

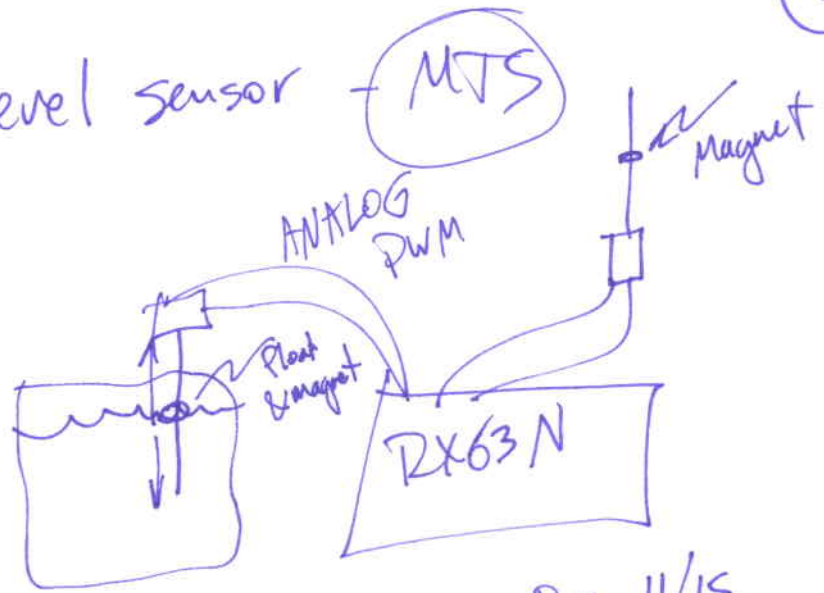
EMBEDDED SYSTEMS

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Lab Assign #6

Opportunity

Bunches of liquid level sensor
A/D ← 2 groups
PWM ← 2 groups



Option Lab #6

→ Queue ← Due 11/15

→ Develop a lab & solve it (Due 12/8)

extra work

Writing / contributing to a paper
Southeast Con 2014 1/4/2014

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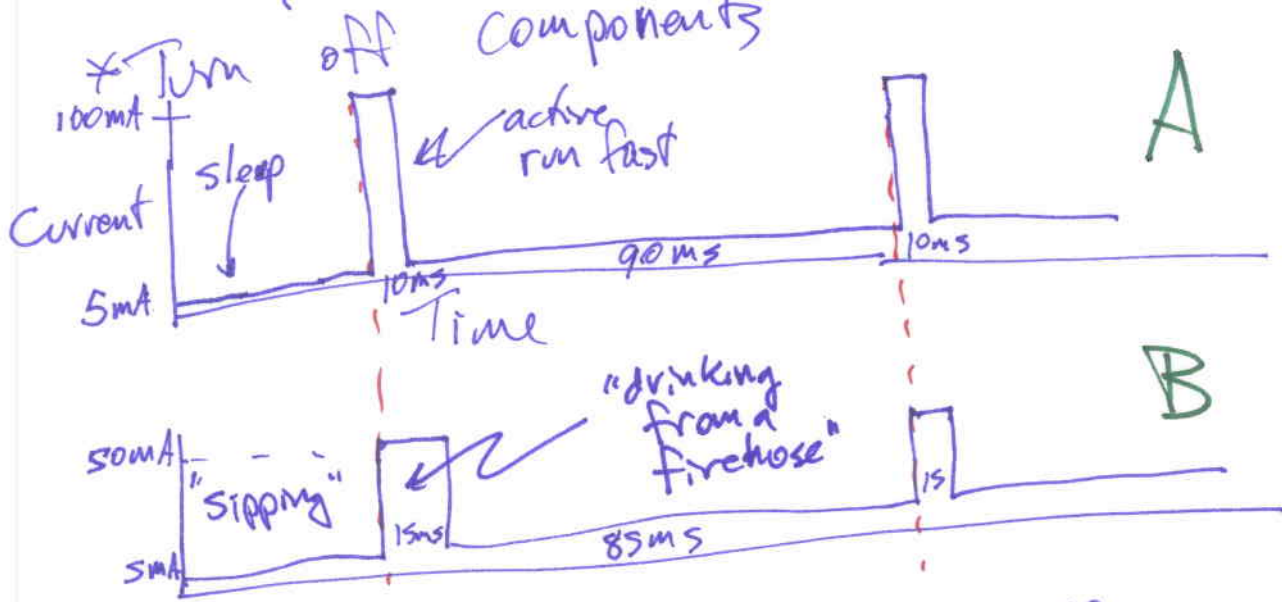
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(2)



