Manual

FlexiVision

OMRON PLUG-IN

ars | Feeding Industrial Robotics

FlexiBowl® by ars

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This Plugin was developed with the idea of communicating **quickly and safely with the FlexiBowl®** through **Omron** robots, using version 4 or higher of the ***Omron Ace software***.

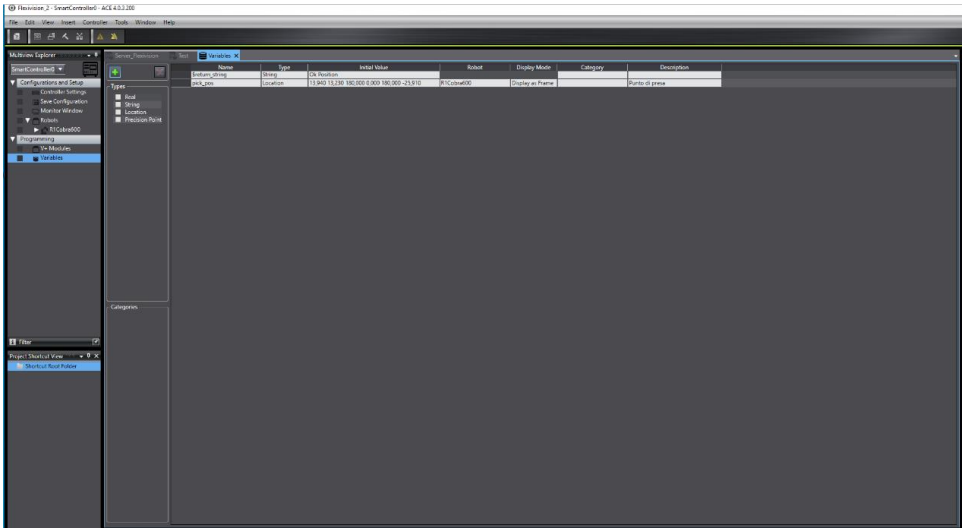
The Plugin does not require additional Omron licenses.

FlexiBowl® Plug-In

OMRON

Plug-In Installation

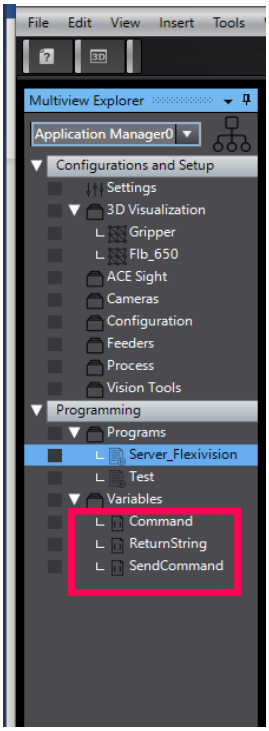
Step 1.



Create two V+ variables, one for the ***location*** and one for the ***response string***:

- $return_string
- pick_pos

Step 2.



Create three c# variables in the Application Manager:

- ***Command*** is the string indicating the operation to carry out on Flexivision;
- ***ReturnString*** is a string containing the Flexivision response;
- ***SendCommand*** is a numerical variable, which acts as a traffic light, when set at 1 the command to send to Flexivision is interpreted, when finished processing the command, this variable goes back to 0.

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Step 3.

Now we create a script c#, where the server Ip will be set which in this case will be the robot, and the communication port.

```
using Ace.Server.Core.Variable;
using Ace.Server.Adept.Controllers;
using Ace.Services.NameLookup;
using Ace.Server;
using System;
using System.Collections.Generic;
using System.Diagnostics;
using System.Net;
using System.Net.Sockets;
using System.Text;
using System.Threading.Tasks;
using Ace.Server.Adept.Controllers.Link;
using Ace.Communication.Services.Link;

namespace Ace.Custom {
        public class Program {
                public INameLookupService ace;
                        // Incoming data from the client.
                        public static string data = null;
                        public void Main() {
                                string ip = "192.168.1.3";  int port = = 8887;
                                // Client socket.  Socket handler = null;
                                bool Violated = false;
                                IVariableString Command = (IVariableString) ace["/Application
  Manager0/Variables/Command"];
                                IVariableString ReturnString = (IVariableString) ace["/Application
  Manager0/Variables/ReturnString"];
                                IVariableNumeric SendCommand = (IVariableNumeric)
  ace["/Application  Manager0/Variables/SendCommand"];
                                IAdeptController adeptController = (IAdeptController)
  ace["/SmartController0/Controller Settings"];
```

