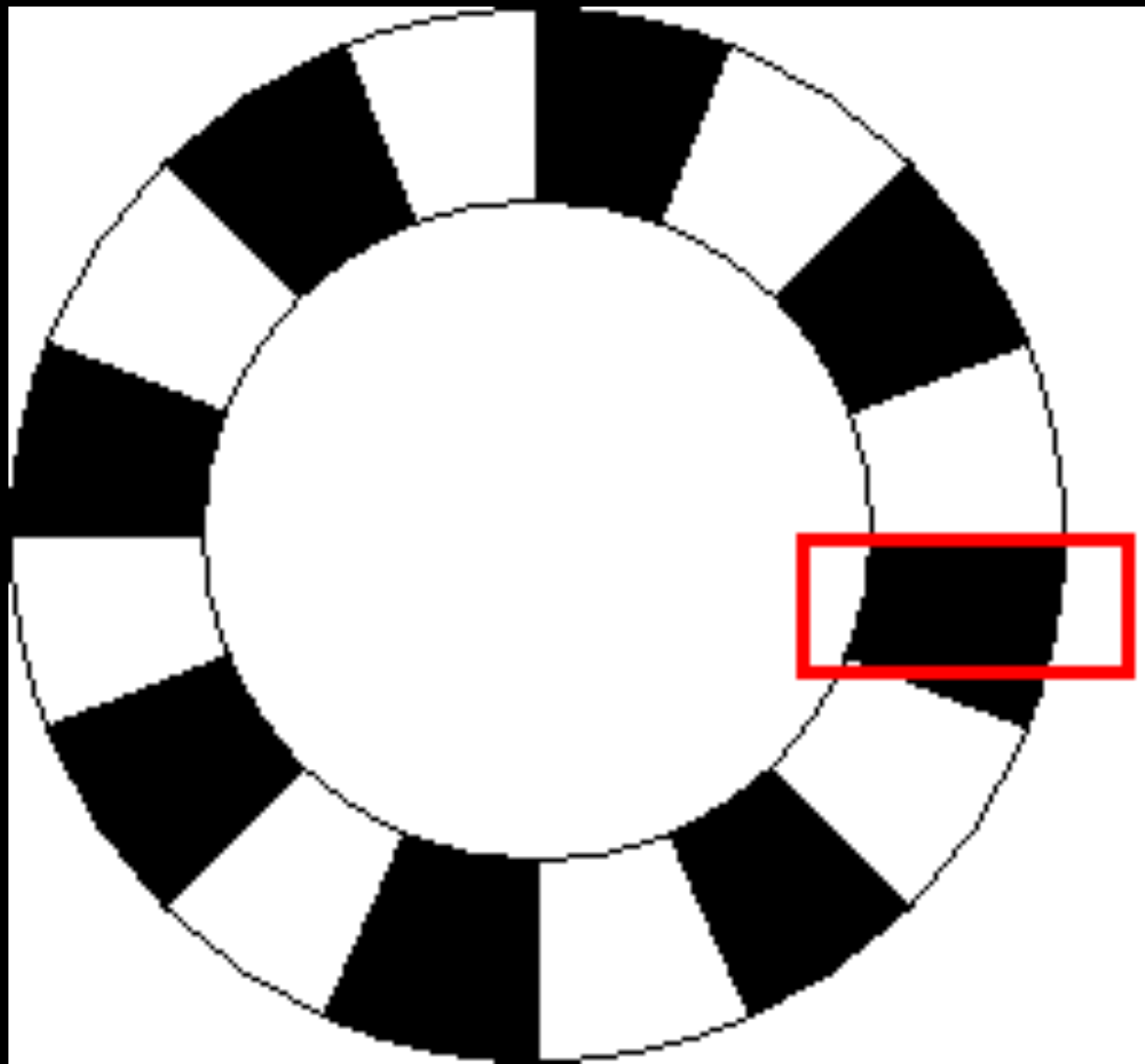
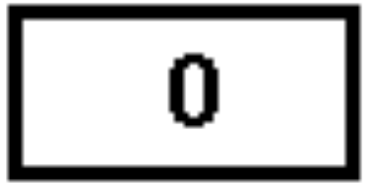
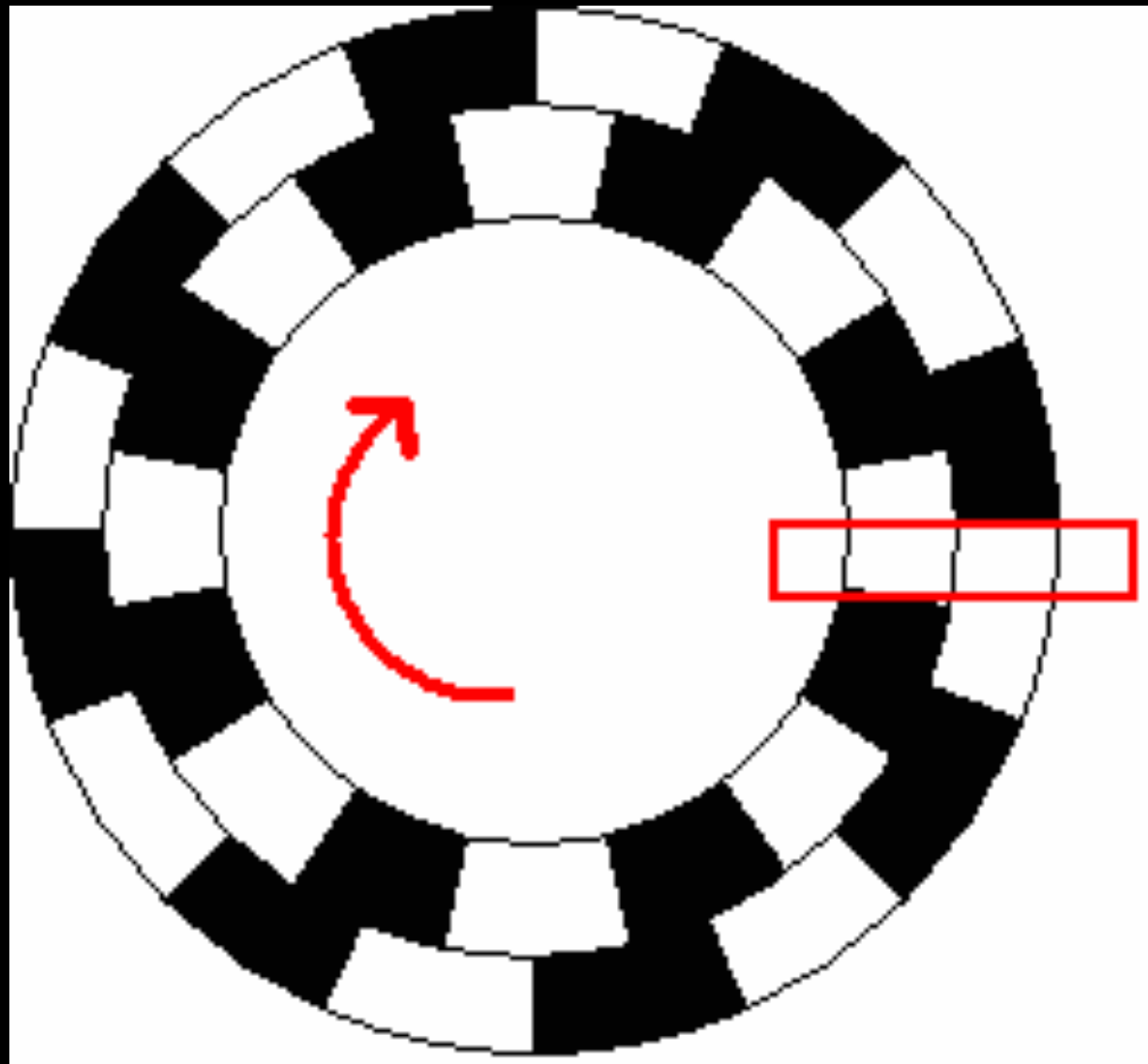
Encoder

