

- 1) ADC
- 2) Sonar/Ultrasonic
- 3) Wheel encoders / Hall Effect Sensors

Analogy to digital Conversion →

Find a number between 0 & 100

50 ↓

25 ↑

40 ↑

45 ↑

47 ↑

48 ↑

49 !!

$$\begin{matrix} 7 & 6 & 5 & 4 \\ 2 & 2 & 2 & 2 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{matrix}$$

$$\begin{matrix} 3 & 2 & 1 & 0 \\ 2 & 1 & 2 & 2 \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 2 = 9_{10} \end{matrix}$$

Find a number between 0 and 255 in 8 guesses

135 ↓

75 ↑

100 ↑

120 ↑

128 ↑

131 ↓

129 !!!

0 and 255 in
 00000000_2 11111111_2

10000000_2 (128_{10}) ↑

11000000_2 (192_{10}) ↓

10100000_2 (160_{10}) ↓

10010000_2 (144_{10}) ↓

10001000_2 (136_{10}) ↓

10000100_2 (132_{10}) ↓

10000010_2 (130_{10}) ↓

10000001_2 (129_{10}) !!!

(2)

$$\boxed{0x76} \rightarrow 0111\ 0110_2 \rightarrow 64 + 32 + 16 + 4 + 2 =$$

$$0x2A1 \rightarrow 10\ 1010\ 0001_2 = 512 + 128 + 32 + 1$$

673

10

$$1001_{10} \rightarrow 0x3\ E\ 9_{16}$$

1 0111 01001

~~111101001~~ 2

$1024_{10} = 2^{10}$

0 to 1023

00 0000 0000₂

to 11 1111 1111₂

Do these exercises now.....

$$n = \left\lfloor \frac{V_{in} * 2^N}{V_{ref}} + \frac{1}{2} \right\rfloor = \left\lfloor \frac{0.5V * 1024}{5} + \frac{1}{2} \right\rfloor$$

$$\lfloor 102.9 \rfloor = 102$$

N = 8 bits
0 to 3.3V
3.0 = V_{in}

(Max 256)

$$n = \left\lfloor \frac{3.0V * 2^8}{3.3V} + \frac{1}{2} \right\rfloor = \lfloor 233.2 \rfloor$$

$$= 233_{10}$$

$$= 1110\ 1001$$

12-bit ADC

0 to 12V

 $V_{in} = 7.55V$ what is n ?

decimal....

binary....

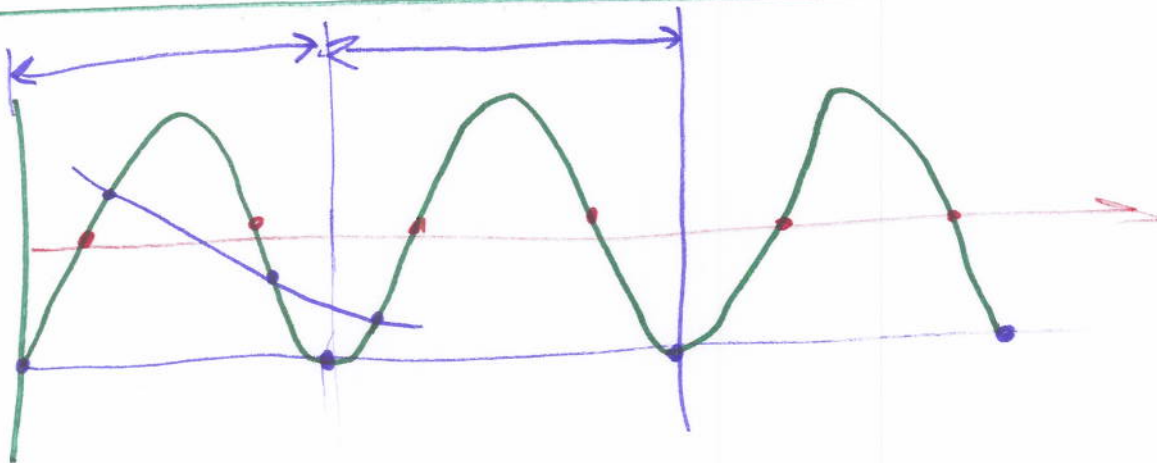
hex....

$$n = \left\lfloor \frac{V_{in} \cdot 2^N}{V_{ref}} + \frac{1}{2} \right\rfloor = \left\lfloor \frac{7.55 \cdot 2^{12}}{12V} + \frac{1}{2} \right\rfloor$$

$$= \lfloor 2577.6 \rfloor$$

$$= 2577$$

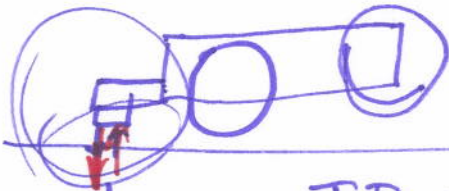
$$= 0xA11 = 1010\ 0001\ 0001$$



ECGR 4161

6/26/12

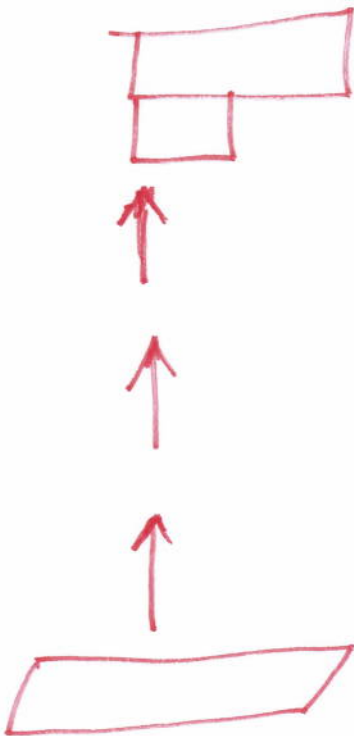
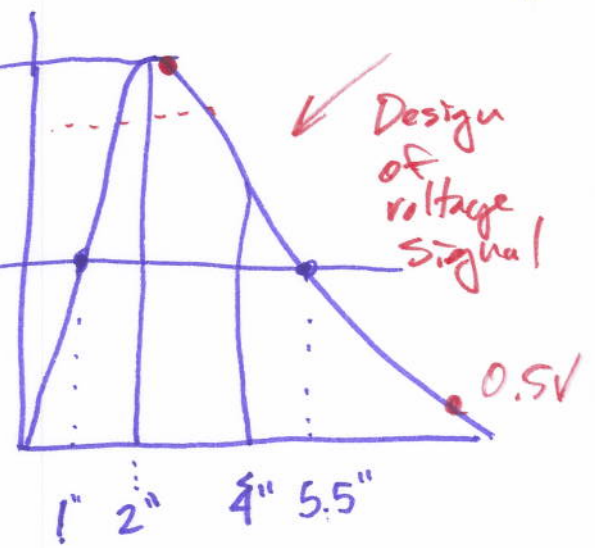
4



Sharp IR sensor
Sensor 5V, 0V, Signal

$$4.8 = V_A$$

$$2.4 = V_B$$



Homework #3 - Robotic Technology - Robots

1) Choose a different Robot that has not been discussed yet (No presentations).

2) Key on

- a) sensors!
- b) actuators!
- c) Uses/applications!

3) 1 slide, 2-3 minutes

Deadline for telling me → July 3

Homework #4 - Mapping & Localization

Dead line for telling me

Homework #5 - Future of Robotics

* Jobs

* Cite one research paper

* Autonomous Car

* Nanites

Deadline for telling me

129

49