

555 2.0:

// Kyle Smith

Goals:

For this independent study, I will continue to develop my skills in designing, prototyping, and fabricating small analog modular instruments. In the spring semester of 2024, I participated in the SynthU Hackathon, where I designed and built a simple analog synthesizer.

This independent study with Professor Schaal offers an opportunity to iterate upon that design, incorporating both analog and digital control over the synth voice. I am fascinated with boutique, DIY analog modular synthesis and plan to further develop this project in graduate school. To complete the independent study, I will research, design, and fabricate an analogue synth voice and a series of 4 total filters: low-pass, high-pass, band-pass and one more, currently unknown, synth voice control element.

This will result in well documented schematics/designs as well as the final prototypes. The final deliverables will also include video documentation featuring an original composition that highlights multiple recordings using the analog instrument and filters fabricated during the independent study.

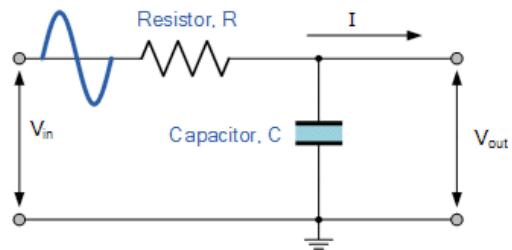
Method of conducting and evaluating the Independent Study:

For this independent study, I will use practical design, prototyping, and iterative testing methods to develop an analog synth voice and a series of four analog filters. I'll start with a deep dive into existing literature on analog modular synthesis, then move on to creating and refining prototypes.

I will document progress through weekly updates submitted every Thursday via GitHub/email to Professor Schaal. By July 5, I'll submit all final deliverables virtually, including a detailed written report with schematics, design notes, and a video demo featuring an original composition using the instrument/filters I've built.

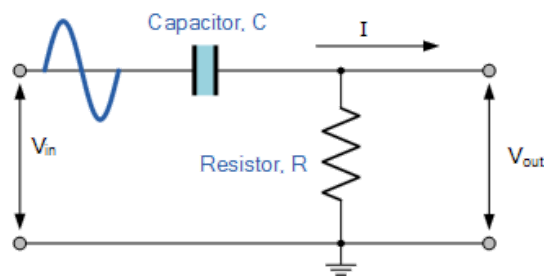
Evaluation will be based on the quality of research and design, how well the prototypes work, thoroughness of documentation, communication, and adherence to the timeline. Each week I am committed to spending at the minimum 6 hours researching, developing, and documenting the project resulting in just over 27 total hours over the course of the Summer Session A.

1.) low-pass

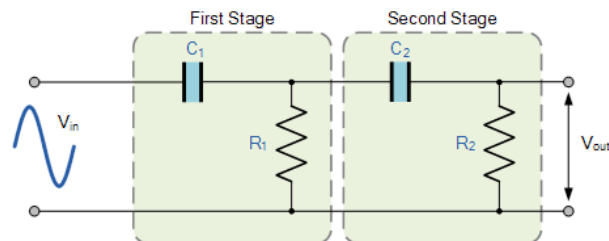


The above schematic is the current lowpass schematic I am going to start testing next week.

2.) high-pass



2nd Degree High-Pass:



Most likely all filters will need to be "2nd Degree, Passive, Analog Filters".

3.) band-pass

a.) will use a combination of the above filters to create a band pass filter unless a I discover a different, more concise option.

4.) (unknown - potentially experiment with Daisy Seed)

Have started reading about the potential DSP effects possible with the Daisy Seed, I will need to learn more going forward.

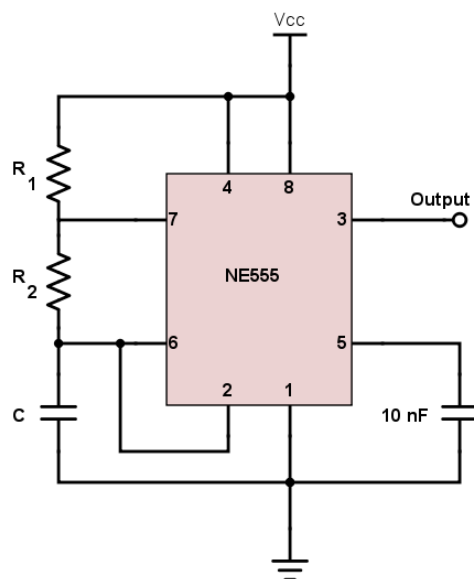
Here is the website I am currently referencing for the schematics as well as the equations necessary to calculate the necessary capacitor and resistance values:

<https://www.electronics-tutorials.ws/>

I am looking into using TL074 Op-Amps as well to make the filters active and if I am lucky, Voltage Controlled.

However, I do not think I am interested in building these into Eurorack Modules and for the sake of this project I'd like them to be entirely standalone and proprietary.

I will be using a 555 Integrated Circuit to generate a square wave. I have also included a series of sketches and schematics showing how I plan to use the Astable Circuit.



After some research I think there is potentially a way to stabilize the signal over 0 with an op-amp, but I will need to do more research; The same is said with the potential of using the 555 to generate a sine wave.

I have begun collecting the necessary components and will begin testing and documenting the high pass filter early next week.