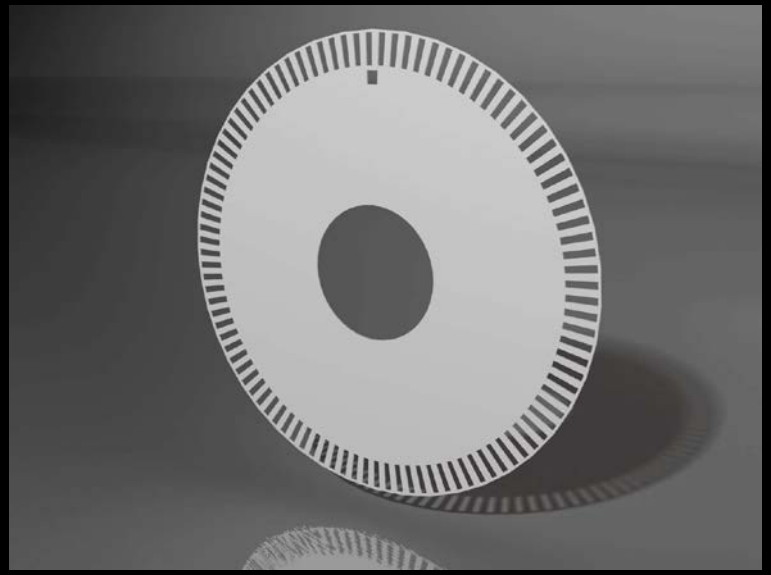




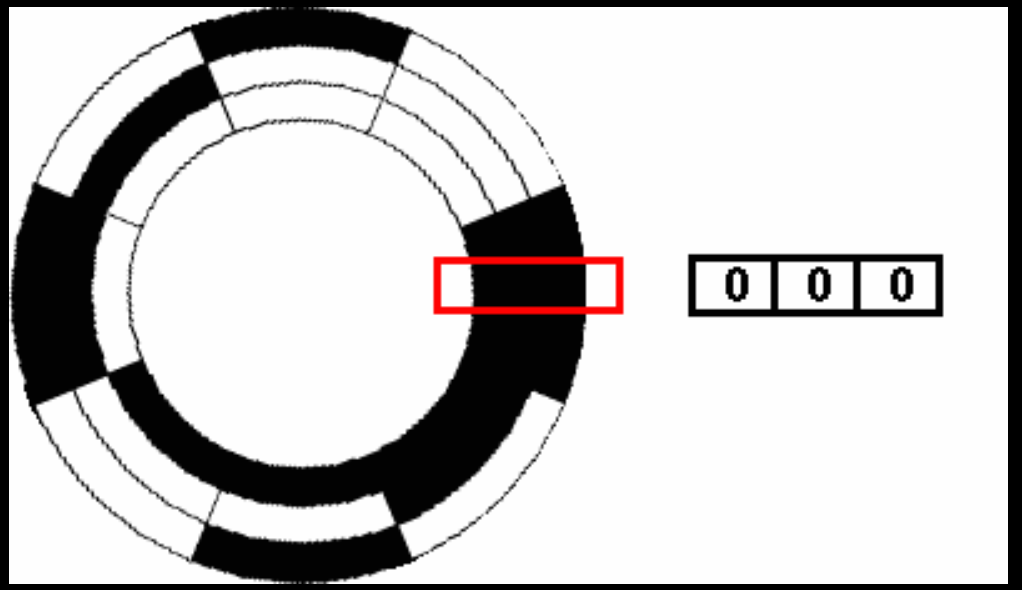
Quadrature

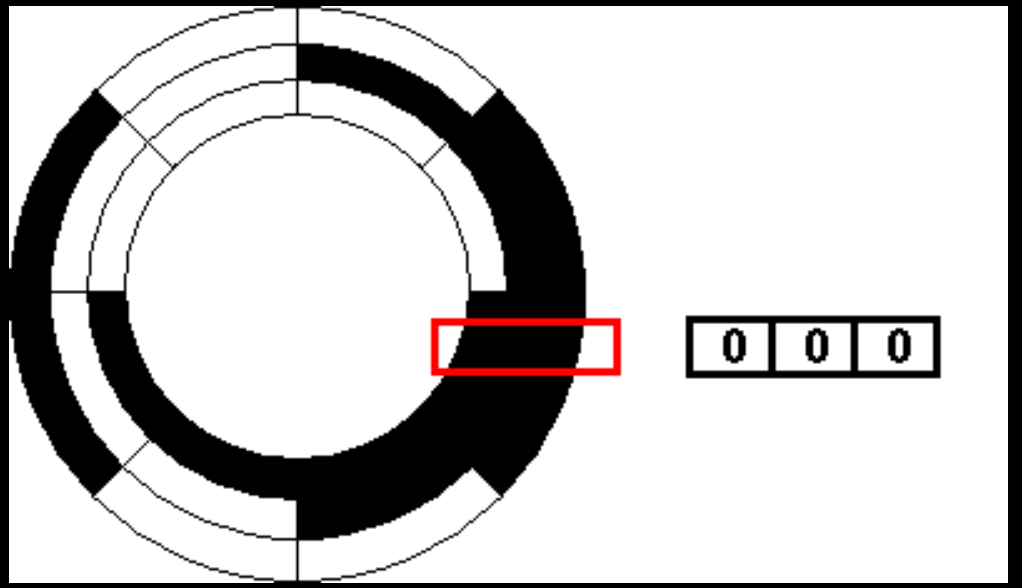


