

## ABSTRACT

- ❑ iPhone JDS used to implement DSP functions.
- ❑ The iJDSP application was first developed in 2011 and then modified to add more functions.
- ❑ Initial iPhone arithmetic was at 32-bit precision.
- ❑ We upgraded all software for iOS 11 at 64-bit precision.
- ❑ We developed and debugged new functions.

## UPDATES IN iOS 11

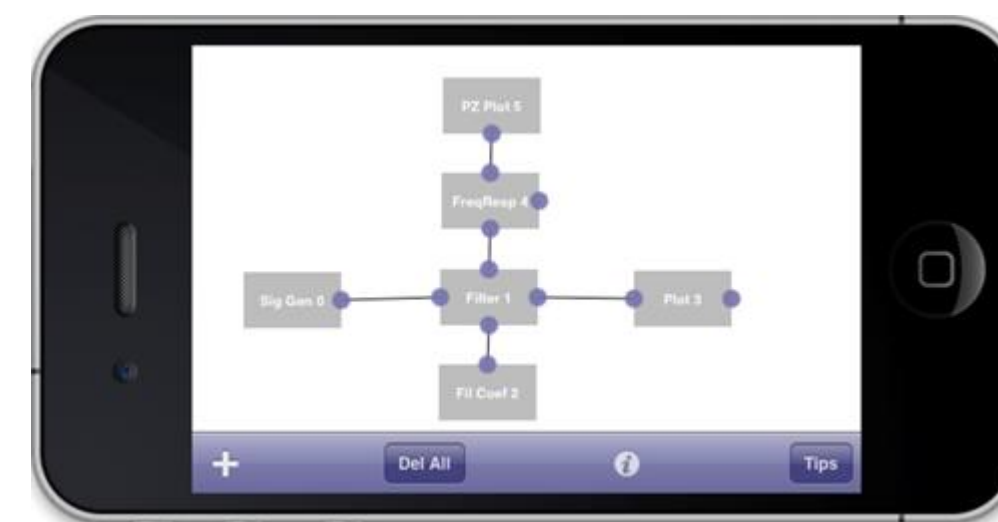
- ❑ New frameworks like ARKit, CoreML, Drag and Drop feature were introduced.
- ❑ Design and performance changes for applications.
- ❑ It was easier to do multi-tasking in iPads.
- ❑ All Apple applications use new features.
- ❑ The support for 32-bit applications was removed.
- ❑ Improved precision and security.

## BENEFITS OF 64-BIT PROCESSOR

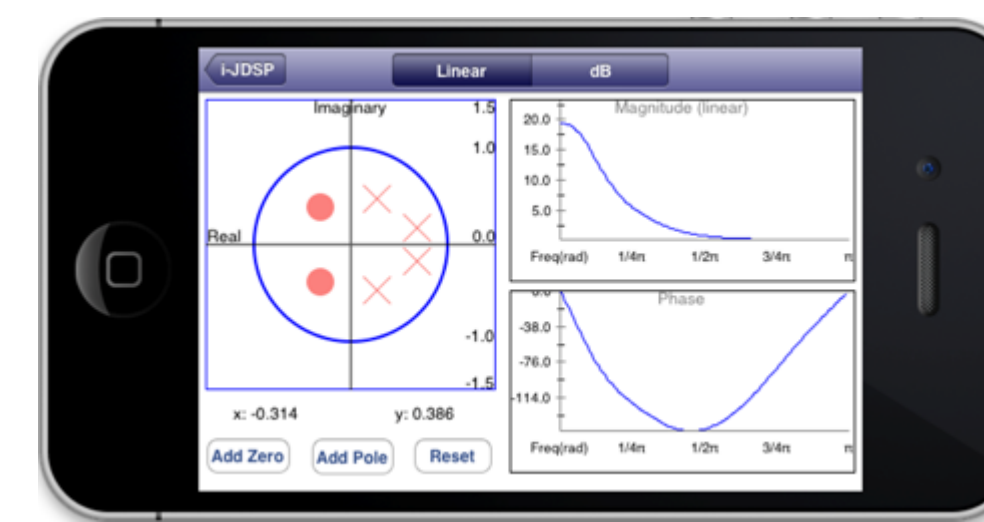
- ❑ Apple introduced 64-bit processors with iPhone 5s.
- ❑ ARMv8 which can support native 64-bit was introduced.
- ❑ Increased the number of registers -> faster execution.
- ❑ The 64-bit processors can address 18.4 exabytes of data, although with the 32-bit chip, memory can only address 4 Gigabytes of data, even if it is capable of more.
- ❑ Due to increase in memory, access time is faster.
- ❑ The 64-bit iOS allows storage of much larger values.
- ❑ More accuracy with DSP functions.

