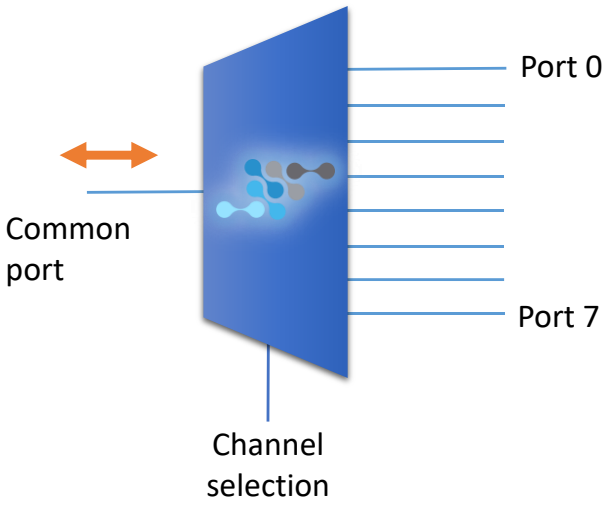
Applications of power multiplexers

by V. M. García-Chocano

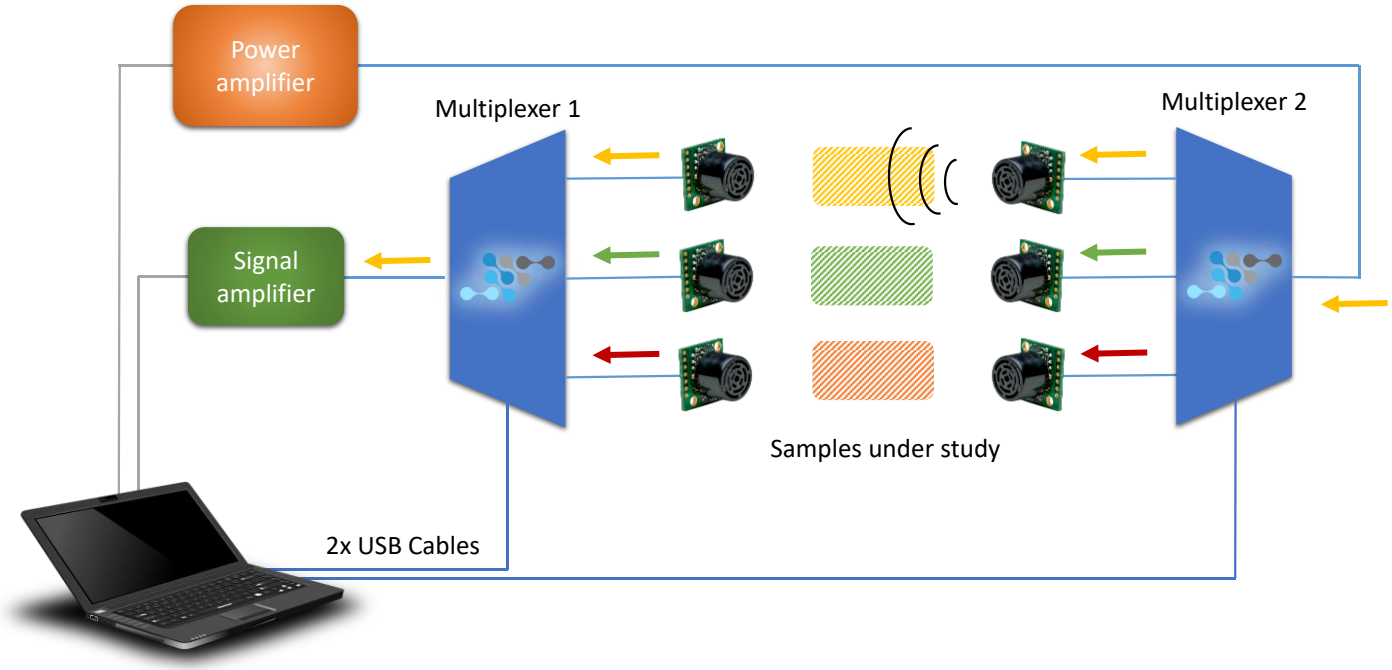
INTRODUCTION:

Multiplexers are devices that interconnects a common terminal to one or several independent ports. The analog power multiplexers offered by Ciprian are bidirectional and can deal with high levels of voltage and current. A high isolation between channels also allows the simultaneous management of high and low-level signals. In addition, any combination of enabled/disabled channels is possible, including schemes with several channels activated. These all features result in a high versatility that can be exploited in multiple scenarios. Multiplexers are proven to be especially useful for sharing common resources and automatizing tasks, thus saving time and money. The aim of this note is to illustrate some application examples where power multiplexers can be employed.

