A THREE TIERS ARCHITECTURE TO CONTROL REMOTE EXPERIENCES

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Abstract

This abstract presents a three tiers architecture design to make easy the access to a remote laboratory to allow the students to practice with real experiences. The students has not to move really to the laboratory, therefore the laboratory availability grows up and the practice scheduling too.

The first tier: physical layer: this layer is a hardware level, the real experience with all the circuits and necessary structures for the experience. The profesor can explain this experience in class, analysing the different assembly posibilities and the way how the experience works.

The secod tier, the automaton, allows to control the experience. It receives all the input events from the experience and acts consequently. The automaton controls the experience and send the events to the third level if there is no a pre-programmed response for the input. The automaton receives commands from the third level and translate them to outputs that act on the experience.

In theory, this automaton gives the possibility to connect more than one experience at same time, we should avoid to use all its outputs and/or inputs with just one experience. We must limit the different memory areas used in each experience connected to the automaton. A global view of this architecture shows that we can program the PLC with specified instructions from the third level. With this aproximation we can use the same physical assembly to make several experiences.

The third tier, application layer: in this level we put the software to publish the experience in an intra or extranet (in example Internet). This level can be a web service (we have made some experiments in this way) or a remote control access allowing to connect experiments from several universities.

This level is very easy because it just has to get the student data (a web form is enough) and send them to the automaton that controls the experience. The serial port is the interface to communicate the both levels. We use a java bean to format the data according to the particular PLC format. We just have to change the bean to use another PLC in the architecture.

The application layer filters the input parameters from the student, so we always ensure that the parameters are right and inside a security range for the experience. This control avoids that a student give dangerous input values for the experience.

This architecture, using the web service option, allows to the student to connect to the laboratory using just a web browser and to connect several experiences too. We want to increase the posibilities that the architecture offers, connecting several computers controlling different experiences and give just one access point to the student. The universities will be able to federate their experiences getting a real shared learning environment where everybody can get profit.