Absolute



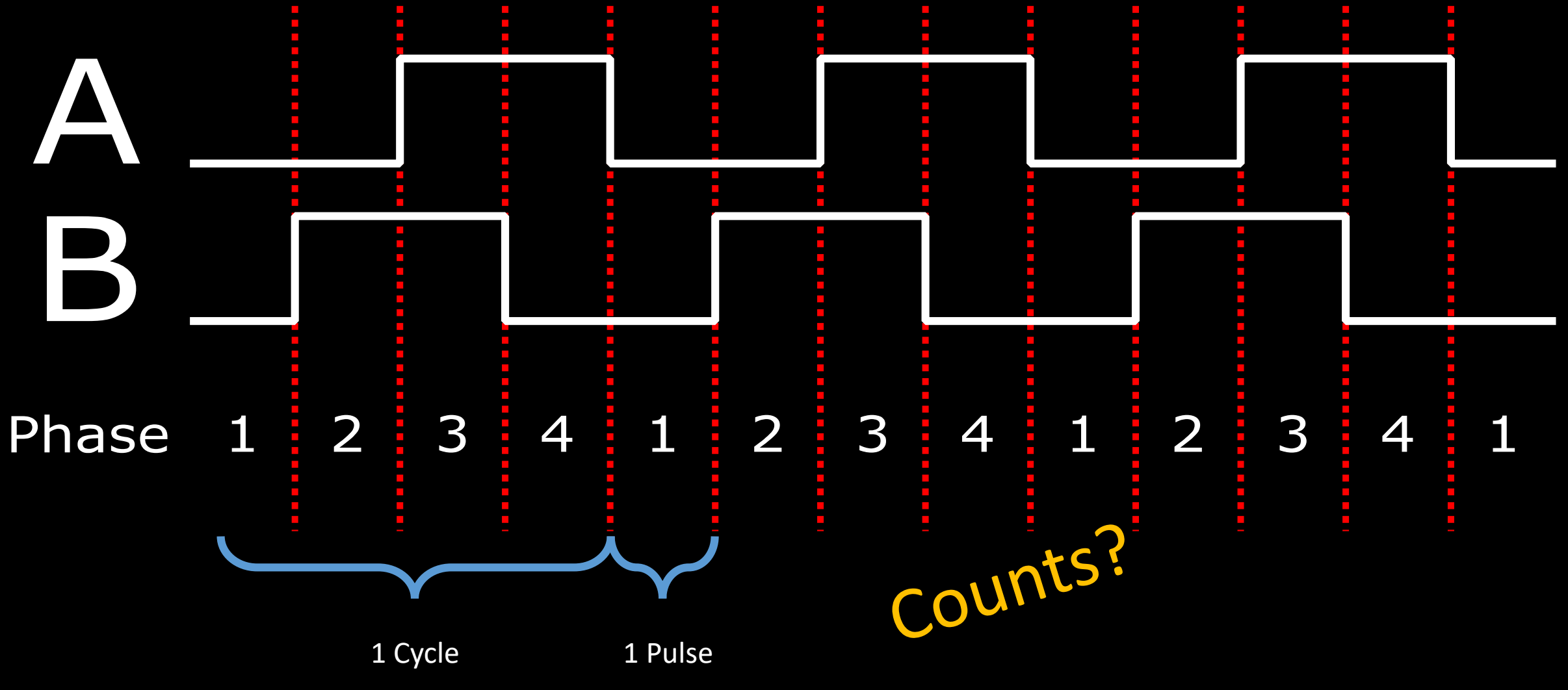
http://www.directindustry.com/prod/honest-sensor/product-125247-1568418.html





