

## The monoBOTICS Framework.

The monoBOTICS (<http://www.monobotics.ic.uach.cl>) project aims to become to an OpenSource Framework, to facilitate the tasks of design, simulation and implementation of solutions for areas of Robotics and Automation, both for people with basic knowledge of programming, as for more advanced developers.



The basic idea behind monoBOTICS, is to facilitate access to a wide range of both hardware-oriented robotics (sensors, motors controllers, actuators, etc.), as different types of devices used in automation in general (smoke detectors, alarm systems, IR control, home automation devices, among others). All this easily through pre-built "kits", as well as allowing their use as building blocks for constructing more complex kits.

The programmer, which does not necessarily require specific knowledge of how to access to low-level hardware or even computer ports access, can use the kits through a simple object-oriented programming with C# language, and then add the needed programming logic to the developed solution.

Additionally, these kits can be used as building blocks in more complex kits for more extensive development with a wide variety of devices to control.

The common user, who has no programming experience, can use monoBOTICS in conjunction with the Icarus project (<http://www.pointscape.com.sg>), to perform 3D designs of the solution they want to implement. Icarus supports scene design, positioning and representation of 3D devices, and even the construction of new kits in a visual way, as well as visual construction of simulated versions and animation, and a 3D GUI designer for including a user interface in published kits.

With Icarus, the design may be constructed visually, and then simulated realistically, by incorporating objects that give physical properties (mass, gravity, friction, etc.) to the models. This allows viewing, experimentation and if necessary, the corresponding correction without necessarily have the devices connected to a PC. This results in significant savings of time and resources in general. Finally, these designed kits and solutions can be controlled either locally or remotely.



Additionally, the developer can also make use of Icarus to aide the overall development of the solution and then enhance with programming more complex logic as needed.

monoBOTICS not only provides pre-built kits and allow the inclusion of these in other more complex ones, also will make available tools commonly used in the development and research in the field of robotics and automation in general, such as:

- GUI controls to easy access to video sources, robotics and automation, etc. (WinForms, Gtk and ASP .NET).
- OpenCV support to easy use to image analysis algorithm.
- Code generator and parsers for C# language (XML structures translated to C# code for further refinement, compilation and installation in the target machine).
- C# code generation from control logic sequences (through Icarus/ISE.Flow's visual logic designer).

- Publish and discovery services of computers that have the monoBOTICS Framework to easy installation and control of the developed solution.
- Local or remote control of the designed solution.
- AI tools through kits that will facilitate the construction and monitoring of Artificial Neuronal Networks, for researches related to this area.
- In addition to the pre-built kits, which may be part of other more complex ones, monoBOTICS include a number of basic types (SerialPort, Servomotor, WebCam, etc.), which make possible the construction of new drivers for devices not provided by monoBOTICS.
- Cross-platform support, including Linux, Windows and OSX through the mono project (<http://www.mono-project.com>, currently monoBOTICS focuses mainly on Linux).

A growing list of devices supported is (for a update one please visit the “Hardware” section at [www.monobotics.ic.uach.cl](http://www.monobotics.ic.uach.cl). Sample videos and images can be found in the “Multimedia section):

#### Robotic Kits:

- ROBOTIS Bioloid Educational Robot Kit and Dynamixel smart Actuators/Sensors
- Dynamixel AX-12+ Smart Actuators
- Dynamixel AX-S1 Multi Sensor

#### Motor Controllers:

- Phidgets Servo Controller 4
- Lynxmotion SSC-32 ServoMotor Controller/Sequencer
- Dimension Engineering Sabertooth 2x5 dual DC Motor controller
- Dimension Engineering Sabertooth 2x10 dual DC Motor controller
- Dimension Engineering Sabertooth 2x25 dual DC Motor controller
- Phidgets Dual Motor Controller HC

#### Interfaces:

- Phidgets InterfaceKit 0/0/4
- Phidgets InterfaceKit 8/8/8
- Phidgets RFID

#### Sensors:

- Devantech Srf04 Ultrasonic Range Finder
- Phidgets 3-Axis USB Accelerometer
- Phidgets Spatial333 multi accelerometer, gyroscope and magnetic sensor
- Phidgets InterfaceKit 8/8/8 Analog Sensors

Note: With the support of the Phidgets InterfaceKit 8/8/8 (among the other Phidgets Interfaces), we can provide support for a wide range of Phidgets analog sensors and digital input/output devices, Phidgets company add more and more sensors often, for a complete list please visit Phidgets Sensor List (all Phidgets device pictures included here are Trademark of the Phidgets company).

#### Relay Boards:

- Phidgets Relay Board
- ZigBee NCD Relay board

- NCD ZigBee Coordinator

X10 Devices:

- X10-LM 2G and X10-AM 2G
- CM11/CP10 and other X10 to PC Interfaces

Note: All other devices that implement the standard X10 protocol are also supported.

Alarm Systems:

- DSC PowerSeries Alarm System
- IT-100 Alarm Systems serial interface

Infrared Transceiver Devices:

- IRTrans IR Transceiver device

Human-Machine Interface Devices:

- Wiimote
- P5 Dataglove