

ECE 321 - Homework #2

Push-Pull Amplifiers & Temperature Sensors. Due Monday, April 12th

Please make the subject "ECE 321 HW#2" if submitting homework electronically to Jacob_Glower@yahoo.com (or on blackboard)

Push-Pull Amplifiers

- 1) Assume you only have access to a +5V power supply. Design a push-amplifier to drive an 8-Ohm speaker
 - Input: 0..5V analog signal, capable of 22mA
 - Output: 8 Ohm speaker
 - Relationship: $Y = X$
- 2) Simulate this design in CircuitLab. Verify
 - Its operation (you can now drive an 8-Ohm speaker), and
 - Its limitations (what voltage range are you able to output? 0V .. 5V?)
- 3) Build this circuit in hardware to amplify the output of your mixed. Verify
 - Its operation (you can now drive an 8-Ohm speaker), and
 - Its limitations (what voltage range are you able to output? 0V .. 5V?)

Temperature Sensors

Assume you are using a thermistor where the temperature - resistance relationship is

$$R = 1000 \exp\left(\frac{3905}{T+273} - \frac{3905}{298}\right) \Omega$$

where T is the temperature in degrees C.

- 4) Design a linearizing circuit so that the resistance is approximately linear from 10C to +30C. Plot the resulting resistance vs. temperature relationship.
- 5) Using the linearizing circuit from problem 4, design a circuit which outputs
 - 0V at 10C
 - +5V at +30C
 - Proportional in between.Plot the resulting output voltage vs. temperature.
- 6) Using the linearizing circuit from problem 4, design a 555 timer which outputs 500Hz at +10C
 - Determine the frequency it outputs from 0C to +40C