



## SYSTEM FOR THE STUDY OF CANOPEN



**DL CANOPEN**

### TRAINING OBJECTIVES

The purpose of this system is to investigate the concepts of network protocols and distributed automation, using the software tools in order to analyze the network data, and then to perfect the technique for the realization of software that is robust against errors or anomalies in the network.

The system has the objective of allowing students to understand the operation of a network based on a CAN field bus and to implement the tools for programming and, therefore, designing systems based on CAN BUS architectures.

The teaching of a field bus can be implemented under different points of view: Physical layer (design and choice of control boards and sensors, electric signals processing), Communication layer (study of data transmission), Application layer (analysis of the process), Devices programming layer (CAN network devices configuration), System programming layer (software programming for process management).

For all sessions, it is possible to simulate faults.

It is addressed to students of technical schools (electronics and IT) and universities and to students of training courses for technical personnel.

Complete with:

- DL CANOPEN software package
- Development environment MPLAB-X for projects development
- Technical documentation for Master and Slave boards
- Software package ALoader for loading the application program on the master, through the CAN interface
- Software packages of the different experiments
- System manual

The system has been designed for the study of electronic systems with can bus architecture, based on CAN OPEN protocols.

The system is composed of a hardware unit and of a software for the analysis of the bus: through the analogue or digital modification of the values of the can module (by means of the software) it is possible to check how the system (hardware) reacts to errors.

Thanks to the functions of the software, there are different possibilities for disturbing the input signal, so that it is possible to simulate the different situations of errors in the operation of an industrial machine.

### GENERAL FEATURES

The system is composed of a dedicated hardware and of a software interface. The connection between hardware and software is carried out via two can connections, connected to the doors can line A and can line B.

The system is composed of two sections, a programmable master control unit and a full CAN OPEN slave, and permits the realization of simple bench experiments: using the appropriate controls it is possible, in fact, to create simple applications and different simulations of the operation of the controller.

The system is open to integration with any type of device with CAN-OPEN interface; the device has a dual function of use as it can be used independently or in combination with other experiments, in which it replaces the traditional PLC.

It is accompanied by a software that realizes the functions of protocol and data analysis: through the software it is possible to realize the function of fault simulation that allows simulating the different error situations that may occur in an automation network. The programming of the master device, to realize the function of automation, is made with a suitable compiler.

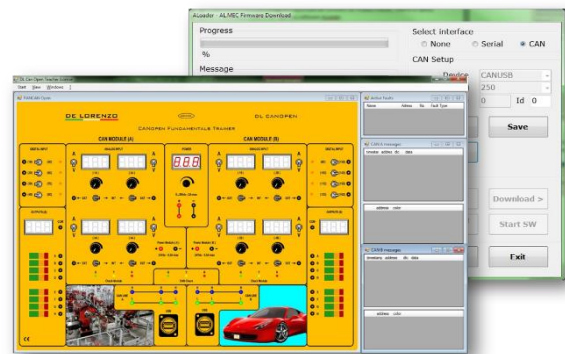


## DIMENSIONS

Dimensions of the panel: 472 x 345 x 180 mm.  
Weight: 10 kg.

## Video on YouTube:

<https://youtu.be/DirPVM-dNFY>



## DESCRIPTION OF THE PANEL

On the upper part of the panel there are the input parameters, the digital ones at the side ends and the analogue ones in the most central section.

On the lower part of the panel there is the display of the detected outputs: in the case where the input signal is not corrupted by the software, the display of the outputs will match with the parameter that is manually set on the panel, otherwise the outputs will be displayed with signal corruption.

To the central body various devices can be connected, from the control unit on which the tests are carried out to the buses for connection with the software.

The system is designed according to the criteria of: modularity (a minimum essential fixed configuration, to which the various elements can be easily connected), intuitive use (clear and well identified connections, pilot lamps for signaling), PC interface software.

## SAMPLE EXPERIMENTS

- Knowledge of the system
- Configuration of a slave node and testing
- Configuration of a slave node with errors
- Management and optimization of the protocol
- Decoding messages for the analogue inputs, Trimmer
- Decoding messages for the digital inputs, Switch
- Decoding messages of the outputs
- Fault simulation and physical deduction of the errors
- Fault simulation and learning of filtering techniques
- Connection to an external CANOPEN device

## FAULT SIMULATION

## TECHNICAL FEATURES

The automation / synoptic block consists of all the hardware that is necessary for the operation:

### MASTER module (PLC):

Supply voltage 9...36V.

8 inputs, 4 of which are universal digital / analogue (configurable as digital high or low side, or analogue 0 ... 40V or 4 ... 20mA) and 4 only digital (high side or low side or fast RPM).

8 high side PWM output (max. available current 4 A, protected).

The resources are accessed through a special terminal with quick coupling. There are buttons and knobs to simulate digital and/or analogue I/O. The module shows the LED for the control of inputs and outputs and the LED of the status of the master (RUN/CAN/ERROR).

### SLAVE module, input only:

Supply voltage 9 ... 36V.

8 inputs, 4 of which are universal digital / analogue (configurable as digital high or low side, or analogue 0...40V or 4...20mA) and only 4 digital (high side or low side or fast RPM).

8 high side PWM output (max. available current 4 A, protected).

The resources are accessed through a special terminal with quick coupling. There are buttons and knobs to simulate digital and/or analogue I/O. The module shows the LED for the control of digital inputs and the LED of the status of the slave (RUN/CAN/ERROR).

### SLAVE module, output only:

Supply voltage 9...36V.

The resources are accessed through a special terminal with quick coupling. The module shows the LED of the status the slave (RUN/CAN/ERROR).



# AUTOMATION



It is possible to set different types of faults, from the simple deletion of the signal (even if the switch is manually moved to a different value, the output will show a zero signal), the addition of messages up to the more targeted corruption of the signal. The types of faults are distinguished for the different types of input signals, analogue and digital.

The system is equipped with **CAN USB interfaces** that serve to connect the personal computer to the hardware.

The personal computer (not included) has to be based on the Windows operating system. Drivers and applications are compatible with Windows XP, 7, 8, 32 and 64 bits.

The minimum characteristics of the PC are:

- Windows operating system
- 2.4GHz processor, dual core (quad core recommended)  
Free RAM memory: 1 GB
- At least two USB ports
- Screen resolution: at least 1280 x 1024