Tyler Evans U1313811 12.3-13.2021

ECE 1245: Preliminary Design Review (PDR)

Switch used:
IR remote.

Sensor used:
IR Receiver
Photo resistor

Output:
Arduino if time for additional features(fun)
Buzzer is most likely.

Input:

Conditional gate op Amp and averaging op amps used:

Logic gate for the IR receiver and output of Vo from op amp

Abstract

Project averages daylight, compares for appropriate amount of daylight and when remote is pressed triggers gives voltage for a source that is either an Arduino or buzzer.

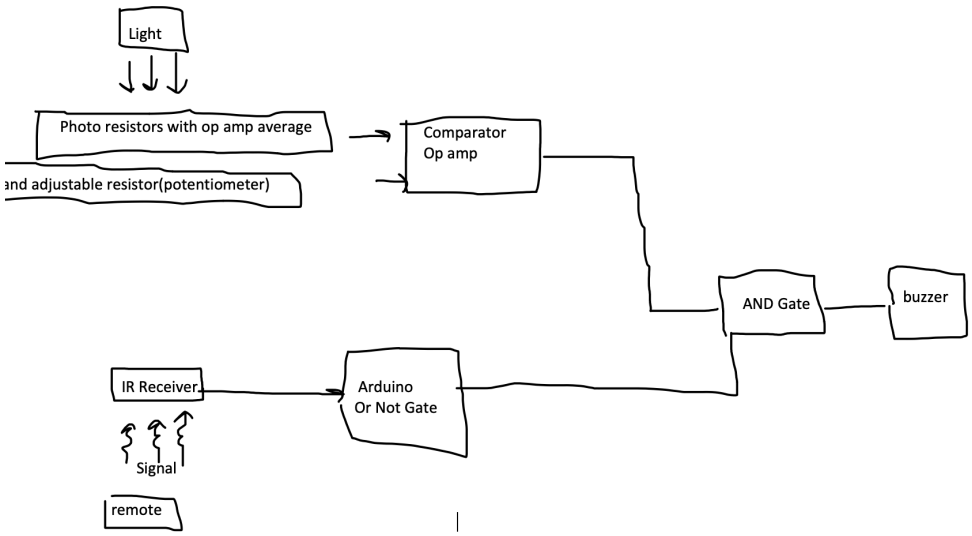
Introduction

electricity is sometimes wasted on devices at night, and when not in use. It would be nice to have a direct way to control power for a device from a set distance during a specific time of day. Personally this could be applied to play music only during the day time from a set distance.

Solution:

How I intend this circuit to work is through two portions the first portion is the photo resistor portion that would turn on or off a voltage dependent on how much light is outside the This will be an averaging photo resistor op amp and a conditional opt amp with two voltages the first will be the photo resistor the second shall be the voltage that is determined at the acceptable amount for daylight at a given time. Because daylight time varies it will have an adjustable resistor (potentiometer). On the second portion an infrared receiver will receive an Ir signal and produce voltage. This will end up going to a logic gate that will follow and structure producing final voltage to be used with either a Arduino/Raspberry pi or a buzzer for the sake of time. References will be used for Ir sensor and can be found here at website and sourced at http://eeshop.unl.edu/pdf/VS1838-Infrared-Receiver-datasheet.pdf[1] and additional cation on code examples here at https://www.arduino.cc/en/Tutorial/BuiltInExamples/ReadAnalogVoltage [2].

Parts needed	Quantity estimated		Cost
Photo resistor	2		0.99[3]
Arduino	1		20[4]
Resistor 10 Ω	2	0.11 per 1	0.22[5]
Resistor 1K Ω	4	0.15 per 1	0.60[6]
100K potentiometer	1		0.7[7]
1838 IR Receiver	1		0.35[8]
Transmiter / controler	1		6.99[9]
74HC00 TI and gate	2	.8 per 1	1.6[10]
LM 324N TI op amp	3	.10 per 1	0.30[11]
Buzzer	1		0.95[12]
			Projected cost Design
			32.7



Digram

References:

[1] “TL1838 infrared receiver Datasheet - eeshop home page,” *openim pulse*. [Online]. Available: http://eeshop.unl.edu/pdf/VS1838-Infrared-Receiver-datasheet.pdf. [Accessed: 03-Dec-2021].