Plug-In Installation

```
// Get access to the communications link

IVpLink link = adeptController.Link;
 // Data buffer for incoming data.
 byte[] bytes = new Byte[1024];
 IPAddress ipAddress = IPAddress.Parse(ip);
 IPEndPoint localEndPoint = new IPEndPoint(ipAddress, port);

 // Create a TCP/IP socket.
 Socket listener = new Socket(ipAddress.AddressFamily, SocketType.Stream, ProtocolType.Tcp);

 // Bind the socket to the local endpoint and
 // listen for incoming connections.
 try {
        listener.Bind(localEndPint);  listener.Listen(10);
        Trace.WriteLine("Waiting for a connection...");
        // Program is suspended while waiting for an incoming connection.
        handler = listener.Accept();
        Trace.WriteLine("Flexivision connected...");
        // Start listening for connections.
        while (true) {
                Trace.WriteLine("Waiting for command");
 ReturnString.CurrentValue = "";
                Violated = false;
                while (Violated != true) {
                        if (SendCommand.CurrentValue == 1)  Violated = true;
                }
        data = null;
        //I analyze the request
        Trace.WriteLine("Command: " + Command.CurrentValue);
        //set_Recipe
        if (Command.CurrentValue.Contains("set_Recipe")) {
                // Convert the string data to byte data using ASCII encoding.
                byte[] byteData
 =mEncoding.ASCII.GetBytes(Command.CurrentValue);
                handler.Send(byteData);
                ReturnString.CurrentValue = "Ok";
                // Set, read, and delete a string variable
                link.SetS("$return_string",ReturnString.CurrentValue);
                SendCommand.CurrentValue = -1;
                }
        //get_Recipe
        if (Command.CurrentValue.Contains("get_Recipe")) {
                // Convert the string data to byte data using ASCII encoding.
                byte[] byteData =
 Encoding.ASCII.GetBytes(Command.CurrentValue);
                handler.Send(byteData);
                int bytesRec = handler.Receive(bytes);
                data += Encoding.ASCII.GetString(bytes, 0, bytesRec);
```