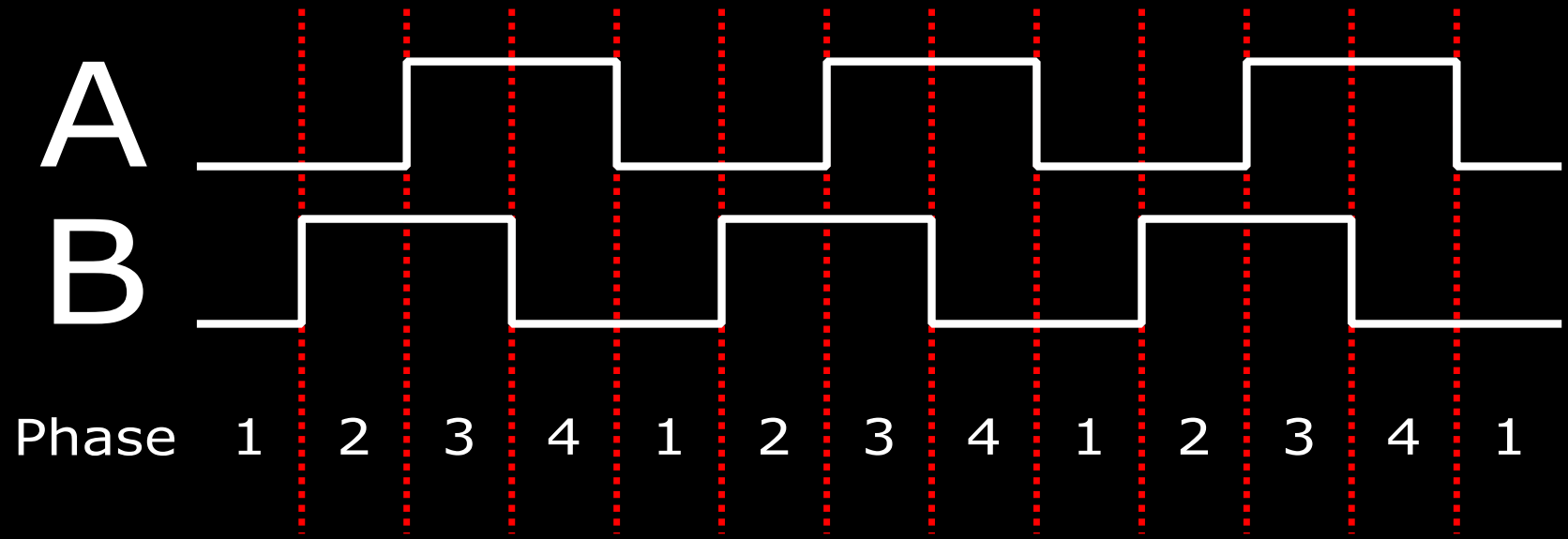
Gray Code

CPR-Cycles Per Revolution
PPR-Pulses Per Revolution



1. What is the current count?

- CH A = 1110001110001
- CH B = 0011100111011
- Phase=4432214332123
- Count=-1-1-1-1-1-1-1+1+1=-5



Selecting Encoders CPR

- To high
  - Miss counts
- To low
  - Low resolution

Selection

2. If you have a digital input that can read at 1kHz and a something you intend to have rotating at 60 RPM how many what is the maximum CPR you can use?