[2] T. A. Team, “Read analog voltage,” *Arduino*. [Online]. Available: https://www.arduino.cc/en/Tutorial/BuiltInExamples/ReadAnalogVoltage. [Accessed: 11-Dec-2021].

[3] *Photoresistor / cds cell / LDR*. [Online]. Available: https://vetco.net/products/photoresistor-cds-cell-ldr-d60?gclid=CjwKCAiAksyNBhAPEiwAlDBeLA3DAsagJCpZplvRzU28ztTtpUCwH0KfGs7o32cA02uyqswXnWkvSxoCmigQAvD_BwE. [Accessed: 11-Dec-2021].

[4] “Arduino A000057 Leonardo with Headers ,” *Amazon*. [Online]. Available: https://www.amazon.com/Arduino-A000057-Leonardo-with-Headers/dp/B008FZJC74/ref=asc_df_B008FZJC74/?tag=hyprod-20&linkCode=df0&hvadid=312069228616&hvpos=&hvnetw=g&hvrand=5031049860776656405&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9052809&hvtargid=pla-492686100233&psc=1. [Accessed: 10-Dec-2021].

[5] “CFR-50JT-52-10R,” *DigiKey*. [Online]. Available: https://www.digikey.com/en/products/detail/yageo/CFR-50JT-52-10R/13921538?utm_adgroup=Yageo&utm_source=google&utm_medium=cpc&utm_campaign=Smart+Shopping_Supplier_Yageo&utm_term=&utm_content=Yageo&gclid=CjwKCAiAtdGNBhAmEiwAWxGcUvRVk91x__v6zFNmStkrASBOxLjTI9ycM4tRtAyieSi5cN22ewXeNxoC6xEQAvD_BwE. [Accessed: 12-Dec-2021].

[6] “P160KN-0QD15B10K - rotary potentiometer, conductive plastic, 10 Kohm, 1 turns, linear, 200 MW, ± 20%, P160 series,” *Newark*. [Online]. Available: https://www.newark.com/tt-electronics-bi-technologies/p160kn-0qd15b10k/rotary-potentiometer-10kohm-16mm/dp/63M1595?gclid=CjwKCAiAksyNBhAPEiwAlDBeLNUtgY2BaQqfWrz0Zy8KwpPznJl3jApj26UpzPKQWmmMxVDlwmFP3RoCeqYQAvD_BwE&mckv=slj3SIGm4_dc%7Cpcrid%7C434136793395%7Cplid%7C%7Ckword%7C%7Cmatch%7C%7Cslid%7C%7Cproduct%7C63M1595%7Cpgrid%7C100464450426%7Cptaid%7Cpla-901397246856%7C&CMP=KNC-GUSA-GEN-Shopping-NewStructure-Passive-Components. [Accessed: 11-Dec-2021].

[7] “ELEDIY 20Pcs IR Receiver Diode VS1838B - 38KHZ ,” *Amazon* . [Online]. Available: https://www.amazon.com/ELEDIY-20Pcs-Receiver-Diode-VS1838B/dp/B071976MZ8/

ref=asc_df_B071976MZ8/?
tag=hyprod-20&linkCode=df0&hvadid=318951396176&hvpos=&hvnetw=g&hvrand=13507369
883159386776&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=90
52809&hvtargid=pla-612320844873&psc=1. [Accessed: 11-Dec-2021].

[8] "Remote-control extenders | Amazon.com," *Tolako Infrared Wireless Remote Control IR Kit Controller for Arduino* . [Online]. Available: https://www.amazon.com/remote-control-extenders/b?node=11039361. [Accessed: 11-Dec-2021].

[9] "SN74LS32N Texas Instruments: Mouser," *Mouser Electronics*. [Online]. Available: https://www.mouser.com/ProductDetail/Texas-Instruments/SN74LS32N?qs=q2XTDbzbm6DA9Mnew5GiLA%3D%3D&mgh=1&gclid=CjwKCAiAksyNBhAPEiwAlDBeLOm6pniNBkmjyI0850S_XFkxB-jChdyqRQd4MkwdKe2uphWwmicIORoCpxUQAvD_BwE. [Accessed: 11-Dec-2021].

[10] "LM324," *LM324 data sheet, product information and support | TI.com*. [Online]. Available: https://www.ti.com/product/LM324#tech-docs. [Accessed: 03-Dec-2021].

