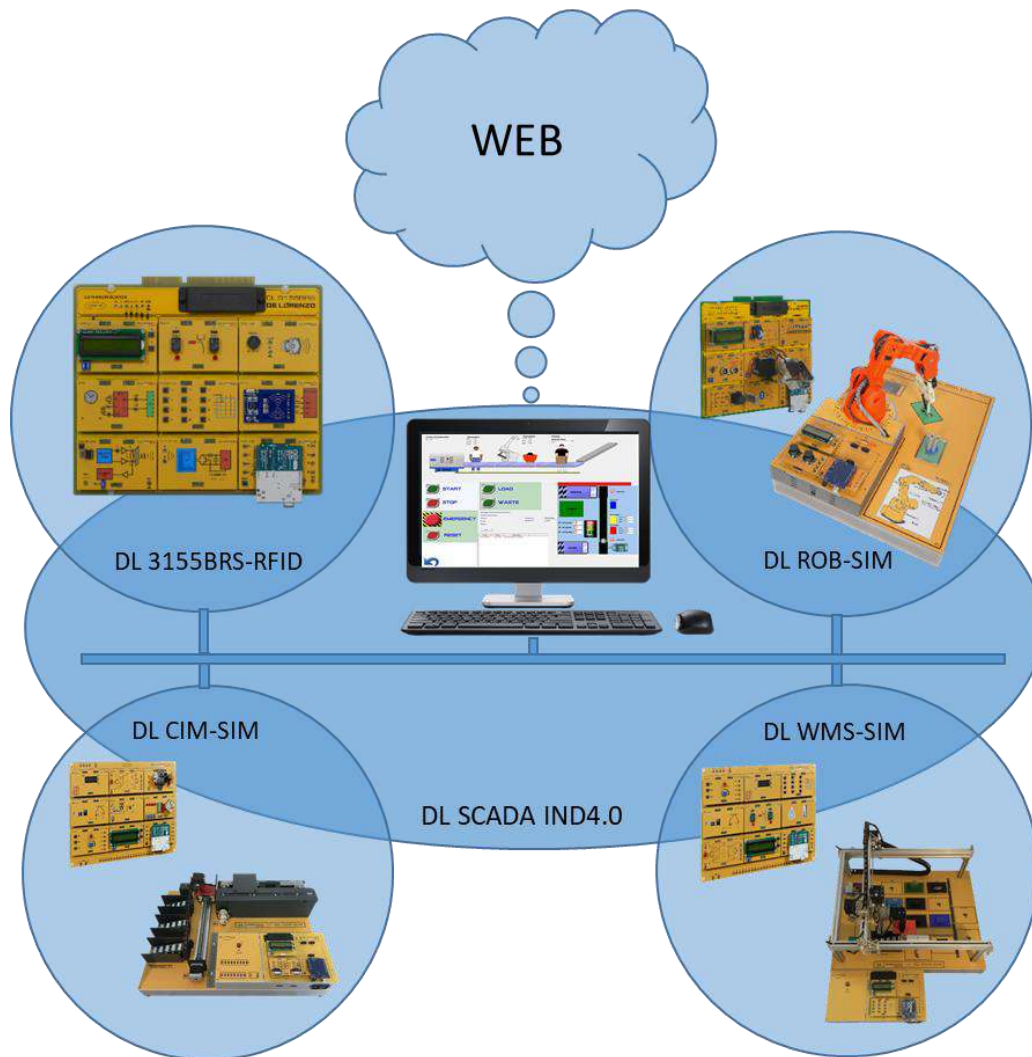
Inventory management
Classification algorithms

Each simulator includes a set of propaedeutic electronic boards to study the basic concepts related to robotics, automation and process control that can be applied to an industrial application.



System architecture:

Though an industrial SCADA (Supervision and Control Data Acquisition) software, all the sub-stations are able to exchange and display information relevant to the process. The SW is structured to follow a simulated manufacturing process receiving input from the user and generating report files that are accessible remotely.



The processes implemented in the SW include:

- Processing an order from a client
- Generating a production order
- Generating a purchase order
- Manage and update different BOMs
- Supervise the production process
- Manage inventories
- Creating packing lists

All the historical data relevant to the production process are logged into the RFID tag of the manufactured object for product traceability.

