**DAY 9 ASSIGNMENT**

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| **Date:** | **27-05-2020** | **Name:** | **Ashish Shanbhag** |
| **Course:** | **DSP** | **USN:** | **4AL16EC008** |
| **Topic:** | **DSP** | **Semester & Section:** | **8th A** |
| **Github Repository:** | **Ashish Shanbhag** |  |  |

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| **FORENOON SESSION DETAILS** |
| **FFT Fast Fourier Transform Matlab**  The fast Fourier transform (FFT) is a discrete Fourier transform algorithm which reduces the number of computations needed for N points from 2N2 to 2NlgN, where lg is the base-2 logarithm.  Fast Fourier transform algorithms generally fall into two classes: decimation in time, and decimation in frequency. The Cooley-Tukey FFT algorithm first rearranges the input elements in bit-reversed order, then builds the output transform (decimation in time). The basic idea is to break up a transform of length N into two transforms of length N/2 using the identity        **FIR and IIR Filters**  FIR Filters have a finite impulse response. That is to say, that the impulse response only goes on for a set number of samples. It will never have more or less samples than that number of samples. The following picture is an example of the impulse response for a hypothetical FIR filter.  https://i0.wp.com/theaudioprogrammer.com/wp-content/uploads/2019/03/FIRvIIR_-1.png?w=1080&ssl=1  As shown in this picture, the filter (for the given settings of cutoff, q and gain) will always yield a linear gain of 1 at sample 1, -0.5 at sample 2 and so on and so forth. We also know that this filter impulse response is 5 samples long. The *number of taps* in an FIR filter is always *N*-1 where *N* is the impulse response length in samples. This means that this FIR filter is 4 taps long. This is equivalent to the following diagram:  https://i1.wp.com/theaudioprogrammer.com/wp-content/uploads/2019/03/FIRvIIR_-2.png?w=1080&ssl=1  IIR filters have an infinite impulse response. This means that the impulse response never becomes exactly 0 but rather approaches it. This is controlled via a feed-back loop with a defined gain *a* (or feed-forward loop with defined gain *b*). Imagine if we have a feed-back loop of a 1 sample delay and a gain of 0.5 as portrayed below.  https://i0.wp.com/theaudioprogrammer.com/wp-content/uploads/2019/03/FIRvIIR_-6.png?w=1080&ssl=1  This means that the sample is always halfway towards 0. And the impulse response is as follows.  https://i0.wp.com/theaudioprogrammer.com/wp-content/uploads/2019/03/FIRvIIR_-7.png?w=1080&ssl=1  This signal flow diagram above shows a simple first order low pass filter. We can take an input signal *x*[*n*] and delay that signal by 1 sample, apply a gain and add it to the next sample and output it. That is to say that our output *y*[*n*] is some combination of our current sample *x*[*n*] and the previous output sample *y*[*n*-1].  We can write this mathematically as the following difference equation:  https://i1.wp.com/theaudioprogrammer.com/wp-content/uploads/2019/03/FIRvIIR_-8.png?w=1080&ssl=1 |

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| **Date:** | **27-05-2020** | **Name:** | **Ashish Shanbhag** |
| **Course:** | **PYTHON** | **USN:** | **4AL16EC008** |
| **Topic:** | **Python** | **Semester & Section:** | **8th A** |
| **Github Repository:** | **Ashish Shanbhag** |  |  |

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| **FORENOON SESSION DETAILS**      **Build a Desktop Database Application**  Python has been the most trending programming language used for object oriented progamming. With python you can run simple statement over and over again without having to compile a whole program of which it's output functionality is superb.  Of course, Python is an interactive programming which has a diverse range of options for GUI (Graphical User Interface) framework (help developers create GUI applications in an easy and secure manner).  PyQt is a Graphical User Interface widget toolkit. It is one of the most powerful and popular Python interfaces. It is a combination of the Qt (owned by Nokia) library and Python programming language which leaves a developer to decide whether to create a program by coding or create visual dialogs using Qt Designer.  PyQt is a free Python bindings software open-source widget-toolkit Qt, implemented for cross-platform application development framework. In the free version, certain features may not be available but if your application is open source then you can use it under a free license.  Tkinter is the most popular programming package for graphical user interface or desktop apps. It is so named because of its simplicity. Tkinter is the combination of Tk and Python's standard GUI framework.  TKinter comes with an abundance of resources of codes and reference books which is the major merit of choosing it as a package. It provides diverse widgets, such as labels, buttons, and text boxes used in a graphical user interface application.  Kivy as an OpenGL ES 2 accelerated framework for the creation of new user interfaces empowers you with the ease to write your code once and have it run on different platforms or Operating Systems  (Windows, MacOSX, Linux, Android iOS and Raspberry Pi).  **Front end Interface**    **Back end** |