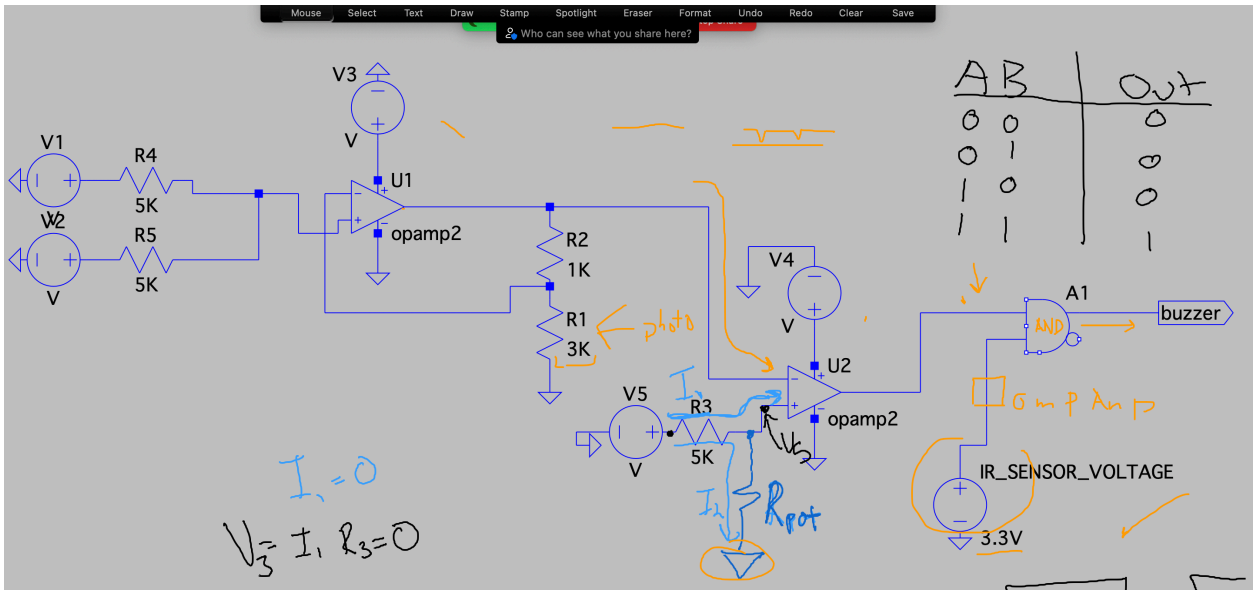
[11] A. Industries, "Buzzer 5V - breadboard friendly," *adafruit industries blog RSS*. [Online]. Available: https://www.adafruit.com/product/1536?gclid=CjwKCAiAksyNBhAPEiwAlDBeLBk7KPAuVitIS-oo9WzaNpVqp3MIKIAXg-DL75DVD1yzQl4FJp7YABoCoEYQAvD_BwE. [Accessed: 11-Dec-2021].

[12] "SNX4HC00 quadruple 2-input NAND gates datasheet (rev. H)," *Texas Instruments SN74HC86-Q1*. [Online]. Available: https://www.ti.com/lit/ds/symlink/sn74hc00.pdf?ts=1605228534576&ref_url=https%253A%252F%252Fe2e.ti.com%252F. [Accessed: 03-Dec-2021].

[13] "SN74HC86-Q1," *SN74HC86-Q1 data sheet, product information and support | TI.com*. [Online]. Available: https://www.ti.com/product/SN74HC86-Q1?utm_source=google&utm_medium=cpc&utm_campaign=ti-null-null-xref-cpc-pf-google-wwe&utm_content=xref&ds_k=%7B_dssearchterm%7D&DCM=yes&gclid=EAIaIQobChMIvMyfr7_I9AIViCtMCh3Y9QTQEAAYAiAAEgJbEfD_BwE&gclsrc=aw.ds. [Accessed: 03-Dec-2021].

