Feb. 22

![Diagram of camera and control system with labels]

Lab 5

- Camera
- Processing
- VGA
- Control

Final Project

- Camera
- Pre
- VGA
- Control_Cam
- Control_VGA

0 = black, 128 = gray, 255 = white

Units [0-255]
Often choose SAT-HI + SAT-LO as max and min 2's compl. range

ex: 5 bit out [-16, +15]
To saturate 5 bits, look for 5+1 MSB bits not the same,

0 = SAT-HI
1 = SAT-LO

Lab 5
Reset - SW

Model - selectable by SW switches probably a large case block

Process: pixel in → pixel out

* RGB
  - Red normal, \( \frac{1}{2} \), \( \frac{1}{4} \), off
  - Green
  - Blue

* Brightness

* Contrast

\[255\]
* Grayscale conversion

\[ Y = \frac{1}{3} R + \frac{1}{3} G + \frac{1}{3} B \]

\[ Y = 0.299 \times R + 0.587 \times G + 0.114 \times B \]

- **Cursor**
  - Up/down
  - Left/right
  - 4 Keys
  - Green

- i) 2 \times 2 square
- ii) box 1 pixel border
- 15 \times 15 pixels
- slow down movement
- stay on screen
- Blur

\[
\text{pixel out} = \frac{\text{current pixel} + \Sigma \text{last } (N-1) \text{ pixels}}{N}
\]

- \(N = 4, 8, 16, 32\)?

- init each row
- pixel buffer

- pipeline for high clk freq