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```
                ReturnString.CurrentValue = data;
                link.SetS("$return_string", ReturnString.CurrentValue);
                SendCommand.CurrentValue = -1;
                }
        //state_Locator
        if (Command.CurrentValue.Contains("state_Locator")) {
                // Convert the string data to byte data usingASCII encoding.
                byte[] byteData = Encoding.ASCII.GetBytes(Command.CurrentValue);
                handler.Send(byteData);  int bytesRec = handler.Receive(bytes);
                data +=  Encoding.ASCII.GetString(bytes, 0, bytesRec);
                ReturnString.CurrentValue = data;
                link.SetS("$return_string", ReturnString.CurrentValue);
                SendCommand.CurrentValue = -1;
        }
        //start_empty
        if (Command.CurrentValue.Contains("start_Empty")) {
                // Convert the string data to byte data using ASCII encoding.
                byte[] byteData = Encoding.ASCII.GetBytes(Command.CurrentValue);
                handler.Send(byteData);
                int bytesRec = handler.Receive(bytes);
                data += Encoding.ASCII.GetString(bytes, 0, bytesRec);
                ReturnString.CurrentValue = data;
link.SetS("$return_string",ReturnString.CurrentValue);
                SendCommand.CurrentValue = -1;
        }
        //stop_Locator
        if (Command.CurrentValue.Contains("stop_Locator")) {
                // Convert the string data to byte data using ASCII encoding.
                byte[] byteData = Encoding.ASCII.GetBytes(Command.CurrentValue);
                handler.Send(byteData);
                ReturnString.CurrentValue = "Ok";
                link.SetS("$return_string", ReturnString.CurrentValue);
        SendCommand.CurrentValue = -1;
        }
        //test_locator
        if (Command.CurrentValue.Contains("test_Locator")) {
                // Convert the string data to byte data using ASCII encoding.
                byte[] byteData =Encoding.ASCII.GetBytes(Command.CurrentValue);
                handler.Send(byteData);
                int bytesRec = handler.Receive(bytes);
                data += Encoding.ASCII.GetString(bytes, 0, bytesRec);
                ReturnString.CurrentValue = data;
link.SetS("$return_string",ReturnString.CurrentValue);
                SendCommand.CurrentValue = -1;
        }
```

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```
        //start_Control
        if (Command.CurrentValue.Contains("start_Control")) {
                // Convert the string data to byte data using ASCII encoding.
                byte[] byteData = Encoding.ASCII.GetBytes(Command.CurrentValue);
                handler.Send(byteData);
                int bytesRec = handler.Receive(bytes);
                data += Encoding.ASCII.GetString(bytes, 0, bytesRec);
                ReturnString.CurrentValue = data;
link.SetS("$return_string",ReturnString.CurrentValue);
                SendCommand.CurrentValue = -1;
        }
        //start_Control
        if (Command.CurrentValue.Contains("start_Locator") ||
Command.CurrentValue.Contains("turn_Locator")) {
                Start_Locator:
                // Convert the string data to byte data using ASCII encoding.
                byte[] byteData = Encoding.ASCII.GetBytes(Command.CurrentValue);
                handler.Send(byteData);
                int bytesRec = handler.Receive(bytes);
                data = Encoding.ASCII.GetString(bytes, 0, bytesRec);
                if (data.Contains("Hopper")) {
                        var t = System.Threading.Tasks.Task.Run(() => ShowThreadInfo("Task"));
                        goto Start_Locator;
                }
                else {
                        if (data.Contains("#")) {
                                ReturnString.CurrentValue = data;
                                link.SetS("$return_string", ReturnString.CurrentValue);
                                SendCommand.CurrentValue = -1;
                        }
                        else {
                                string[] subs = data.Split(';');
                                // Set, read, and delete a location variable
                                Transform3D loc = new  Transform3D(Convert.ToDouble(subs[1]),
Convert.ToDouble(subs[2]), 180, 0, 180,  Convert.ToDouble(subs[3]));
                                link.SetL("pick_pos", loc);  Transform3D lVal = link.ListL("pick_pos");
                                SendCommand.CurrentValue= -1;
                                ReturnString.CurrentValue = "Ok Position";
                                link.SetS("$return_string", "Ok Position");
```

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```
                                        if (lVal != loc)
                                            throw new
                                        InvalidOperationException();
                                    }
                                }
                            }
                        }
                    }
                    catch (Exception e) {
                        Trace.WriteLine(e.ToString());
                        //System.Threading.Thread.Sleep(200);
                    }
                    handler.Shutdown(SocketShutdown.Both);  handler.Close();
                }
                static void ShowThreadInfo(String s){
                    Trace.WriteLine(s);
                }
            }
            }
```

FlexiVision Command List

To send the command to FlexiVision you must modify the value of the "command" string.

N_Mission	Command	Action
1	"start_Locator"	Starts the parts localization process by recalling the FlexiBowl handling routine in case there are no parts that can be picked up. ***Return:*** "Pattern1;x;y;r".
2	"stop_Locator"	Stops the process of locating the object with the aid of the FlexiBowl.
3	"turn_Locator"	If no parts are picked up, by this command the operator can make the Flexibowl rotate and the "start_Locator" routine start. ***Return:*** "Pattern1;x;y;r".
4	"test_Locator"	Starts the process of locating the object without the aid of the FlexiBowl. ***Return:*** "Pattern1;x;y;r".
5	"start_Control"	Starts the inspection cycle. ***Return:*** "Control1;x;y;r".
6	"state_Locator"	Locator status diagnostics is shown: ***Return:*** "Locator is Running" "Locator is in Error" "Locator is not Running".
7	"start_Empty"	Start the FlexiBowl® Quick-Emptying sequence. ***Return:*** "start_Empty ended"
8	"get_Recipe"	The name of the recipe currently loaded on FlexiVision is shown. ***Return:*** "recipe name".
9	"set_Recipe=recipe name"	The recipe corresponding to the sent "recipe name" is loaded.