Integration of an affordable switching mechanism into the NI ELVIS 11+ platform used in iLab shared architecture

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The NI ELVIS is one of the platforms commonly used by iLab Shared Architecture (ISA) in developing online experiments. It is one of the affordable solutions to developing online experiments, particularly in developing countries operating environments. However, it has its own limitations when it comes to deploying discrete experiments using common measuring and testing instruments; as well as the use of different components on the same experimental setup. Once the instrument has been used by one experiment, it is not available to another experiment. This requires switching mechanisms as a solution to implement those experiments. n this work, a switching system exploiting the availability of NI ELVIS Digital Writer instrument and analogue electronic switches with digital control inputs to allow switching of various experiments online was proposed. The electronics switches are cheap and can work with less complexity in providing flexibility to students to perform the same experiments using different components; as often done in conventional laboratories, as well as making different experiments available concurrently on the same NI ELVIS platform. Two experiment modules have been implemented in demonstrating switching between different components of the same experiments and switching between different experimental setups. To extend the switching options, a combinational logic circuit was implemented using peripheral interface controller (PIC). This could give up to 255 digital lines for controlling switches. This work has successfully integrated a new switching mechanism to simple experiments at a very affordable cost and much reduced complexity on remote lab experimentation using ISA.