## iJDSP APPLICATION

- ❑ The iJDSP application is used to perform calculations and implement DSP functions in a mobile environment.
- ❑ No special resources required to perform the task.

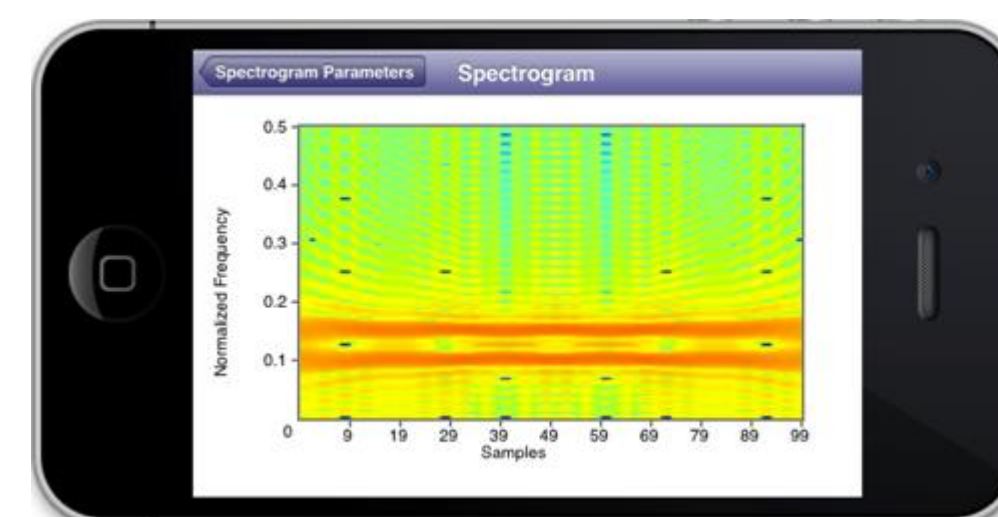


(a)

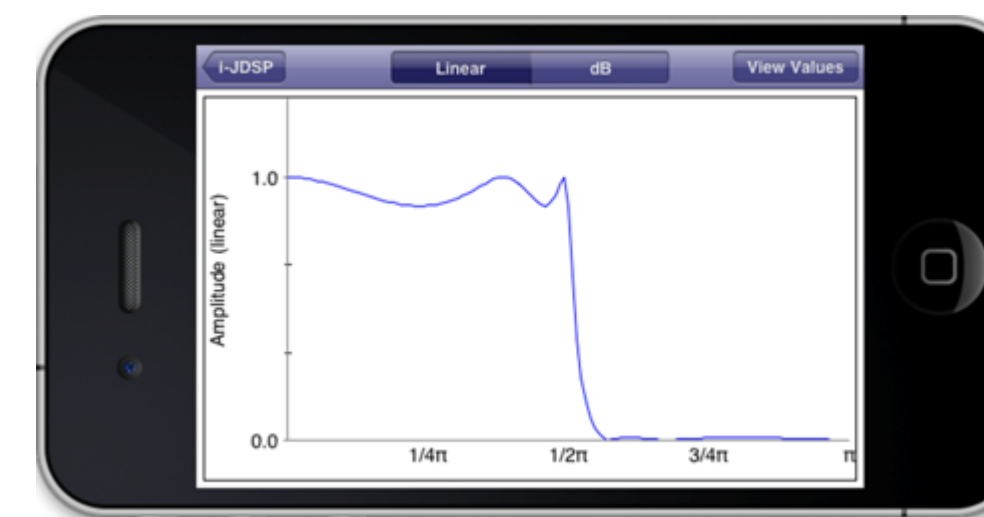


(b)