- 60 RPM= 1 rev/sec, sampling frequency maxes out at 1000 counts/second => 1000 counts per rev. Should probably go lower than this

3. What resolution would this give you?

- 360 deg/rev /1000counts/rev = .36 deg/count

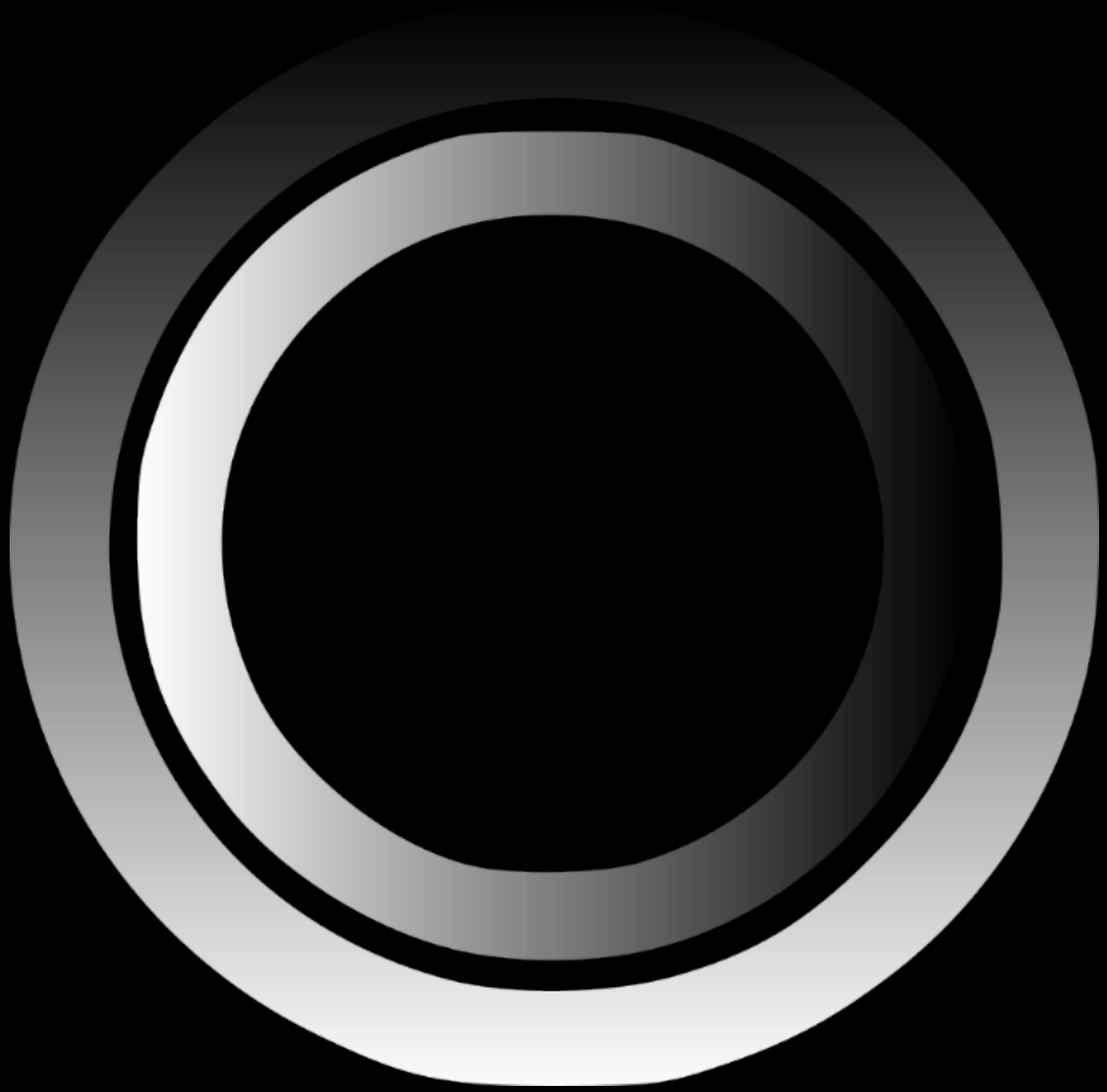
Gearbox?

Encoders

- Pro- Robust to noise
- Pro- Quick to read
- Pro- Easy to make low resolution version
- Pro- Non contact (high life span)

- Con- Limited resolution
- Con- You generally need to keep track of where you are or use a complicated system, homing.
- Con- Expensive to make high resolution
- Con- Sensitive to dust, impact. It can be sealed up to help this

