

USING ADOBE FLASH TO CONTROL THE SYSTEMS CONNECTED TO PC

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Abstract

Adobe Flash is known as a tool for creating interactive multimedia animations suitable for creating systems which can communicate with servers, databases and other systems. Using Flash, it is possible to create high-quality desktop applications with high proportion of internal intelligence.

Flash applications usually communicate with each other over servers. If you run multiple desktop and web-based Flash applications on one computer, they can communicate directly without involving the server. Flash applications can communicate with the environment in which they run, which provides us very interesting and useful possibilities for its use.

Electronic measurement systems connected to PC via USB, Bluetooth or COM ports are currently the most frequently controlled by programs developed in Java, Delphi, Visual Basic or C + +. To create quality multimedia graphic interfaces using these programs is quite laborious and demanding.

On the contrary, to create it using Flash is easy. A graphic designer can create the graphic interface and then a programmer can program only the functionality. It is really easy to use Flash to create high-quality interactive multimedia learning system which cooperates with electronic systems connected to PC. It is also possible to create graphic interfaces for systems developed in the programs mentioned above using Adobe Flash. Nevertheless Flash doesn't have to be just a graphic interface, but Flash can also be an intelligent system which can communicate with networks and other systems.

1. The measurement system

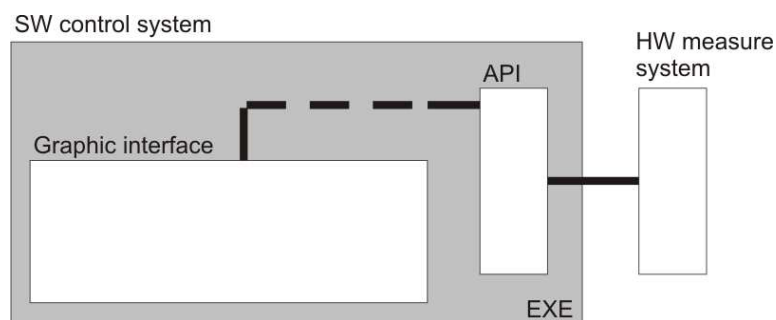


Figure 1: The basic scheme of the measurement system

At the side of server or PC runs the software (SW) part of the application (program, EXE) which via API (Application Programming Interface) or by using special drivers communicates with connected hardware. The hardware part (HW) of the measurement system is often realized either as a special PC card at the side of PC or as an external device connected via standard ports.

2. SW part of measurement system created in Visual Basic or C++

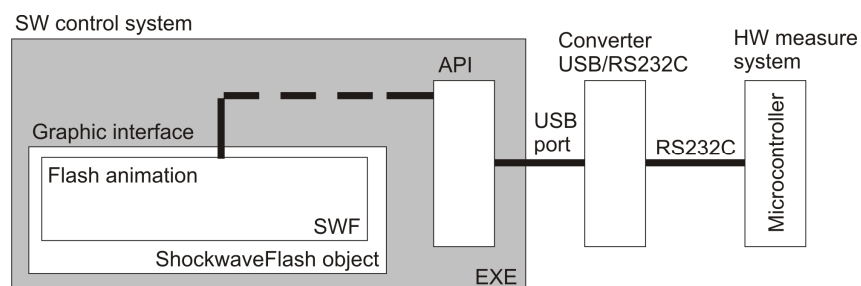


Figure 2: The scheme of the system created in Visual Basic with a graphic interface created in Flash

Even though the RS232C bus (COM port of PC) is quite out-of-date and relatively slow, it is often used for some of its advantages – it is possible to use this type of communication for connecting via USB, Bluetooth and IR port because all these devices can work in RS232C mode. It is enough

to install the virtual COM port for these devices and we can use API of COM ports. We usually use components of Visual Basic or C++ for the graphic interface of the SW part but using various animated schemes and special buttons, for example, is quite complicated and sometimes requires special libraries, therefore the graphic realization depends again on the programmer. On the other hand, using a Flash animation in creating graphic interfaces is not so limiting for the graphic designer and he can design the whole graphic interface on his own. The programmer of the application just uses the Shockwave Flash object which displays the graphic interface – a Flash animation. Using this object, it is easy to send data between the Flash animation and the system itself.

