

*Team 13361*

*MSD 1*

*Project Summary*

This project generates a laboratory experience that will be used as a teaching guide to introduce filters to the EMEM-543 course. The lab to be designed will introduce and demonstrate various implications of filters in engineering by focusing on three different cases. The first front is one-dimensional audio signal case. The student will have the capability of recording a waveform or using a prerecorded audio signal and will wire the included circuit board to act as a high pass, low pass or band pass filter. Through this interaction the student will be able to hear different ranges of frequencies of the signal utilizing the various filters. This method using auditory enforcement to demonstrate the implication of filtering.

The second topic is that of image processing, where the user will have the ability to either import an image through their cell phone or be able to capture a snap shot of themselves through a USB webcam. The use of filters through image processing will demonstrate the fact that an image can be smoothed, sharpened, or processed using edge detection. Such implications will be give the student further merit of the applications of filtering in the visual realm.

The last area is that of phase. Phase can be easily concluded as just a delayed version of a signal; however, the importance of this effect is generally not appreciated until the student is much further in his or her career (when he or she is designing). As phase is a more abstract concept, this will help characterize its effects in a more concrete setting. This activity aims to focus on engaging the student in learning about why phase must be considered in hardware or software design.

In addition to the learning modules that are to be developed, all associated documentation must be included, as well as the associated hardware and software peripherals necessary for the lab. A thoroughly successful design will create an immersive learning experience and demonstrate multiple aspects of filter applications in a compact and easily accessible manner while still being highly informative.