Analog Encoders

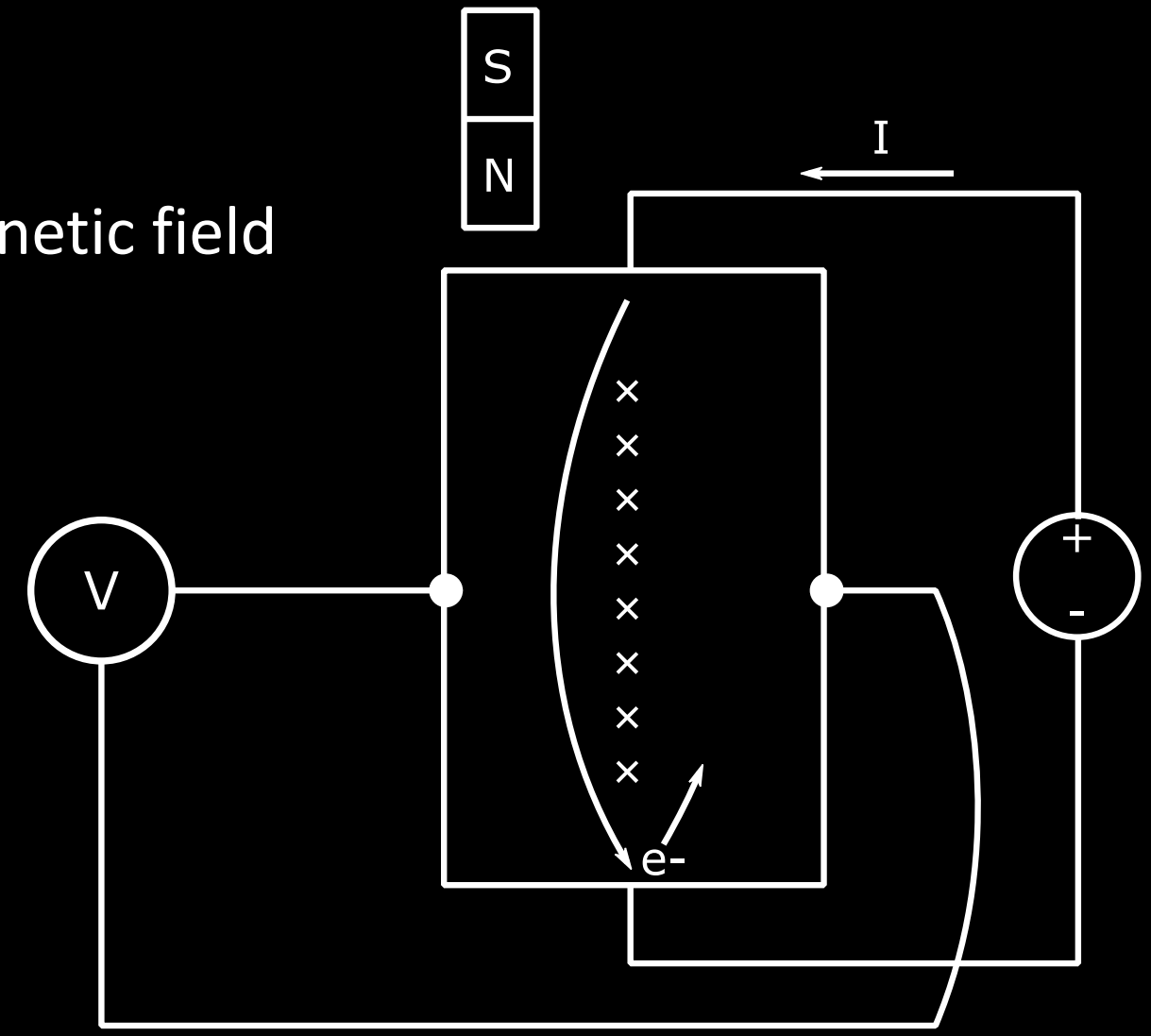


Analog Encoder

- Pros- See potentiometers
- Cons- ADCs are expensive and take a while to read. You now have two channels to read.
- Possible Hybrid
  - Digital for side analog for resolution