I have been dealing with this topic for a considerable amount of time. This way of controlling was used this year by my student to control and display the state of the counter connected to PC via USB port.

3. The measurement system created in Flash and MDM Zinc

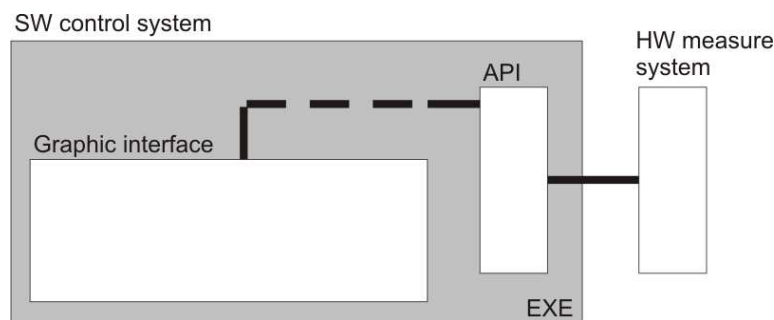


Figure 1: The basic scheme of the measurement system

MDM Zinc is a great tool for creating offline applications. Applications are created directly in Flash but MDM Zinc adds new and very useful classes not only for communication with HW.

There is also a tool for creating desktop application directly in Flash – Adobe AIR. Unfortunately for us, AIR is not able to communicate with COM ports.

It is possible to create the whole SW part only in Flash.

4. Remote control of the application connected to the measurement system

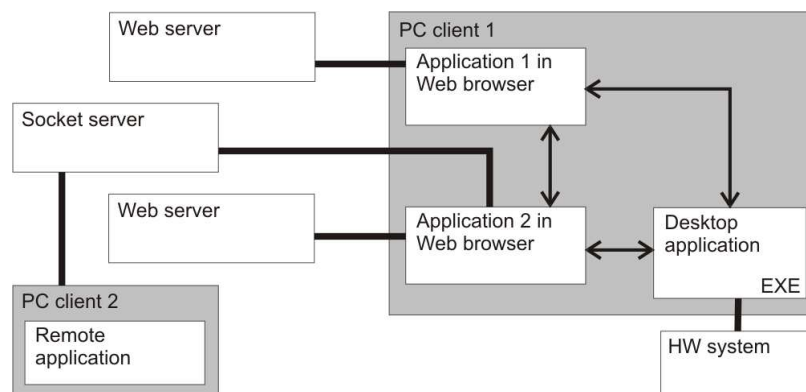


Figure 3: An example of connection of Flash to an application

Nowadays, many of measurement and control systems (distant laboratories) run on servers to which are connected client applications. It is possible to control the measurement systems and to collect measured data from these client applications. These systems are often created in Java environment.

If we use Flash to control the measurement and the control system on a client computer, we have many new possibilities – for example a possibility of communication between Flash applications without a necessity to communicate over the server. The great thing is that we are able to connect the communication channels of web applications which have an access to the server with desktop

applications which have an access to the hardware of the client computer. Even using the socket servers we are able to connect various clients in this way, even those who don't run at the same platform Java or Silverlight.