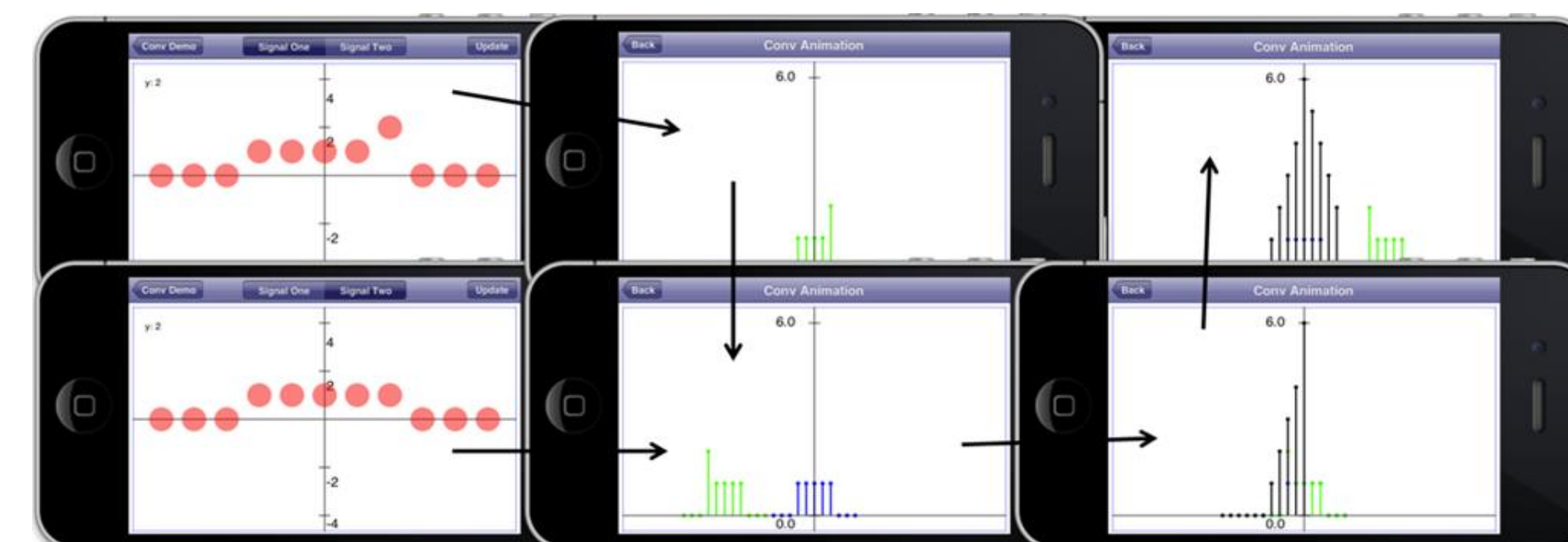
Interface of "iJDSP", a standalone mobile app for signals and systems, and DSP mobile laboratories and simulations. (a) block diagram, (b) z-plane and frequency response interactive simulation and visualization.



Spectrogram of a sum of two sinusoids, each of length of 100 samples and normalized frequencies 0.2 and 0.3 radians.



The magnitude frequency response of the digital filter with coefficients  $a_1=0.2$ ,  $a_2=0.8$  and  $b_0=1$ .