Tyler Evans U1313811 12.3-13.2021

Simulation of Circuit here

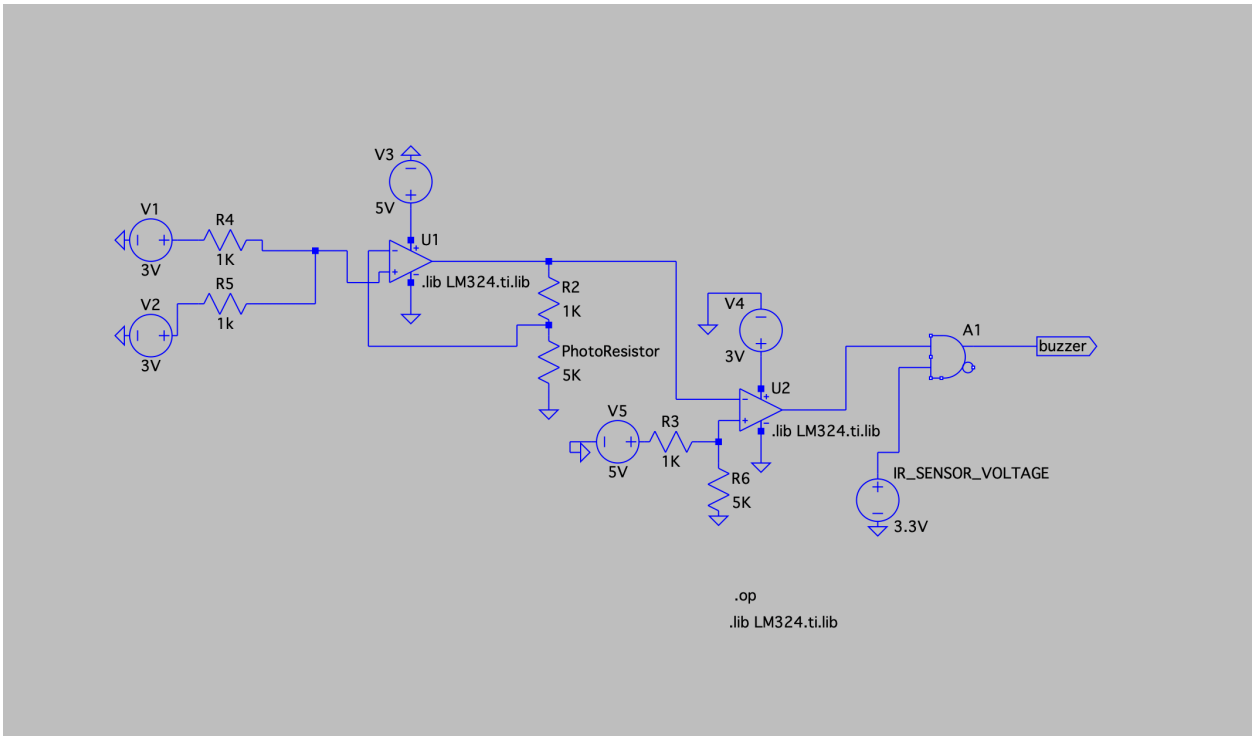


Original schematic that did not do its purpose.

Issues: This design did not use voltage divider's, however further discussion about when building the circuit and the issues of it with the T.A for this course revealed that it was needed for the behaviour that was intended. It was a great lesson that took a few hours off my day. Please forgive me for being late when I was doing this project.

