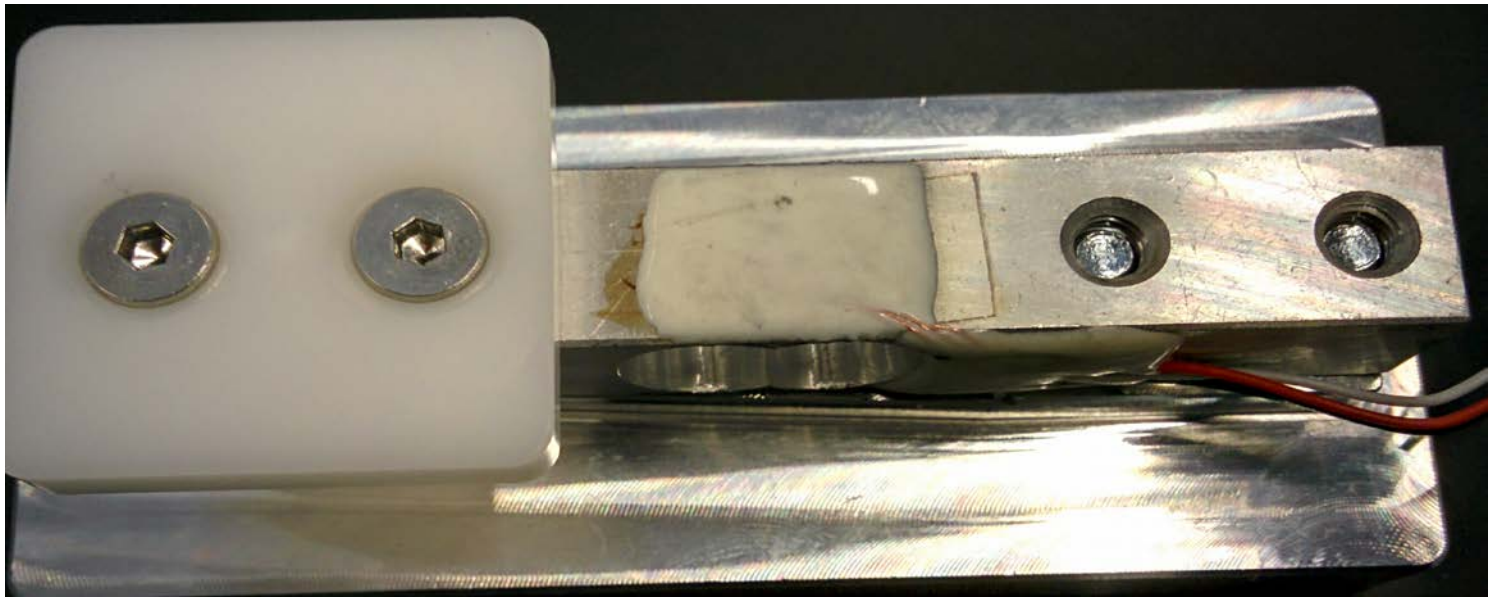
A/D and D/A
lab experiment

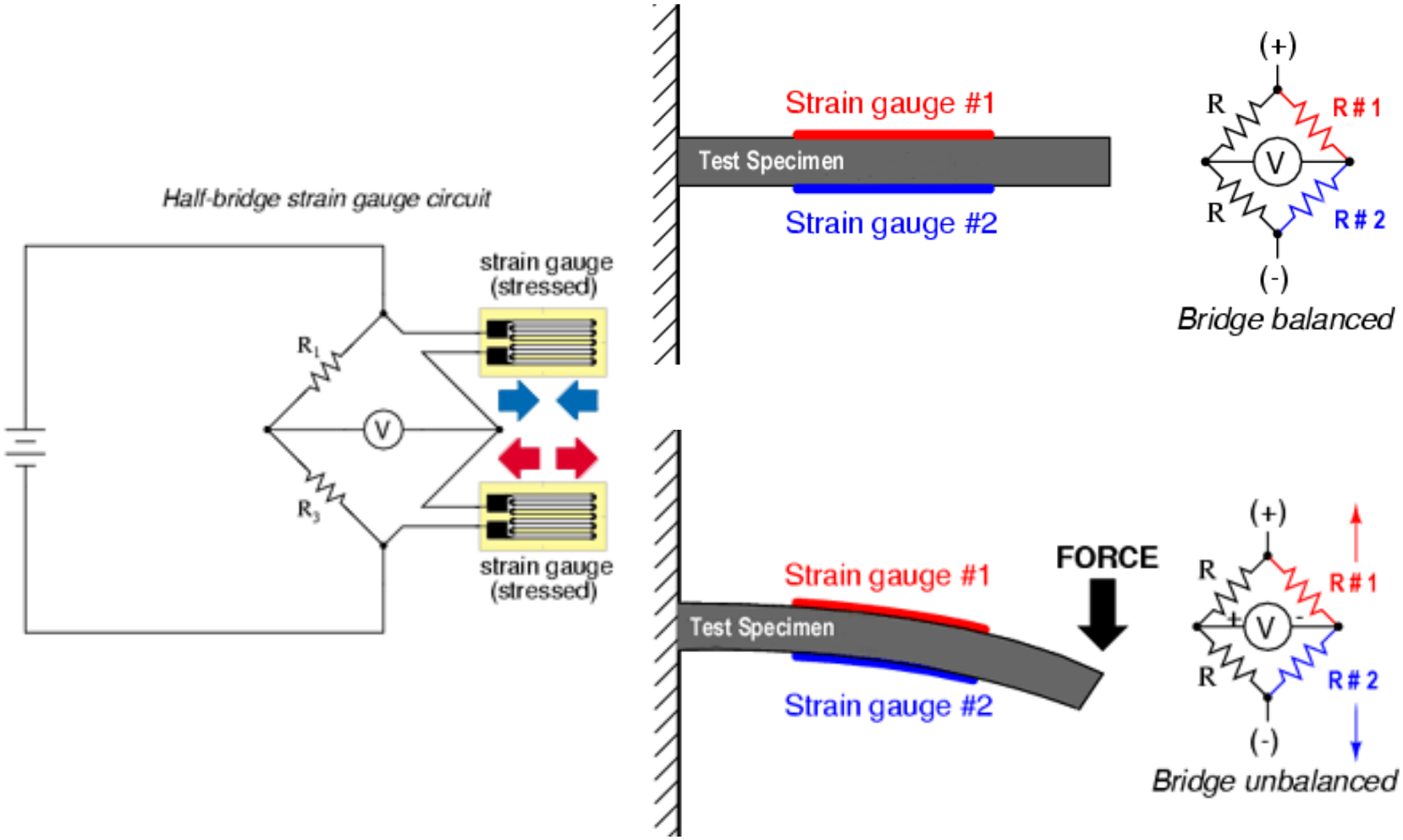
1 experiment (+1 optional)

