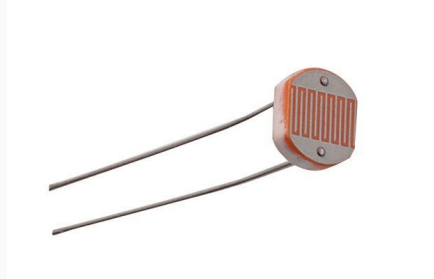# Lab 3 Introduction Part 1

Exploring Digital Signal Processing
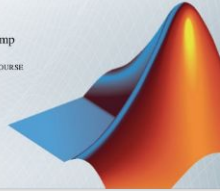
# Things You Will Need
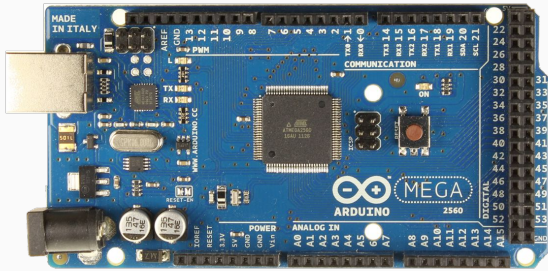
# MATLAB OnRamp Assignment

- Interactive tutorial created by MathWorks, the creator of MATLAB
- Can be found at:
  https://matlabacademy.mathworks.com/en/selfpaced/gettingstarted/
- No need to download/install MATLAB for this tutorial
- Will need MathWorks user ID (use ucsd email)
- Will take approximately 2 hours
- At the end of the tutorial, you will get a certificate
- Submit a picture of your certificate on TritonEd **by 11:59pm Tues, 2/12**

# MATLAB App Designer Tutorial
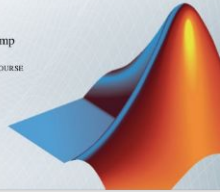
- Quick Video and Tutorial for App designer in MATLAB
- Video (5 min) can be found at:
- https://www.mathworks.com/videos/app-designer-117921.html
- No need to download/install MATLAB for this tutorial
- Tutorial can be found at (need MATLAB):
- https://www.mathworks.com/help/matlab/creating_guis/create-a-simple-app-or-gui-using-app-designer.html
- Will take approximately 15 minutes to complete.
- There is no submission needed, but a 5th & 6th question will be asked on the Wednesday quiz to indicate whether you completed video/tutorial

# MATLAB Accessing

**ACCESS:**

Download (mac & pc)

matlab.ucsd.edu/student.html

# Lab 3 Part 1 - Challenges

- Part 1 (Intro DSP) will be posted on Monday.
- Part 2 (Image Processing) will be posted on Friday

# Challenge 2A: Creating a Signal

- Simple Code that will generate a sine wave and a time domain and then will graph that sine wave
- Also generates a cosine wave
- Your job is to create different sine waves with different frequencies, amplitudes, and sampling frequencies

# Challenge 2B: Receiving Signal Through Serial

- Arduino and MATLAB code given to you to create your own signals
- We do this using a simple photoresistor circuit
- To create a sine wave, move your hand up and down to change the level of light around the photoresistor
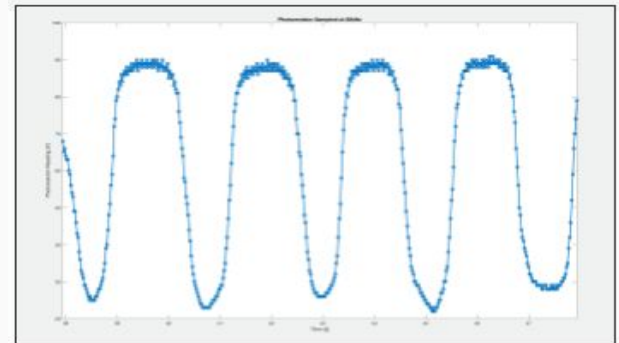
# Challenge #3A: Sample Signals via Functions