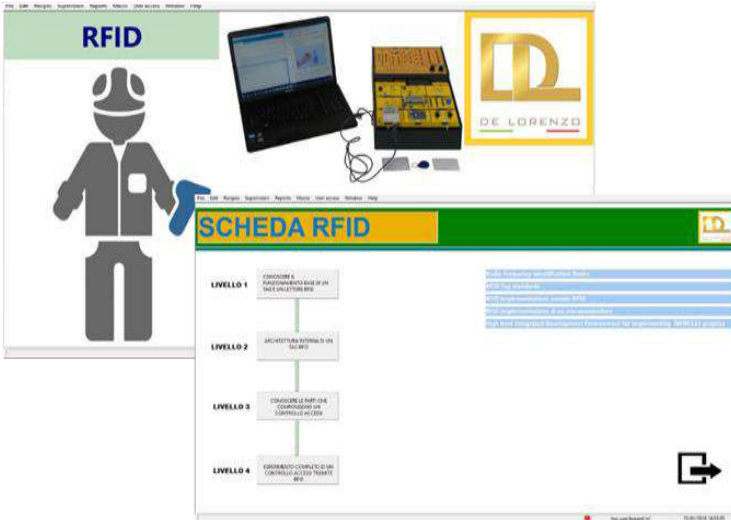


INDUSTRY 4.0



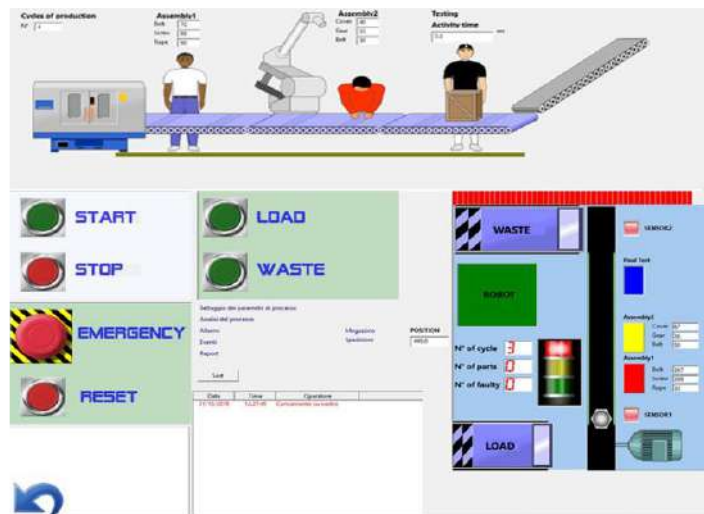
Open SCADA-Web:

The open SCADA software exchanges information with all the trainer subsystems, showing the data from the sensors and the system status to control it in real time. The software also acts as a Computer Assisted Instruction (CAI) software that guides the student through their learning path.



The learning platform software (CAI) is structured using a didactic approach, including the theoretical and practical information necessary to complete the proposed exercises.

The open SCADA-WEB license allows the students to create their own projects and customize them to show the parameters of interest, generate automatic reports and control the actuators for an "intelligent" management of a productive process.

