WEBINAR:

Prodigy Open-Platform Research Ultrasound System Overview

Questions and answers from the April 5, 2023, webinar titled "Prodigy Open-Platform Research Ultrasound System Overview"

This document includes questions we received and answered during the webinar, as well as those that we did not have time to address.

Is there a limit on the length (i.e., number of samples) of arbitrary transmit waveforms?

The arbitrary waveform length is limited to 4096 samples per 4 channels. Therefore, a maximum of 1024 waveform samples can be set per channel. However, longer waveforms can be set if fewer channels are used. For example, when only 64 channels are enabled in the Prodigy 256 channel system, each channel can be set with up to 4096 waveform samples.

How long can the duration of the pulse be with the high power transmit module?

The high power transmit module allows continuous wave transmission within its power limits.

Is the amplitude tunable between 1V and 170Vpp? Is that max amplitude of 170 Vpp possible for arbitrary signals?

Yes, the amplitude can be set to any integer from 1 to 170 Vpp, and can also be applied to arbitrary signals.

How developed and what does the Python interface look like? Does it come with a native and fully-developed API in Python?

There is a ReceiveData() API that enables real-time access to RF or beam-formed data. Any Python IDE can be used, and sample scripts displaying the image and enabling CNN prediction for speckle reduction are also included with the system. GPU acceleration can also be used in real-time in this manner.

Is the max amplitude of 170 Vpp possible for any type of signal and not only for pulses? I.e., is it possible for sine tone burst signals, chirp signals, arbitrary waveforms and within the whole frequency range from 1 kHz to 30MHz?

Yes, Prodigy allows a maximum amplitude of 170Vpp to be applied to all types of signals and supports them across the whole frequency range from 1kHz to 30MHz.

Is the output signal amplitude tunable at any value between 0 and 170 Vpp, e.g., 1V, 5V, 10V, 50 and so on, up to 170 Vpp? within the whole frequency range 1 kHz to 10MHz?

The amplitude can be set to any integer from 1 to 170 Vpp within the whole frequency range from 1kHz to 10MHz. For 0 Vpp, the Tx channel can be disabled for that event.

Has the amplifier a very linear gain from very low to very high level, at least within 50kHz to 1MHz?

Yes, the Prodigy supports tunable linear gain from 1 to 170 Vpp within the frequency range from 50kHz to 1MHz.

What does "true arbitrary transmit waveform with 4096 levels" mean? Are there false arbitrary waveforms? In what sense is yours true?   What does 4096 levels mean?

"True arbitrary transmit waveform" means that we have digital to analog converters (DAC) and linear amplifiers on all Tx circuits, and the DAC on our design supports 4096 amplitude steps. Almost all ultrasound imaging systems on the market use pulsers on the Tx circuit. Some of them claim to support "arbitrary transmit waveform", but the waveform typically relies on a low-pass filtering effect on the Tx channel to simulate the arbitrary designed waveform; as such, waveform distortion is expected. Hence, their transmit waveforms are not truly arbitrary.

Does the Prodigy work either in pitch catch mode or in pulse-echo mode? Is it possible to switch from one mode to the other depending on our application, using the same Prodigy?

Yes, the Prodigy supports pitch catch and pulse-echo modes or can be configured in pulse-sequence mode to behave in such a fashion. The synthetic aperture focusing mode does something very similar. All modes (except for reflective ultrasound computed tomography which requires a custom firmware) are software-based and can be switched at will.

What connector do you use to plug multi-element probes?

The Prodigy uses Cannon DLM1-156 for 128-channel probes and DLM6-360 for 256-channel probes.

In your presentation, I was able to read something like: " ... transmit frequency 1kHz to 30MHz* in arbitrary waveform "; what does the star (*) next to 30MHz signify?

The * denoted that a non-standard low-frequency configuration is available with transmit frequencies down to 24 Hz. I.e., a range of 24 Hz to 30 MHz.