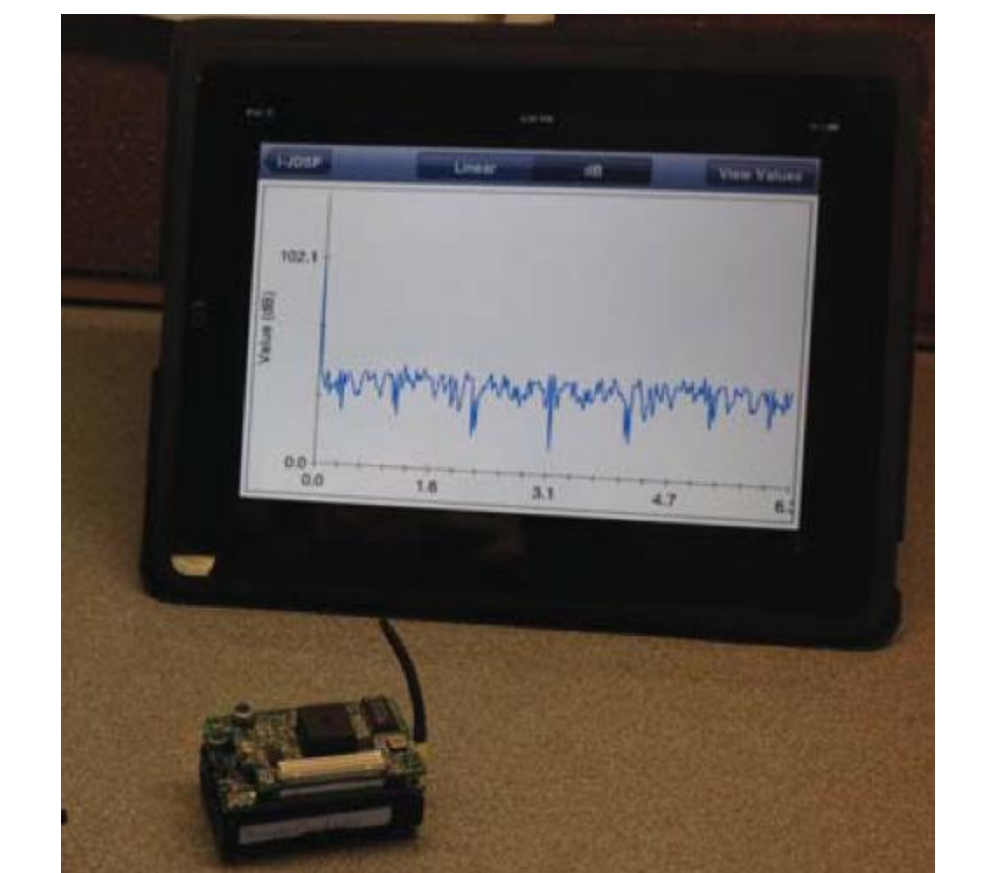
Editing the user-defined discrete-time signals in the Conv Demo block.

## NEW UPDATES IN THE APP

- ❑ Overall user experience has been improved.
- ❑ Made the application responsive to the screen size of the iPhone.
- ❑ Updated the Plotting APIs for better precision and faster performance.
- ❑ Updated the functions to avoid crashes.
- ❑ Added support for iPhone X.



Real-time plots of data recorded from a sensor motor.



FFT magnitude of data recorded from a sensor motor.

## REFERENCES

- ❑ Kalyanasundaram, Girish, Mahesh Banavar, and Andreas Spanias. "Audio modeling and loudness estimation with IJDSP mobile simulations." *Acoustics, Speech and Signal Processing, ICASSP, 2015*.
- ❑ Liu, Jinru, et al. "Interactive DSP laboratories on mobile phones and tablets." *Acoustics, Speech and Signal Processing, ICASSP, 2012*.
- ❑ [https://developer.apple.com/library/archive/releasenotes/General/WhatsNewIniOS/Articles/iOS\\_11\\_0.html](https://developer.apple.com/library/archive/releasenotes/General/WhatsNewIniOS/Articles/iOS_11_0.html)
- ❑ Download the app from AppStore <https://itunes.apple.com/us/app/ijdsp/id540962535?mt=8>

## ACKNOWLEDGEMENTS

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