5. My interactive multimedia education environment

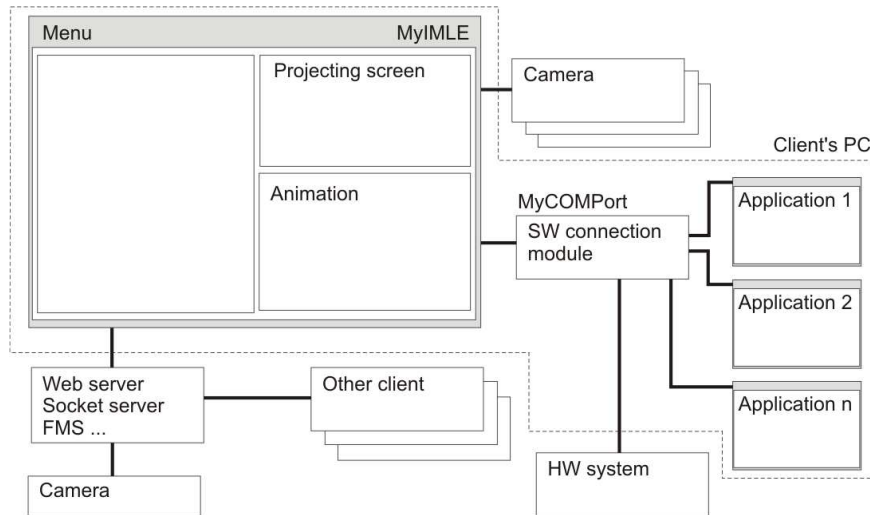


Figure 4: The basic scheme of the connection of systems to MyIMLE

The principles mentioned above are used for creating control systems for common measurement and control applications, but they also bring great advantages for creating simulators and emulators of various types.

Interactive animations, simulations and various didactic games together with the opportunities that Flash gives us, bring a brand new dimension to education. The direct connection of Flash animations and real systems, together with a possibility of a team work of more users opens us a new way to interesting study supports which can play an important role especially in technical subjects.

I have been creating my own learning system which I named "My Interactive Multimedia Learning Environment" – MyIMLE, which follows the principles of creating distant study supports. This system should be dynamic and open enough for future extending to new areas. One of important branches should be mobile interactive multimedia learning environments.

You can see this in the example of connection of HW to MyCOMPort. The HW system, after connecting PC and after switching on the power, sends its identification to COM port and waits an answer from COM port (more accurately – it is waited for connecting sequence of MyCOMPort module.) If MyCOMPort is working, it sends an answer and the HW system starts working in a "waiting for connection" mode.

If MyCOMPort starts working, it is possible using the configuration file to find where the connected HW system is. It is possible to automatically scan available COM ports and send initializing sequence for connecting the HW system. The communication is then realized via the COM port over which the HW system answered. It is also possible for a user to manually determine via which COM port the communication should be realized by setting the number of the COM port. The HW system answers by its identification to the initializing sequence of the module, and both MyCOMPort and HW system are ready to work. If MyCOMPort module is connected to HW system, all applications that have set a request for receiving data from COM port, or applications specified in the configuration file, are informed about this event.

6. Conclusion

We summarized the basic possibilities of using Flash animations for controlling HW systems connected to PC. Flash brings many new possibilities to the creation of these systems. Even though there are many other different solutions, it is hard to say which solution is bad and which

one is good. Our aim was not to compare these solutions, but rather to show the new possibilities. Nevertheless Flash has one big advantage which is a possibility of full involvement of graphic designers and animators directly to the development of these applications. This is something that many developers of interactive study supports, developers of didactic games and developers of progressive graphic interfaces for controlling electronic systems will appreciate.

It is possible to use MyIMLE system in various fields of Physics. MyIMLE can be used to create study supports and animations explaining physical principles. Flash animations can simulate a problem and, at the same time, an external system controlled by the animation can be connected. The teacher can therefore demonstrate the study matter on a real situation

MyIMLE can directly realize both the control system and the measure system. For example MyIMLE can control the current to a bulb and can measure the voltage on the bulb at the same time. MyIMLE can also display a graph illustrating the dependence of the voltage on the bulb on the current. The measured data can be saved in a database or sent to a different user over the Internet.

MyIMLE can control the measurement of a student and in case of a wrong procedure MyIMLE can warn the student or show the right order of steps.

MyIMLE is able to communicate with computers of other users and cooperate with their applications. It also offers, for example, a possibility to connect a video-camera to record the screen. This system has also many other potential possibilities and it is hard to pretend what this system can reach..

References

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