Keep a charge for a VERY long time

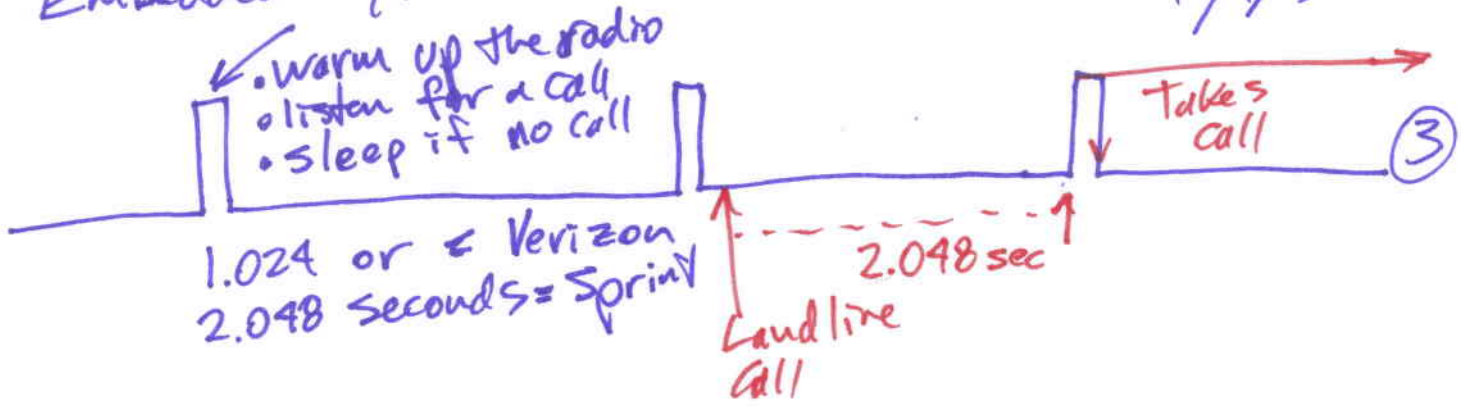
- * Lower CPU frequency
- * Change Protocol (how often we run protocol)
- * Bigger battery
- * Better battery
- * Components that consume less energy (i.e. smaller display)



Over the course of every 100ms, what is average power consumption of Processor A & Processor B?

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Underlying Modern Systems

Time \rightarrow timers

Heartbeat of a digital system = clock

$$PCLK = 48 \text{ MHz}$$

Count 1.028 seconds.

How many \uparrow of clock \approx μs ?

	49,349,000
	48 MHz
	24 MHz (1/2)
	12 MHz (1/4)
	6 MHz (1/8)
	3 MHz (1/16)
1,542,000	= 1.5 MHz (1/32)

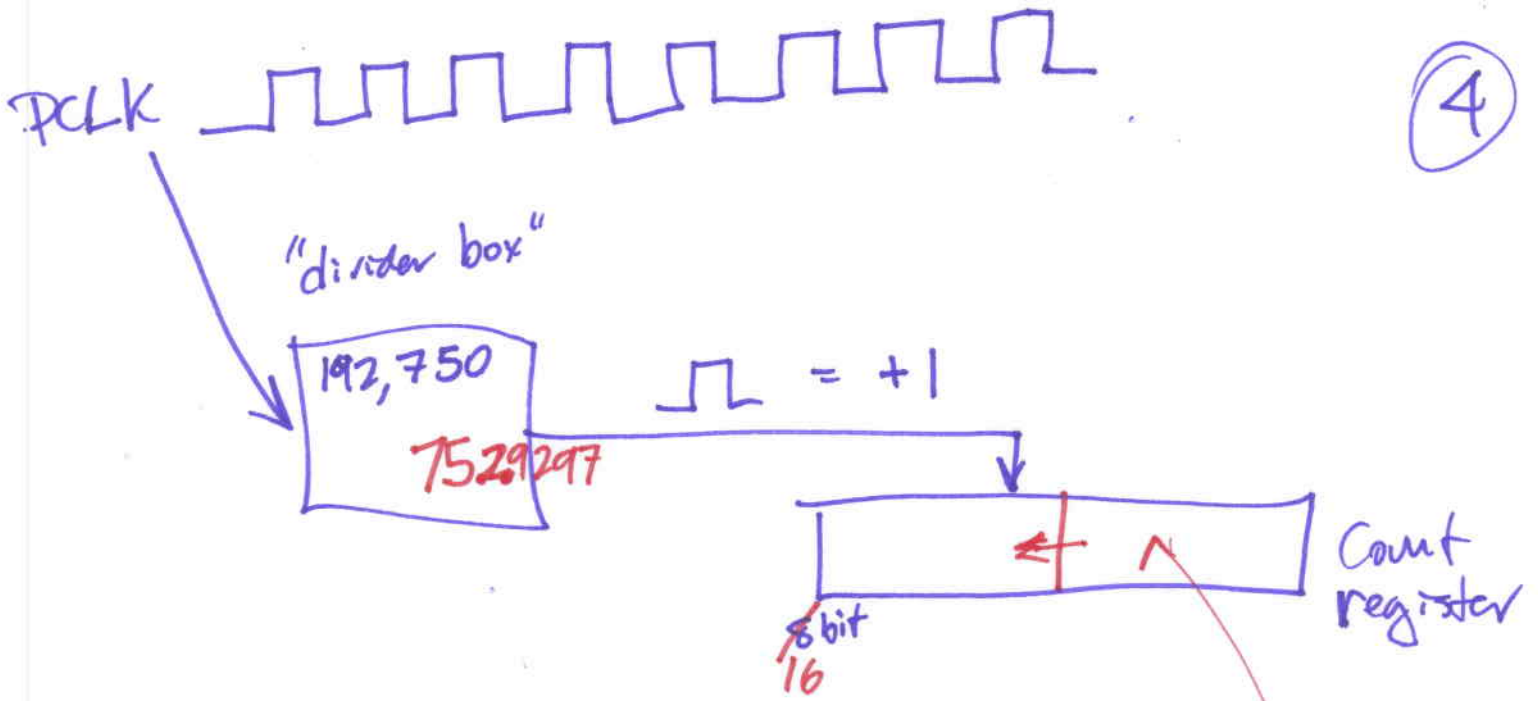
Now, what is the ~~range~~ ~~of~~ ~~values~~ size of a variable needed to store this "count"

