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General and Technological Education

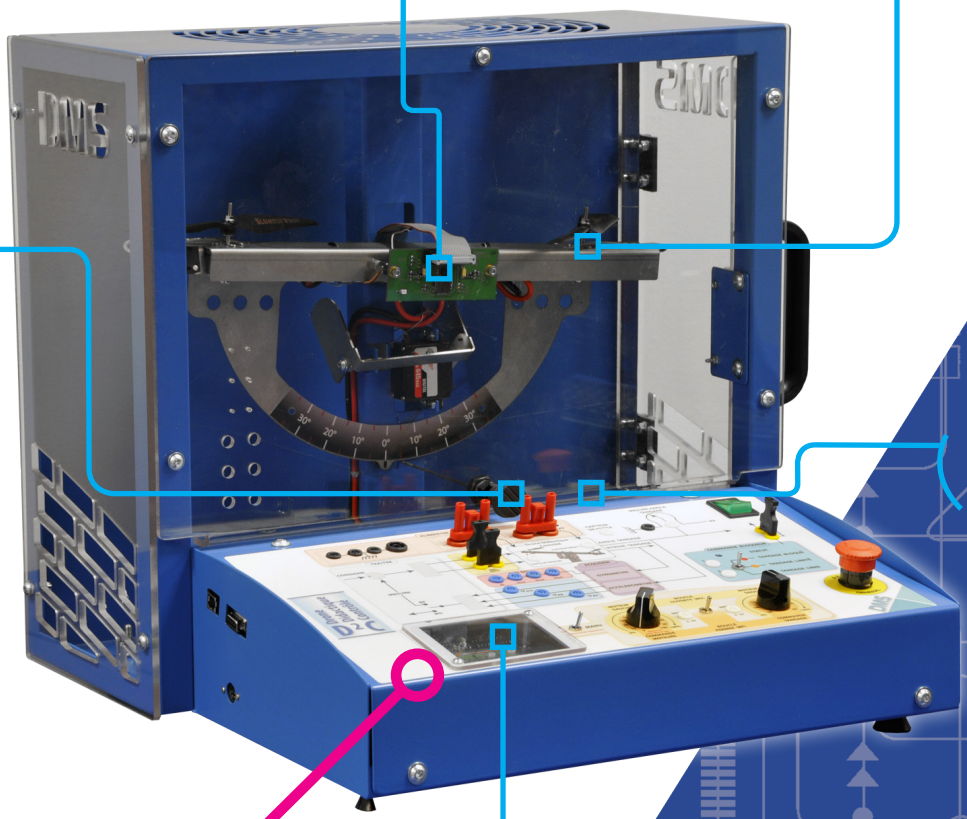
DMS Education

Creative engineering for quality education

Oscillation (Kinetic characteristics)

Inertial unit

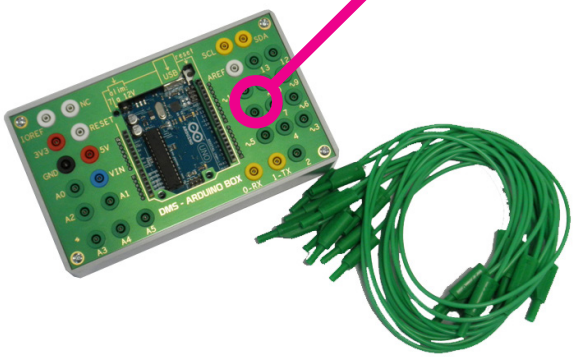
Three-phase brushless motors with speed sensors



Force sensor & Anemometer

Microcontroller dsPIC 10µs

Programming on Arduino board



D2C

DIDACTIC DRONE CONTROL

DESCRIPTION

The Controlled Didactic Drone implements the technologies that make up the drones. The D2C system makes it possible to test technological solutions for the command and control of a servo system.

The educational operations make it possible to analyze, simulate and experiment with the on-board information and communication technologies necessary for the control / command of a drone.

This system is an ideal support for the new teachings of the Scientific baccalaureate «Engineering Sciences» and for the transversal teachings of the Baccalaureate «Sciences and Technologies of Industry and Sustainable Development.

The D2C consists of a secure enclosure with:

- A pivoting support moved by two brushless motors (with speed sensors) reproducing the body of a drone in its pitching capacity.
- An intertial unit (accelerometer and gyrometer) to obtain the information needed to manage the pitch servo.
- A dsPIC microcontroller providing control command as well as communications between the system and the motorization interface.

