

## Workshop to demonstrate the use of simulation to aid design in design and development to biomedical applications - Amplification.

When it comes to design and development in biomedical applications (Devices) precision and accuracy are some of the aspects that need to be considered. Any minor variations in the generated waveform can bring about wrong diagnosis, this makes it very crucial for engineers to design biomedical devices with the highest precision possible. The human body is comprised of a number of systems such as respiratory, nervous, cardiovascular systems. Each of these systems is comprised of several subsystems that carry physiological processes. These physiological processes are associated with various kinds of signals known as biological signals which do reflect their variables such as nature and activities which carries useful information.

However, these biological signals are of very low amplitudes which arises the need for amplification. This amplification must provide a good gain to the biological signal over the low frequency range so that the signal is amplified without distortion. With this in mind, a circuit simulation workshop was conducted at the recently concluded UBORA design school at the University of Pisa, Italy.

Simulation of amplification of these biological signal enables engineers to virtually design and test circuitry before building the actual design, an activity that saves time and costs involved in hardware iterations. During the design school students were able to simulate two different types of amplifiers namely the inverting amplifier and the non-inverting amplifier where different external parts such as resistors and capacitors were used to calculate and determine the Gain, they were also able to view the amplified signals with the help of virtual instruments. This in a way gave them a deeper understanding of the theoretical electronic circuits courses taught in class.