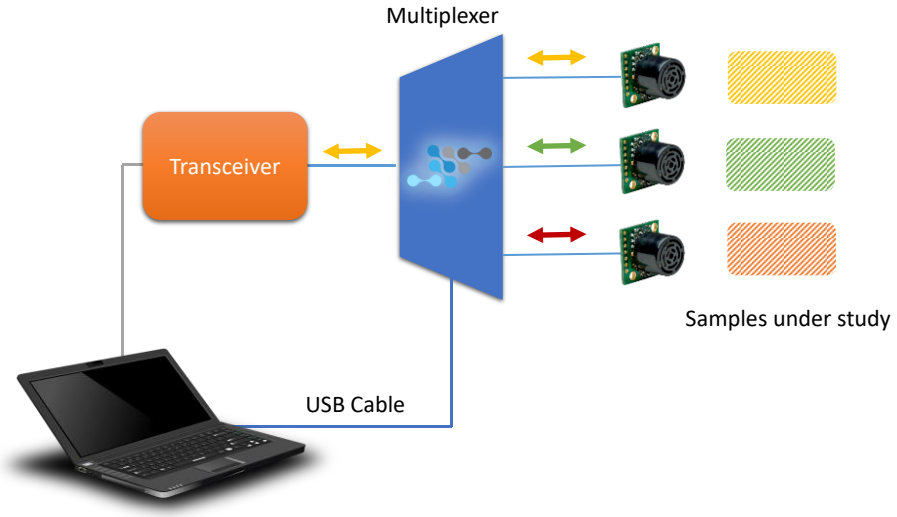


MEASUREMENT OF SEVERAL SAMPLES:

The scheme of the figure below shows a system intended for the simultaneous characterization of several samples with ultrasonic transducers. Both multiplexers simultaneously select a specific channel and the corresponding sample is measured. Thus, all samples are sequentially tested by performing a sweep on the different lines of the multiplexers. Only one power amplifier is here required for the excitation thanks to Multiplexer 2, while a single low noise amplifier is employed for the reception due to the use of Multiplexer 1.

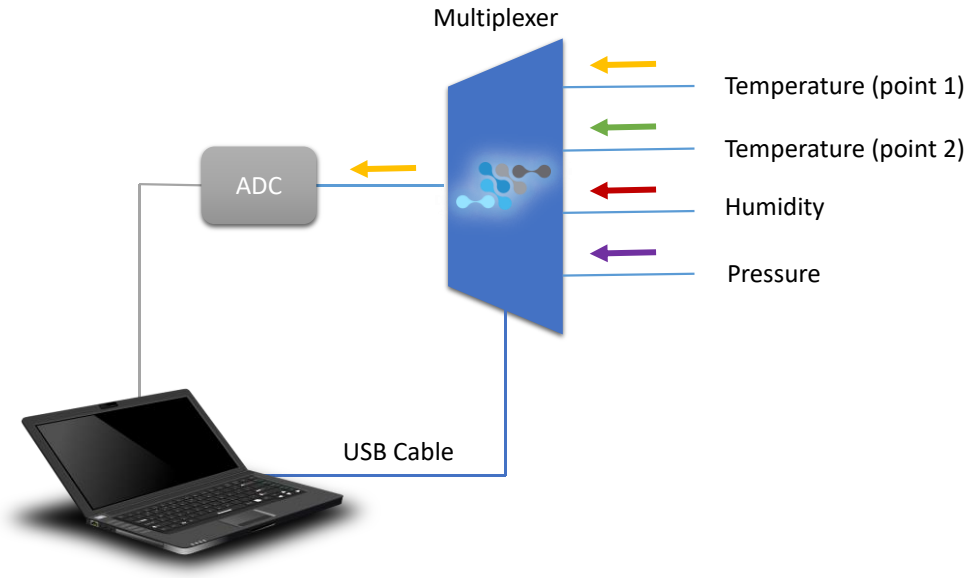


A practical variation of this scheme employs only one receiver and several transmitters located at different positions (or vice versa). Since ultrasonic transducers are bidirectional, a pulse-echo acquisition system can be also implemented. The next figure shows a similar system that only uses one transducer per channel. Each time the multiplexer selects a channel, the corresponding transducer performs a measure operating in pulse-echo mode.