Tyler Evans U1313811 12.3-13.2021

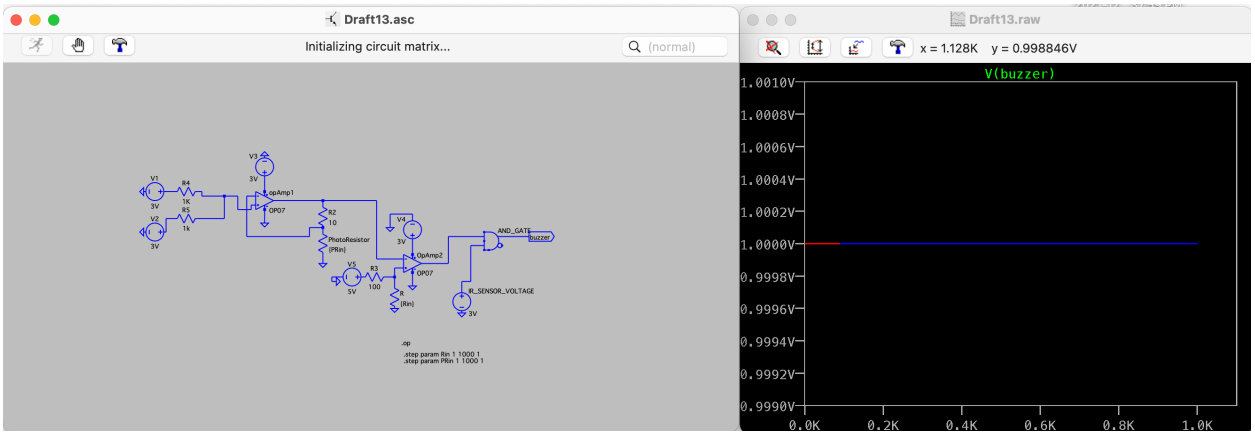
Second design of the circuit

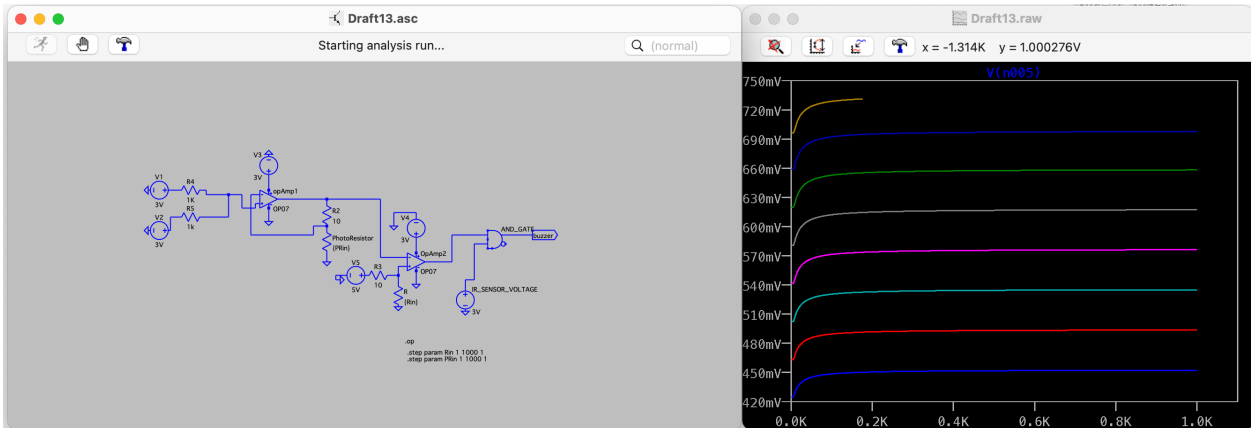


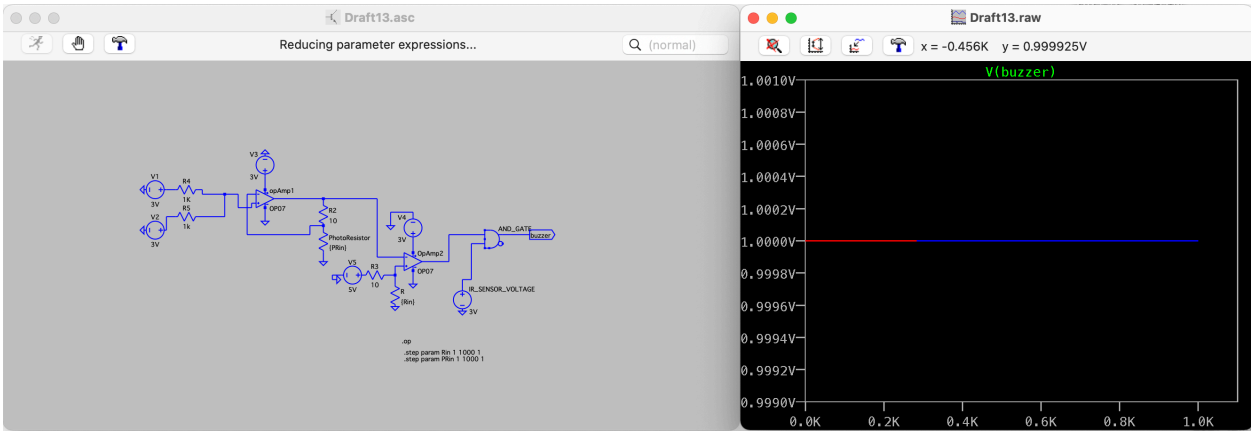
What was done incorrectly here was the 1K restore and the neglect of the voltage divider.