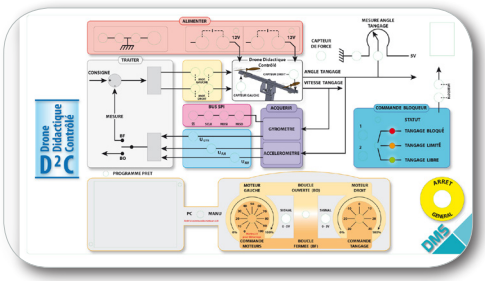
The Controlled Didactic Drone is piloted :

- either by the console with the possibility of open loop and closed loop control in different configurations.

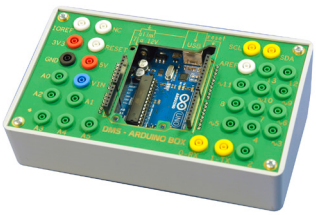
- either by a PC interface on which the commands and the acquisitions of all the quantities are carried out.

- sor by the «Arduinobox» assembly which can be connected to the system and process the exchanges between the sensors, the actuators and the PC computer.

Controlled Didactic Drone : D2C



Control / command desk



ArduinoBox

The D²C makes it possible to approach the skills and knowledge of the programs, and more specifically:

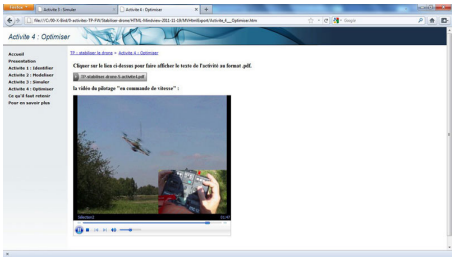
	Sequence designation	Description of the sequence
Control	Identify the components, information flows and energy	The main thread of the proposed work is the analysis of constituents and solutions techniques that allow control of the pitch inclination of a drone; «the D2C controlled didactic drone» which takes up the technical solutions of a drone real will allow experimentation with easy access to components and sizes physical. The whole work is broken down into 3 activities: Activity 1: Identify the components and flows of information and energy Activity 2: modeling the components Activity 3: simulate and adjust with accelerometer and gyrometer
Acquire programming	Acquire speed propellers	The student must implement improvements in the program that performs the acquisition of the rotational speed of the propellers. The whole work is broken down into 3 activities: Activity 1: sensor technology analysis; signals and connectors Activity 2: validation of the possibility of measuring the maximum propeller speed Activity 3: programming
Exploit	Operate the plant inertial	The student must use the signals that come from the inertial unit; It must perform various processing operations on the signals from the accelerometer and the gyrometer to measure an angle and analyze sensor performance.
Energetic efficiency	Optimization flight energy drone	The student must experiment to find an optimal operating point of the motorization to deduce the optimal load that the drone can carry, and the foreseeable duration of the flight before battery discharge; It will choose settings on the information channel to obtain a behavior satisfied with the system.
Command	Program the engine control	In this subject, we propose to create the part of the program that allows you to control the variation in the speed of a motor according to the command generated by one of the console potentiometers. To avoid deprogramming the micro-controller of the «desk» card, we will use a external microcontroller present on an Arduino board.

ACCOMPANYING DOCUMENTS

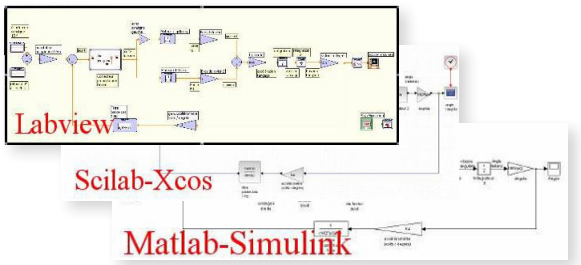
The system to teach **«controlled didactic drone»** is supplied with accompanying documents in digital form :

- a technical file with description and definition of the system, modeling, simulation and characteristics specific to the didactic as well as the definition of the variations.
- *A complete educational file offering :*
  - a presentation of the Practical Work with summary tables by areas of interest and a set of generic practical worksheets.
  - practical work completely developed by areas of interest with corrections implementing the engineer's approach.
  - an ergonomic proposal for island workstations for teamwork in a Digital Workspace.
- A resource file containing educational resources intended for the development of formalization sheets and technological resources, presenting additional information likely to enrich the scientific and technological culture of students.

Workstation organization



Multimedia learning environment



Modeling under Scilab and/or Matlab

Servo-controls

TO ORDER

The "Drône Didactic" system to be taught is offered through two references :

- Reference SIDD3100 includes the Controlled Didactic Drone, its accessories as well as the accompanying documents.
- Reference SIDD3110 corresponds to the ArduinoBox add-in.

www.dmseducation.com
document non contractuel

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