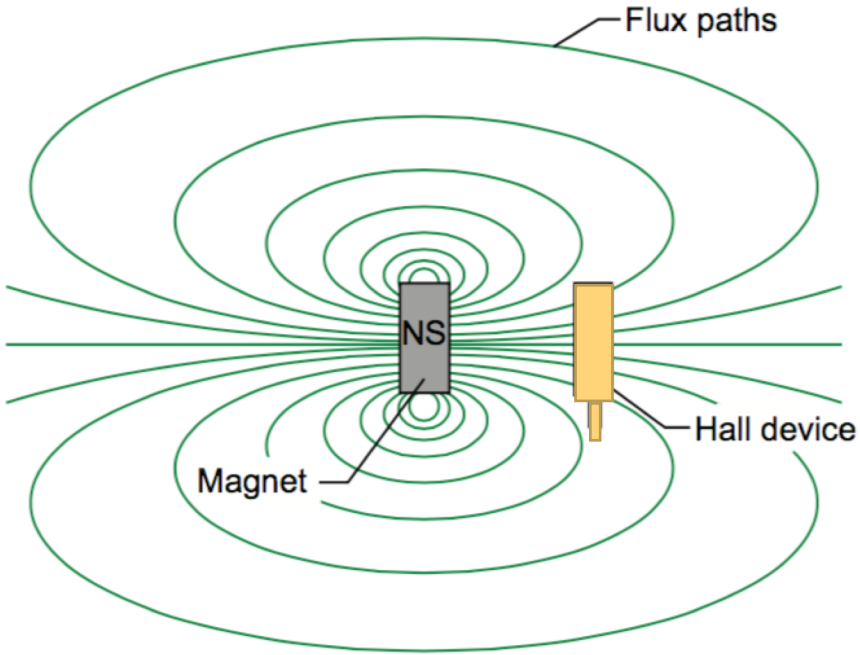
Hall Sensor

- Measure voltage based on magnetic field

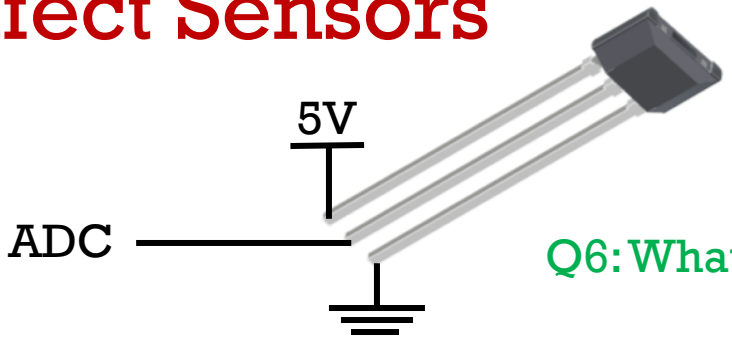


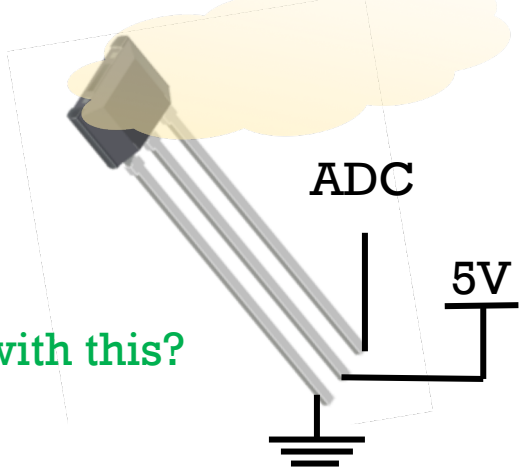
Hall Effect Sensor

- Voltage proportional to applied magnetic field
- If the magnet rotates, the field will change correspondingly (non-linear, somewhat sinusoidal).



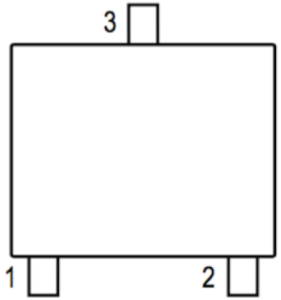
Hall Effect Sensors



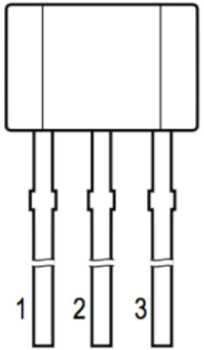


Q6: What's wrong with this?