Additional mistakes were made and revisions had to made again.

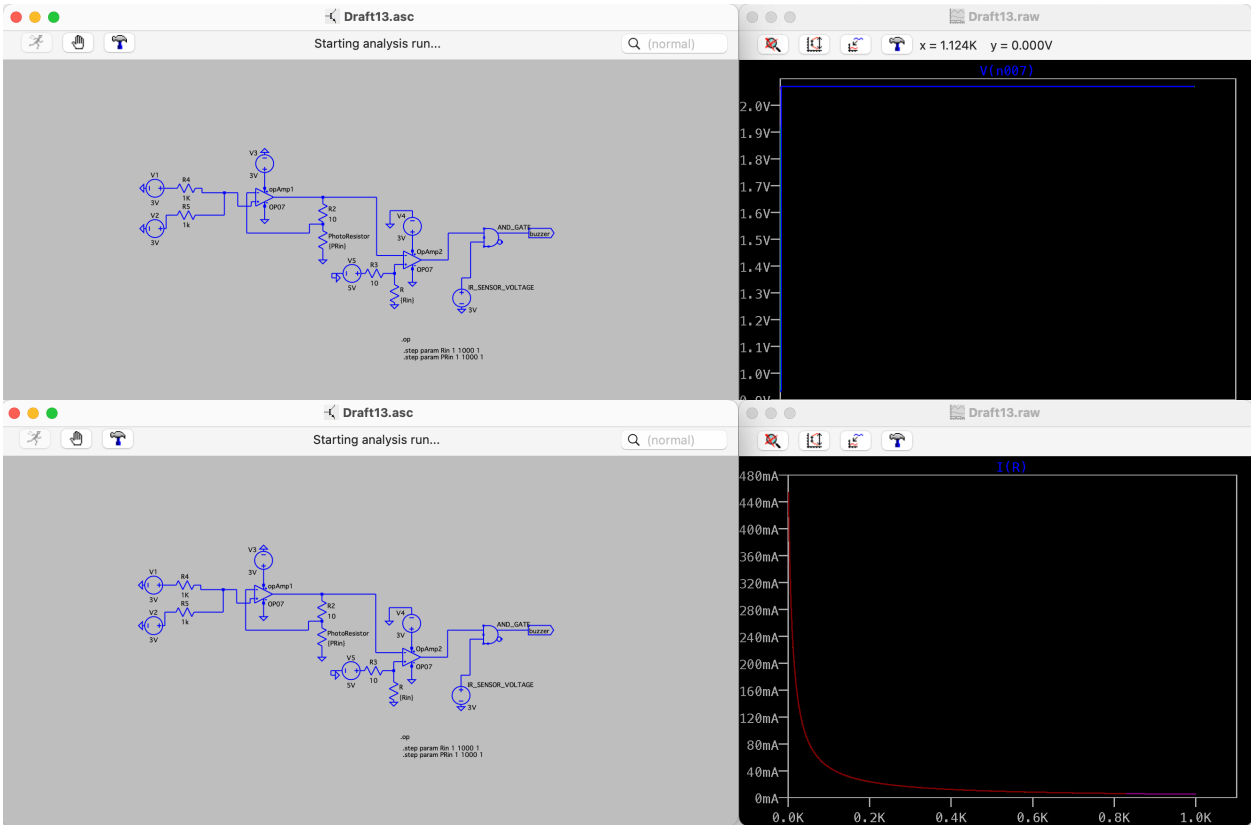
Tyler Evans U1313811 12.3-13.2021

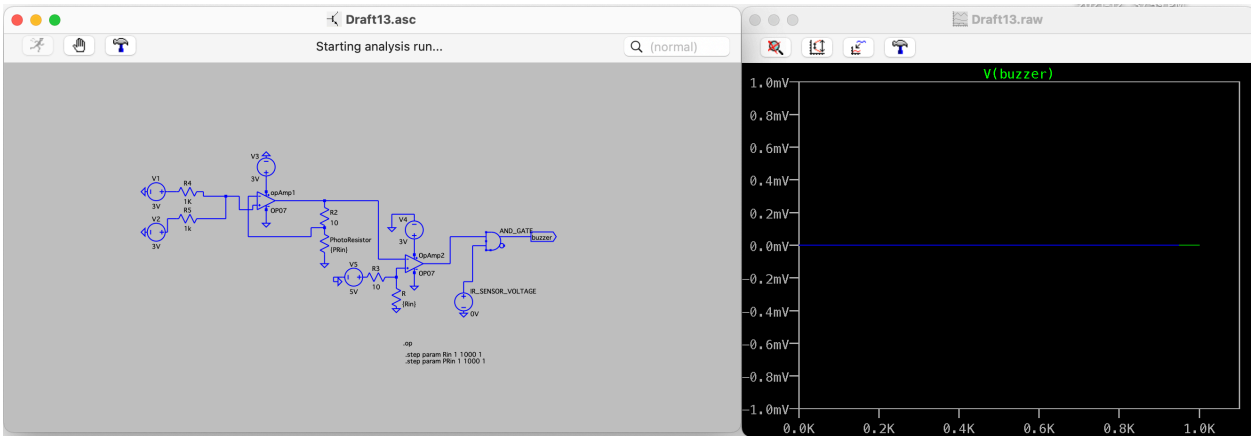




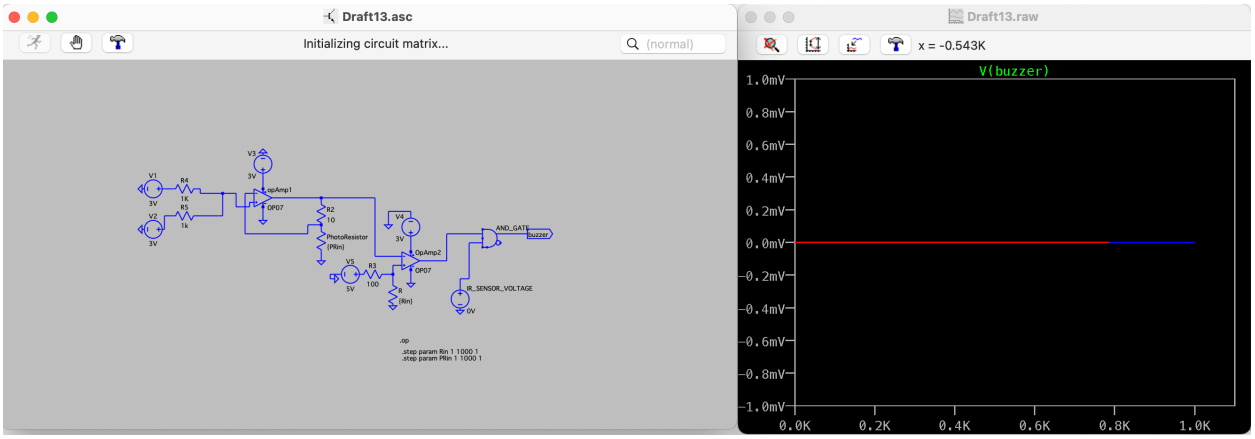


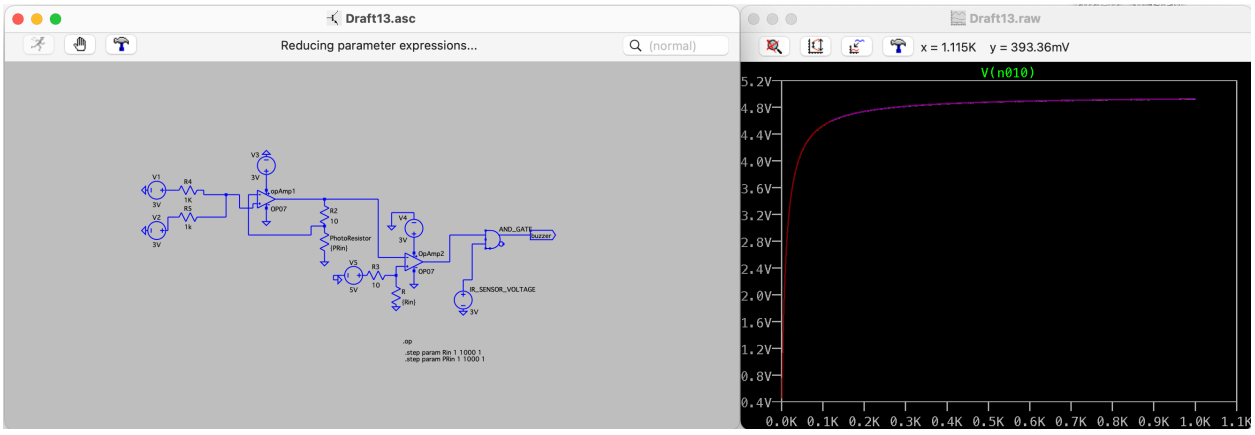
Tyler Evans U1313811 12.3-13.2021