- 8 bits 0-255
- 16 bits 0-65,535
- 24 bits

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4



$$\frac{49,344,000}{256} = 192,750$$

$$\frac{49,344,000}{65,536} = 752,929.7$$

48 MHz

$$49,344,000 \div 1024 =$$

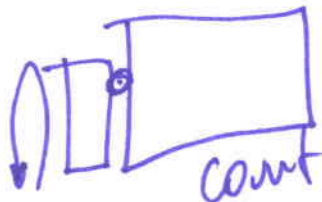
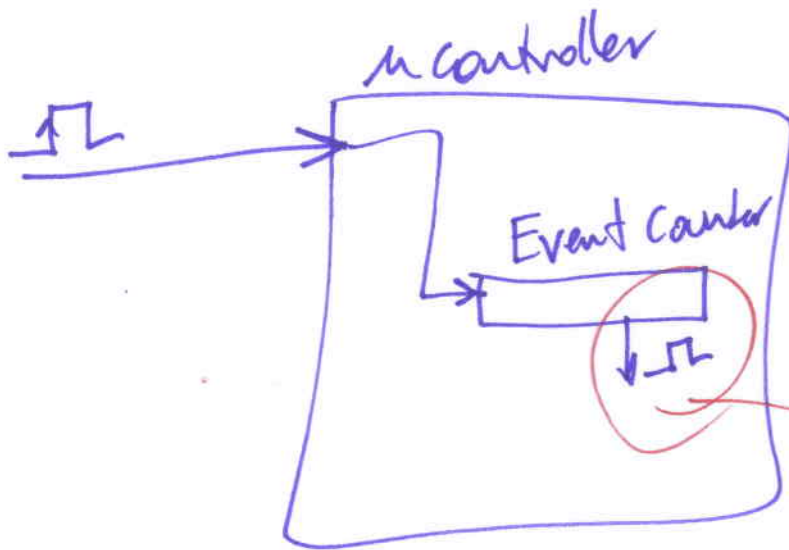


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Event Counter

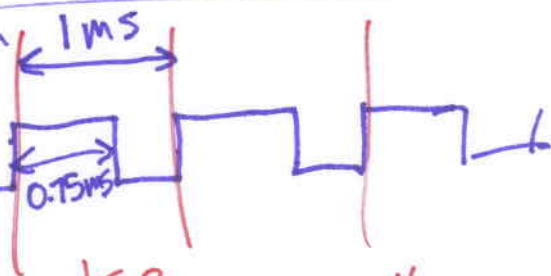
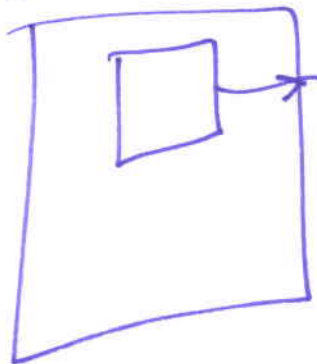
(5)



count

the wheel rotations reach 50, identity with a pulse

Pulse width modulation



pulse frequency n Hz
Duty cycle of $m\%$ in state of '1'
 $f = 1000$ Hz
Duty cycle = 75%

Question