- Fill in the blank code
- Shows how to use functions in MATLAB
- Do not add lines of code to the function
- Do not call subplot or plot in genSine
- Do not hardcode in numbers
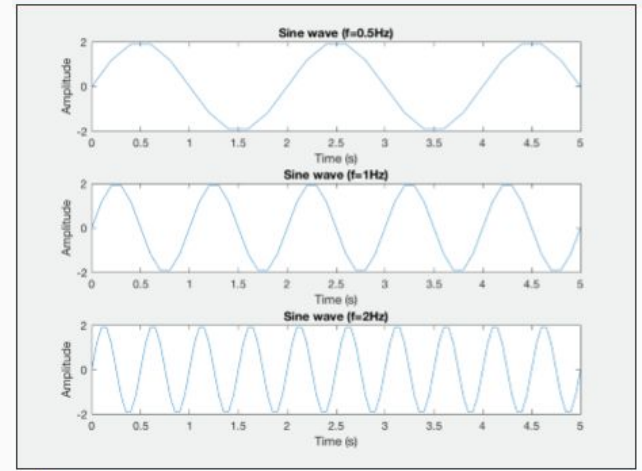
# Challenge #3B: Sampling with Arduino/MATLAB

- Basically doing the same as challenge 2B, with creating our own sine wave with the photoresistor circuit
- However, now the sampling rate will be different
- There will be four different plots with different sampling frequencies
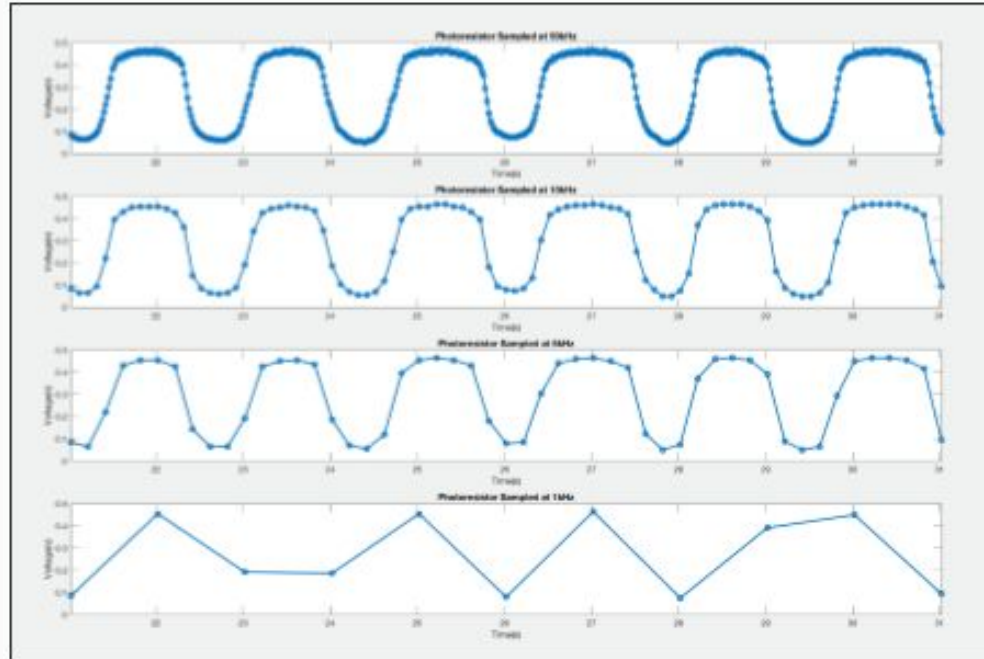
# Challenge #4: Time and Frequency Representation

