DE LORENZO

DL NGL-CIMSIM
Module for the study of a conveyor belt

The design and construction of electronic circuits to solve practical problems is an essential technique in the field of electronic engineering and computer engineering.

With this board system, students can study the properties of a conveyor belt used in industrial environments. Sensors and actuators are included for the development of a complete course on the main characteristics of conveying systems and their applications.

The system is equipped with SCADA software for studying automation and industry 4.0 concepts and can be combined with the other simulators of the family to simulate a simplified industrial 4.0 factory.

The system for studying a conveyor belt consists of two main elements:
- A kit of boards for studying the hardware characteristics and control techniques of a conveyor belt. Sub-boards include all the components, sensors, and actuators needed to understand and manage the operation of a conveyor belt.
- A real hardware simulator of a conveyor belt used in industrial environments. Through this simulator, the student will be able to learn how to operate and control a production line through the use of a PLC and an open-source microcontroller. Its structure allows the connection of the components included in the board kit, making them compatible with each other.

The integration of the belt conveyor system in an industrial process is possible through a **SCADA** software, which allows a study on the concept of automation and Industry 4.0.

With the card and the respective simulator, the DL NGL interacts through a gateway software allowing the passage of information between devices that use different communication protocols, guaranteeing the compatibility between them by their interoperability and by providing a common interface for their communication. The end user can monitor, interact, acquire, and analyse the data generated by interactions to manage and optimize the entire industrial process.

Description of the System:

KIT OF BOARDS
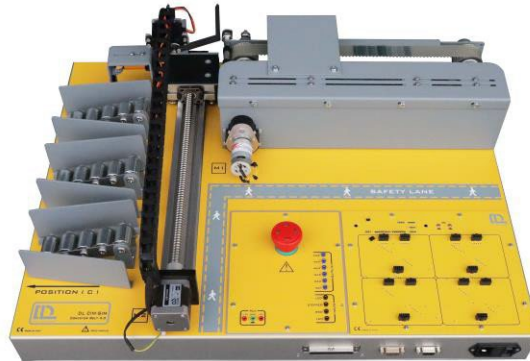

EDUCATIONAL EXPERIENCES

Kit composed of sub-boards for the preparatory study of the different elements that make up a system of conveyor belts. The sub-boards can interact with each other through a dedicated motherboard, allowing the student to perform interactive practices on different topics related to automation such as:

- Control of an LCD display via a microcontroller.
- Detection of an object using an infrared sensor.
- Monitoring of an RGB sensor.
- Control of a DC motor through a power driver.
- Control of a stepper motor.
- Action control and interlock function via a push button pad.
- Writing on a seven-segment display.

CIRCUIT BLOCKS

- Motherboard
- LCD display sub-board
- DC motor driver sub-board
- DC motor sub-board
- Inputs sub-board
- Seven-segment display sub-board
- Stepper motor with driver sub-board
- IRD sensor sub-board
- RGB sensor sub-board
- Microcontroller sub-board

HARDWARE SIMULATOR

EDUCATIONAL EXPERIENCE

This system is mainly used to teach, demonstrate and experiment with different methods of controlling a conveyor belt.

The student will improve the skills necessary for the HW designing and SW programming of an electromechanical system.

A real PLC (supplied with the trainer) controls the sequential operation of the system, as in real automated processes, allowing the development, implementation and optimization of an application in the industrial field:

- Control of a conveyor belt through a pushbutton panel.
- Use of a PLC to control the movement of the conveyor belt.
- Monitoring and identification of a processed part on the conveyor belt.
- Tracking of the position of a part placed on the conveyor belt.
- Identification and check of the color of a part.
- Identification of a defective part and placing it in the correct position at the end of the line.

The system interfaces with the SCADA software for monitoring and control.

TECHNICAL CHARACTERISTICS

- Power supply: 90V-230V ±10%, 50/60Hz
- DC motor that drives the belt:
  - Speed: 10 rpm
  - Rated voltage: 12 Vdc
- Linear actuator of the stepper motor:
  - Rated voltage: 12 Vdc
- Servo motor:
  - Rated voltage: 5 Vdc
- Control panel:
  - Motor drivers
  - Inputs and outputs of sensors and actuators accessible via 2 mm connectors.
  - Slot for inserting the system boards.
  - Compatible with Arduino UNO boards:
    - ATMEGA328 processor
    - 32KB flash memory
    - 1KB EEPROM memory
    - 2KB SRAM memory
    - 23 generic I/O ports
- IR position sensor
- RGB sensor
- RFID detector

ACCESSORY INCLUDED:

Programmable Logic Controller 12/10
Type of module: frame or bench type
PLC inputs:
- 8 digital inputs
- 4 digital/analogue inputs

PLC outputs:
- 8 relay outputs
- 2 analogue outputs (V / I selectable outputs)

Two 0-10 V outputs are adjustable through potentiometer.
12 digital level switches
8 LED for the visualization of the output states
Output in 24 V_{DC} fixed voltage
Programmable via USB port
Communication: Modbus RTU RS485

DL 2110AM

NECESSARY ACCESSORY:

DC power supply

- ± 5 Vdc, 1 A
- ±15 Vdc, 1 A

DL 2555ALG