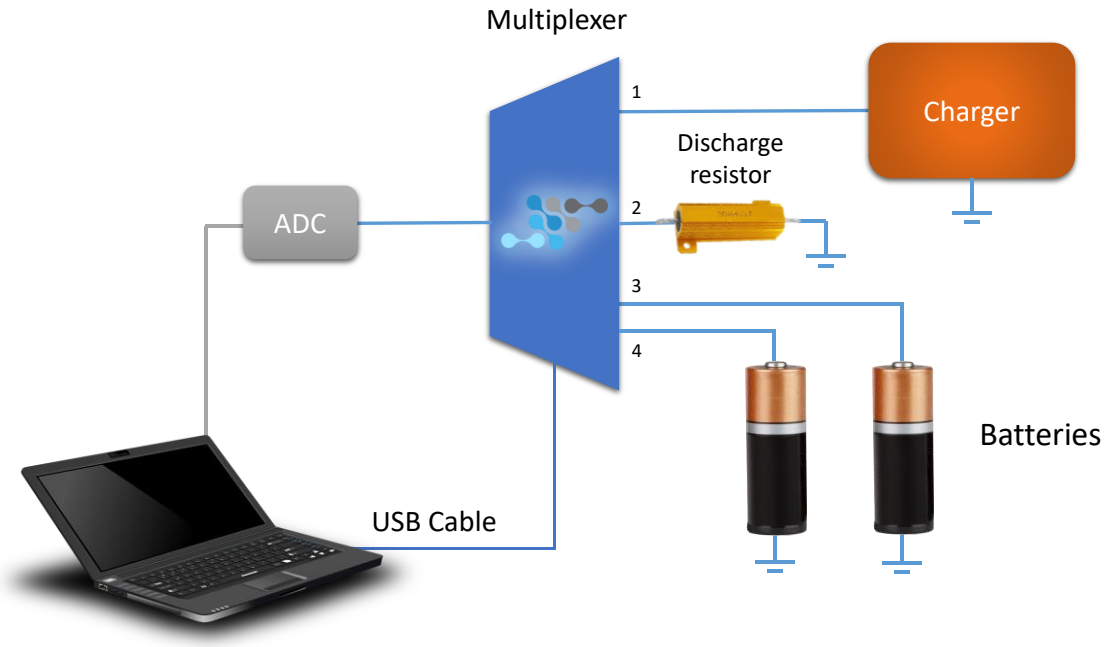
MULTIPLE SENSORS:

A multiplexer can be helpful when measuring data from multiple sources. It allows the acquisition of several signals with a single analog to digital converter. The fast switching speed of the multiplexers (especially those based on solid state switches) allows the measurement of all channels with a frequency high enough for most applications.



BATTERY TEST:

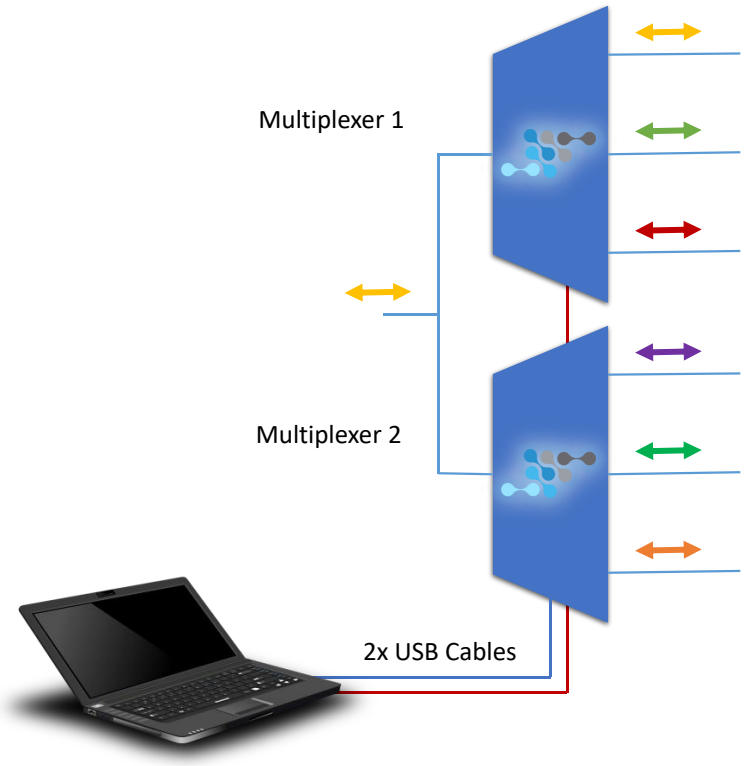
This example illustrates a simple charge-discharge testing system for batteries or supercapacitors. First, the charger is connected to the battery under test (ports 1 and 3 are activated in the figure below). Once the battery is charged, it is connected to a resistor (ports 2 and 3 activated) in order to perform a discharge cycle. This process is repeated until the battery life ends. The common terminal of the multiplexer can be employed to monitor the charge and discharge curves, which are acquired with an analog to digital converter. When the procedure is finished, a new test can automatically start by using a new battery connected to another port of the multiplexer (port 4).



INCREASING THE SIZE:

Ciprian multiplexers have 8 independent ports. Although this is enough for most applications, in some cases more lines are required. In this sense several multiplexers can be employed to work as a bigger-one. This is achieved by simply connecting the common terminals of each device (see figure below). While one multiplexer is working with one or several active channels, the remaining devices can disable all their ports. The user can connect as many

multiplexers as needed, the only limit being given by the maximum number of USB connections (up to 127 ports when using USB hubs).



Ciprian SARL
65 Chemin de Ribotière
38330 Saint Ismier
France
www.ciprian.com
contact@ciprian.com
tel. +33 476 77 17 77
fax. +33 458 00 13 10

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