10/15

Tags october meetings

- budvin - analyzing the adc code
- venkatesh - looking into pcb design for epc 901 (and then 905)
- madison - researching lens to use

▼ choosing lens

- parameters:
  - 1024 pixels
  - 7.5um width per pixel
  - image (lens) distance of 1 cm
  - object distance of 50 cm
- all variable magnification lens come to a point of focus based off of:

$$\frac{1}{f} = \frac{1}{z} + \frac{1}{z'}$$

  - where..
    - z' is the image distance (distance from lens to sensor) — 1 cm
    - z is the object distance (distance from lens to object) — 50 cm
    - f is the focal length of the lens = 9.8 mm
  - eq might fall short because it does not describe the FOV
- better eq for solving for which focal length lens is required to solve an application, given fundamental parameters such as FOV and sensor size

$$H = H'(\frac{z}{f} - 1)$$

  - where H' and H are the size of the image plane (most often a sensor size) and FOV respectively
  - typical machine-vision lenses:
    - f/2.8 → f = 2.8 × 12.7 mm ≈ 36 mm
    - f/4 → f = 4 × 12.7 mm ≈ 51 mm
  - given our parameters..
    - z is the object distance (distance from lens to object) — 50 cm
    - H' is the sensor size — 7.68 mm
    - f is the focal length (fixing it here based off previous calculations) — 51 mm
    - H is the FOV — 67.6 mm
- chosen lenses (plano concave mounted):

    - http://digikey.com/en/products/filter/lenses/1045?s=N4IgjCBcoGwJxVAYygMwIYBsDOBTANCAPZQDa4ADABwBMArHSIWHVXGACxPhUf0QBdQgAcALlBABlUQCcAlgDs/

- the lenses are very expensive