- In part 1, you will generate three sine waves using the function in 3A, combine the three waves, and then use a Fourier Transformation in order to plot the combined wave in both the frequency and time domains
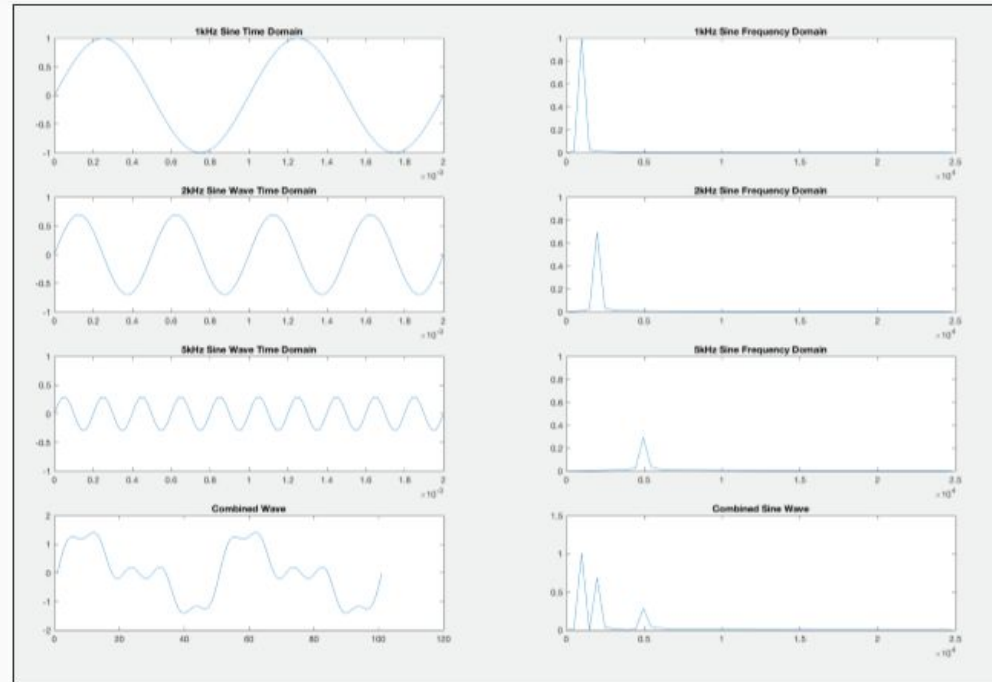
# Challenge #4: Time and Frequency Representation

- In part 2, you will create your own sine wave with the photoresistor circuit, and use a Fourier Transformation to find the frequency of the sine wave
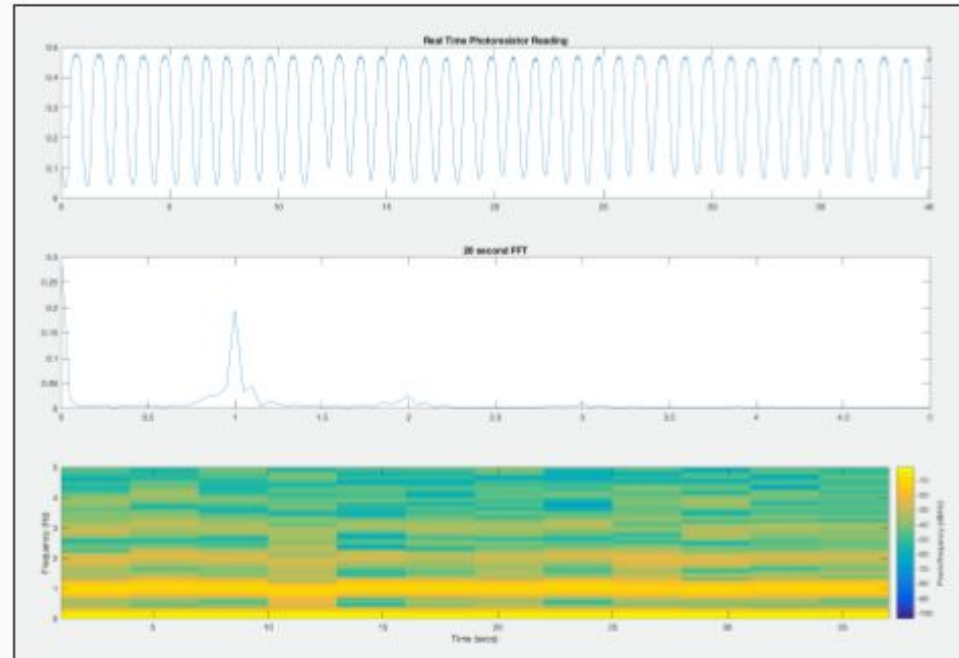
# Lab 3 Submission / Due Date

- MATLAB OnRamp
  - Submit Picture of Certificate on Grade Scope
  - Due 11:59PM Tueday, 2/12/19
- MATLAB App Designer
  - No submission needed (but 2 questions on quiz)
- Remember to take pictures/screenshots of the different plots
- Save all modified or create MATLAB code
- Lab 1 Part 1- Submit on GradeScope before Sunday 11:59 pm 2/17/19
  - Submit slides as PDF
  - Submit all modified code in a single .zip file
- Remember, this is only Part 1, there is also a Part 2 that goes over image processing