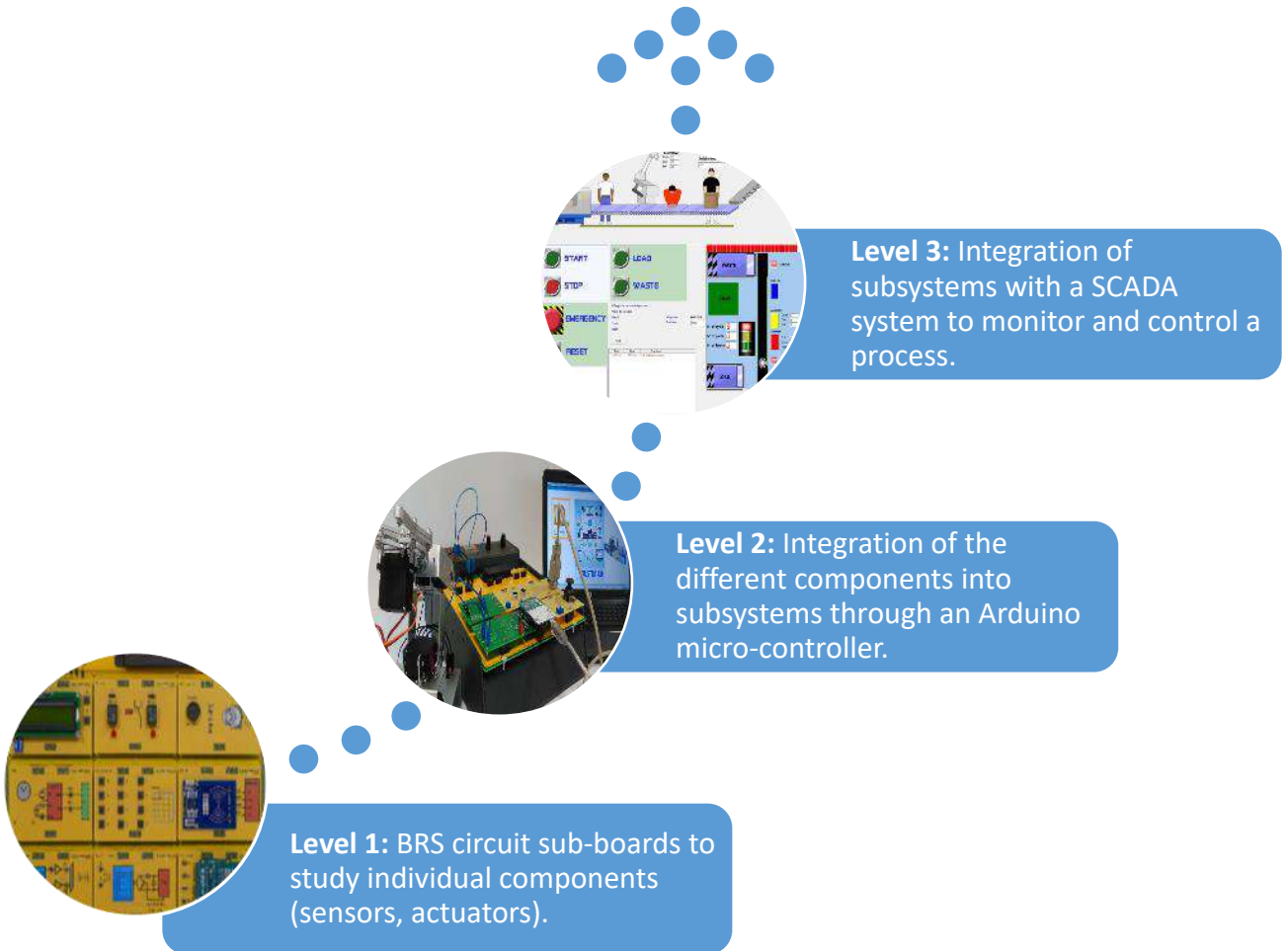


Depending on the configuration, it is possible to use the software to remotely monitor the system from a local or remote PC using an internet connection.



Didactic approach:

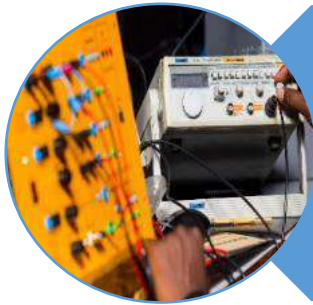
With this trainer, the student will get familiar with the different parts that compose a real industrial process and will learn the corresponding concepts gradually, starting from the study of basic hardware until the practical development of a production line scale model.





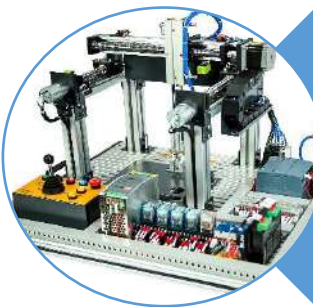
Skills development:

This multidisciplinary laboratory aims to provide a practical and progressive learning tool to be used throughout a course in basic electronics, automation and process control, thus developing skills at various levels:



Technical and vocational schools:

- Circuit theory.
- Programming fundamentals.
- Sensors y actuators.



Robotics, telecommunications and electronics engineering courses:

- Study of communication protocols, RFID, Bluetooth, IOT.
- Automation and control theory.
- Microcontrollers.



Engineering colleges and universities:

- Theory and process optimization.
- Information theory.
- Industrial automation.



INDUSTRY 4.0



Composition:

DL I4.0 FACTORY is composed by the following modules:

CODE	DESCRIPTION	Qty.
DL 3155BRS-RFID	RFID protocol study board.	1
DL ROB-SIM	Kit for the study of industrial robotic arm 4.0 (Simulator + electronic boards)	1
DL CIM-SIM	Kit for the study of conveyor belt 4.0 (Simulator + electronic boards)	1
DL WMS-SIM	Kit for the study of warehouse 4.0 (Simulator + electronic boards)	1
DL SCADA IND4.0	SCADA software and connection kit for industry 4.0	1