Pearson BTEC Level 4 Higher Nationals in Engineering (RQF)

Unit 6: Mechatronics

Unit Workbook 3

in a series of 4 for this unit

Learning Outcome 3

Simulation and Modelling Software

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Contents

SCILAB SIMULATOR

Scilab is an open source simulation environment used for mathematical, engineering and scientific applications. It can also be used for 2D and 3D visualisation, optimisation of algorithms, statistical analysis, signal processing, and, of specific importance to this learning outcome, control systems via the integrated Xcos simulator.

Download and install Scilab from this link.

Xcos

The Xcos simulator may be started from Scilab by clicking on Applications -> Xcos. This will then open the Xcos palette browser, containing many graphical tools which can be interconnected to produce almost any control system.
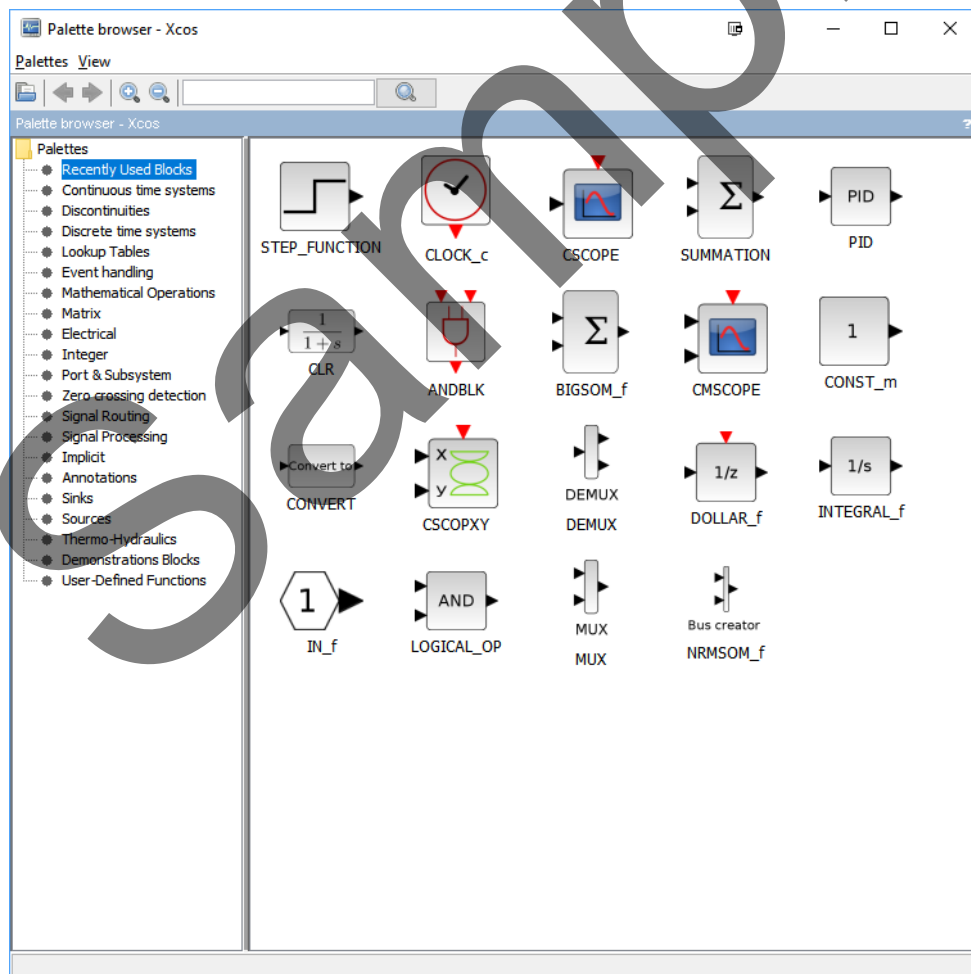

Figure 1 *The Xcos palette browser*

The assignment for this learning outcome asks you to build and simulate a control system using Xcos. Guidance on how to build such a system is provided in this video.

System Elements

$$\frac{1}{1+s}$$	**CLR** **Continuous Transfer Function** You will learn about system transfer functions if you go on to study the level 5 Unit 54: Further Control Systems Engineering. For now, just think of a transfer function as way of describing a circuit or system – for example, a low-pass filter.
PID	**PID controller** **Proportional-Integral-Differential controller** If we are trying to set a temperature for a central heating system, we will always have an error (difference) between the Set and Measured temperature values. The PID controller is used The PID controller is manipulated via three constants; K_p the proportional constant, which determines the reaction to the current error K_i the integral constant, which determines the reaction based upon the sum of recent errors K_d the differential constant, which determines the reaction based upon the rate at which the error has recently been changing

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