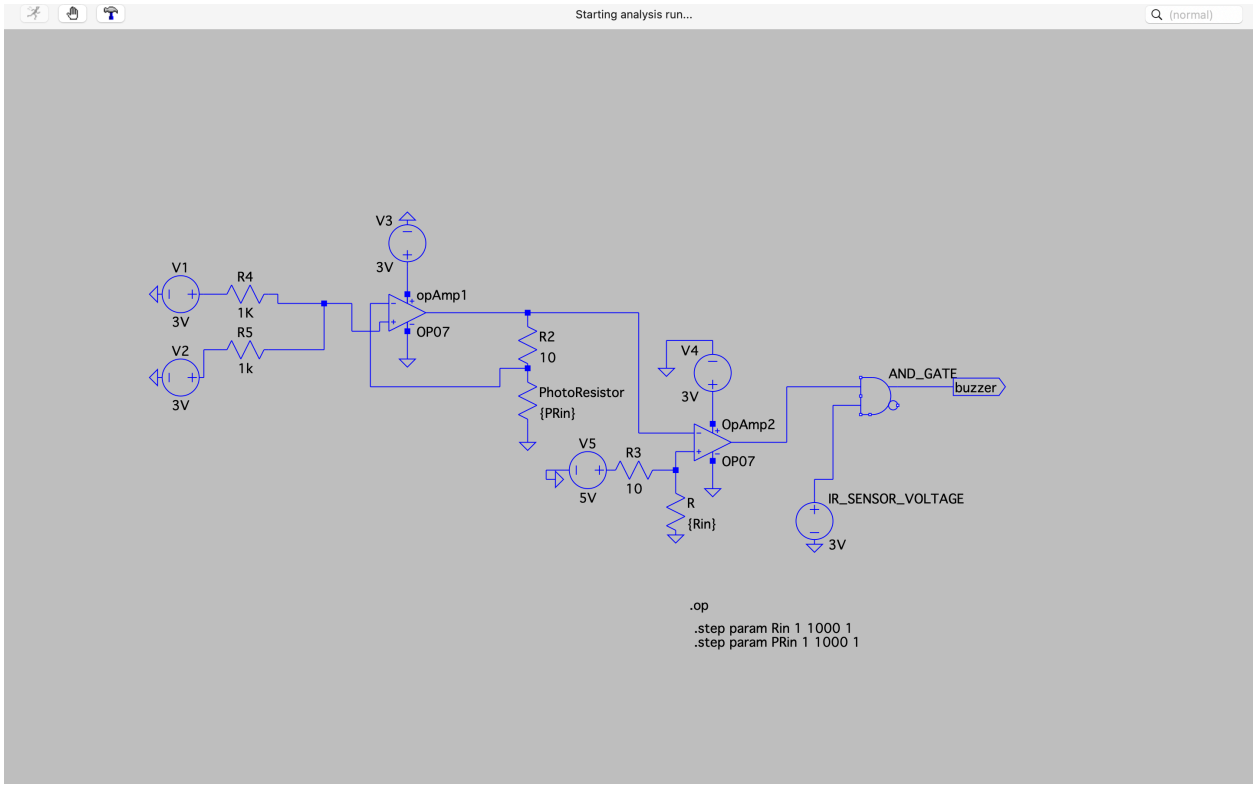


Tyler Evans U1313811 12.3-13.2021





Tyler Evans U1313811 12.3-13.2021



Here is the final design and the intended voltage outcomes may change, however the design should remain the same I have tried building out portions and got it working in some parts. Because of the amount of samples the graphs above show voltage varying over small amounts and it is because the software cannot keep up with the amount of times it has to graph the object it is quite entertaining to see, and I wish this would have been in one of the labs.