Pin-out Diagrams



LH Package

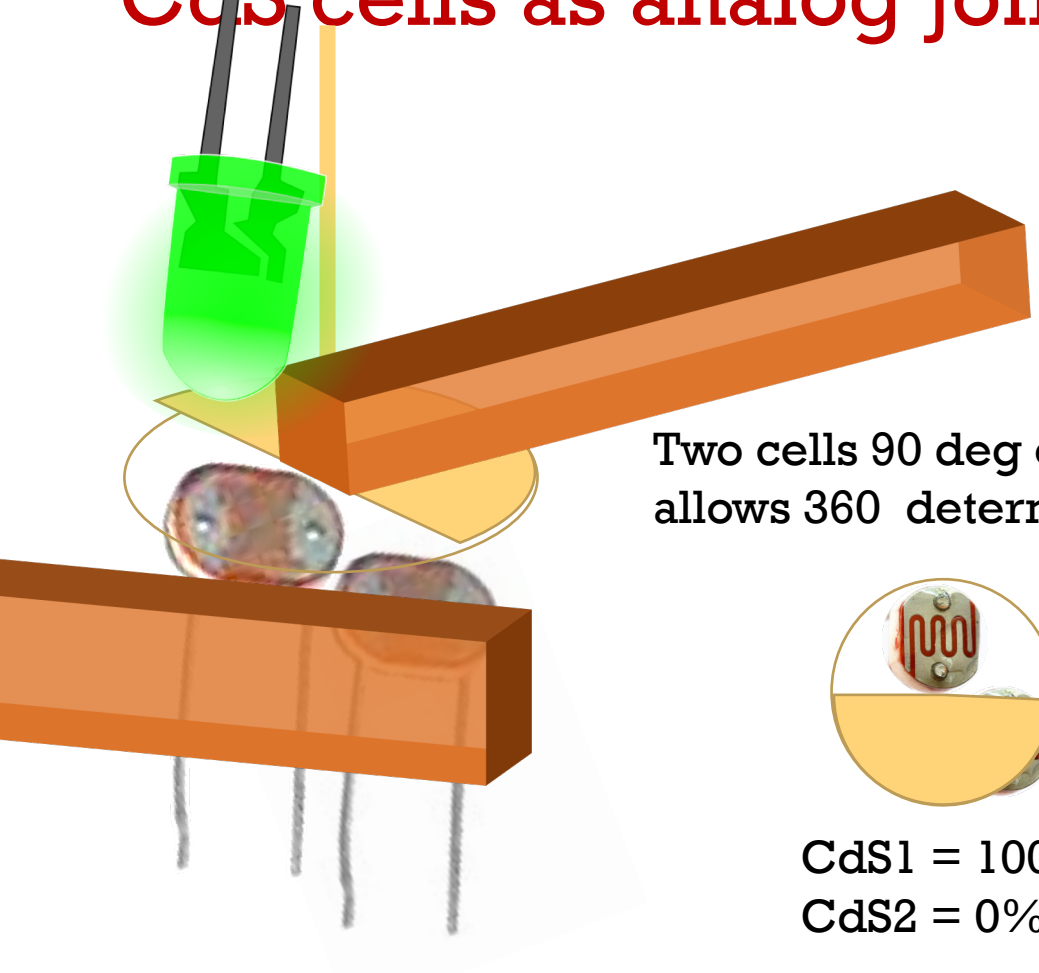


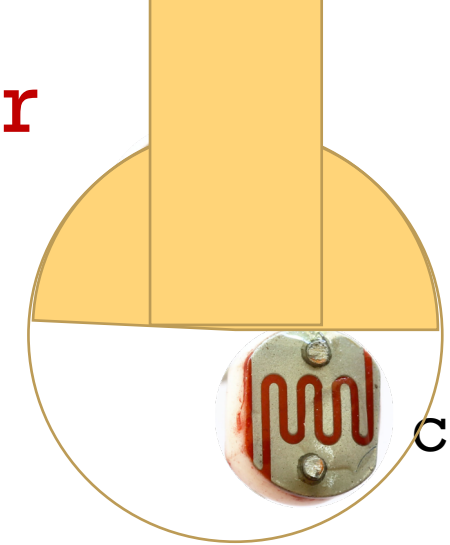
UA Package

Terminal List Table

Name	Number		Function
	LH	UA	
VCC	1	1	Input power supply; tie to GND with bypass capacitor
VOUT	2	3	Output signal; also used for programming
GND	3	2	Ground

CdS cells as analog joint sensor

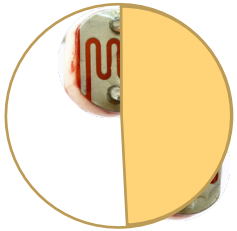




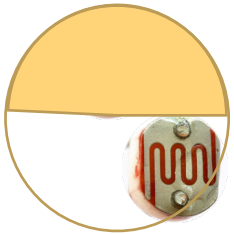
CdS 2

Two cells 90 deg out of phase
allows 360 determination

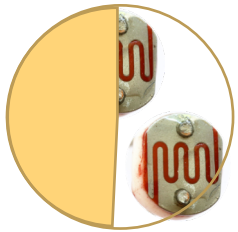
CdS1 = 100
CdS2 = 0%



CdS1 = 50
CdS2 = 0%

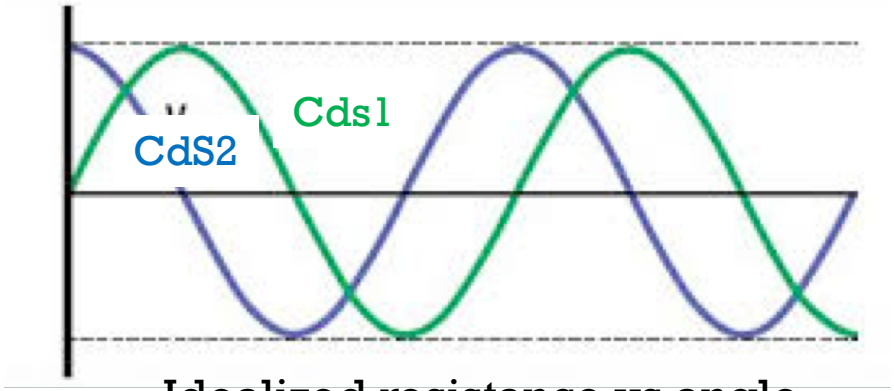


CdS1 = 0%
CdS2 =100

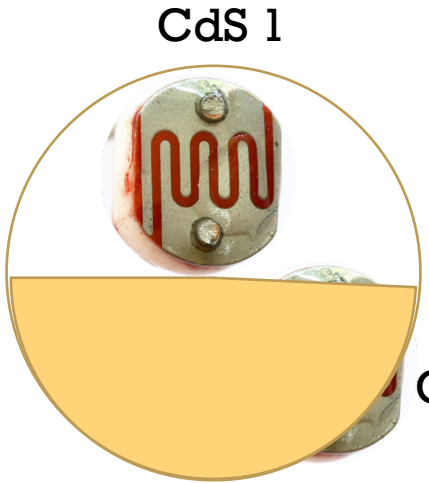


CdS1 = 50%
CdS2 = 100

CdS cells as ~sin/cos encoder



Idealized resistance vs angle

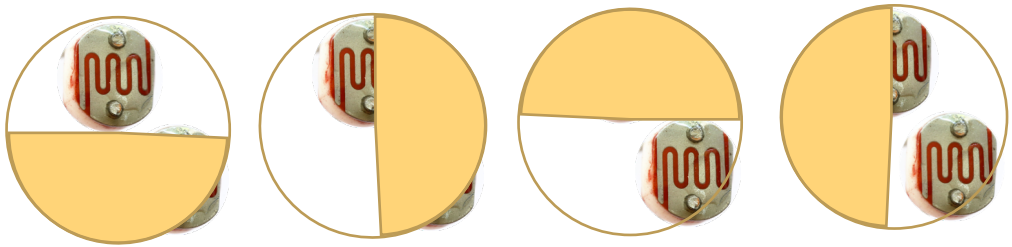


Have in GM lab

Roughly:

$\theta = \mathrm{atan2}(R1, R2)$

Use lookup table and interpolate



CdS1 = 100
CdS2 = 0%

CdS1 = 50
CdS2 = 0%

CdS1 = 0%
CdS2 =100

CdS1 = 50%
CdS2 = 100