- Implement a scale
  - PSoC
  - Load cell (based on a strain guage)
  - Instrumentation amplifier
- Optional: Experiment with the PSoC WaveDAC

Load cell



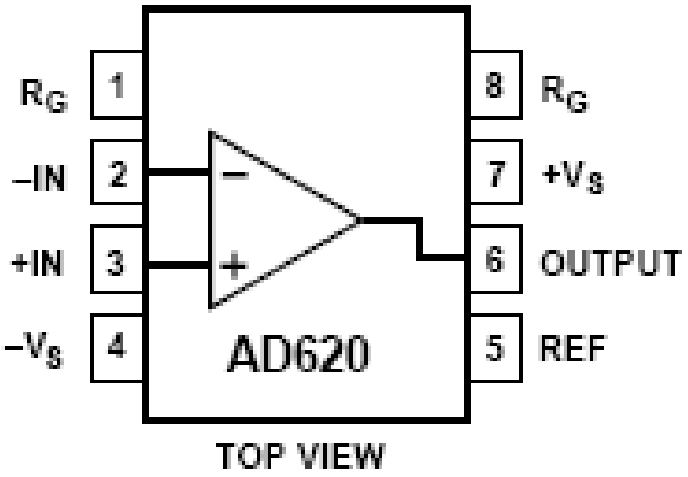
Strain gauge



Strain gauge based weight in lab

- Datasheet on blackboard.
- Based on a half bridge strain gauge.
- Range: 0-1 kg
- Output signal approximately 1mV/V.

AD620 Instrumentation AMP



TOP VIEW

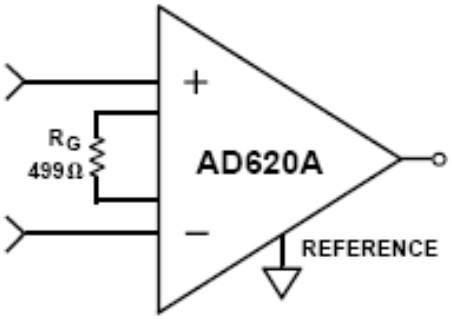
FEATURES
EASY TO USE
Gain Set with One External Resistor
(Gain Range 1 to 1000)
Wide Power Supply Range (±2.3 V to ±18 V)
Higher Performance than Three Op Amp IA Designs
Available in 8-Lead DIP and SOIC Packaging
Low Power, 1.3 mA max Supply Current

EXCELLENT DC PERFORMANCE ("B GRADE")
50 μV max, Input Offset Voltage
0.6 μV/°C max, Input Offset Drift
1.0 nA max, Input Bias Current
100 dB min Common-Mode Rejection Ratio (G = 10)

LOW NOISE
9 nV/$\sqrt{\text{Hz}}$, @ 1 kHz, Input Voltage Noise
0.28 μV p-p Noise (0.1 Hz to 10 Hz)

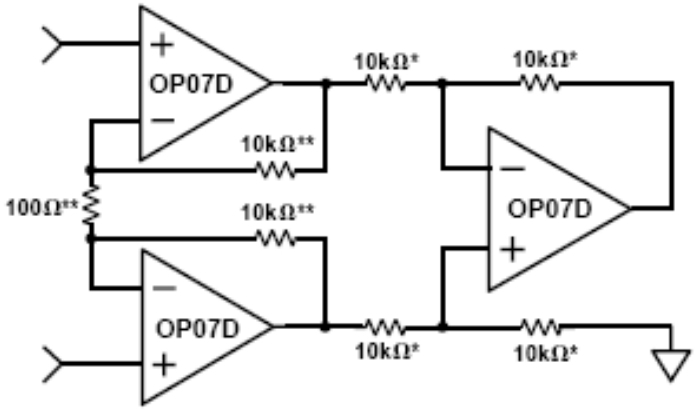
EXCELLENT AC SPECIFICATIONS
120 kHz Bandwidth (G = 100)
15 μs Settling Time to 0.01%

APPLICATIONS
Weigh Scales
ECG and Medical Instrumentation
Transducer Interface
Data Acquisition Systems
Industrial Process Controls
Battery Powered and Portable Equipment



AD620A MONOLITHIC
INSTRUMENTATION
AMPLIFIER, G = 100

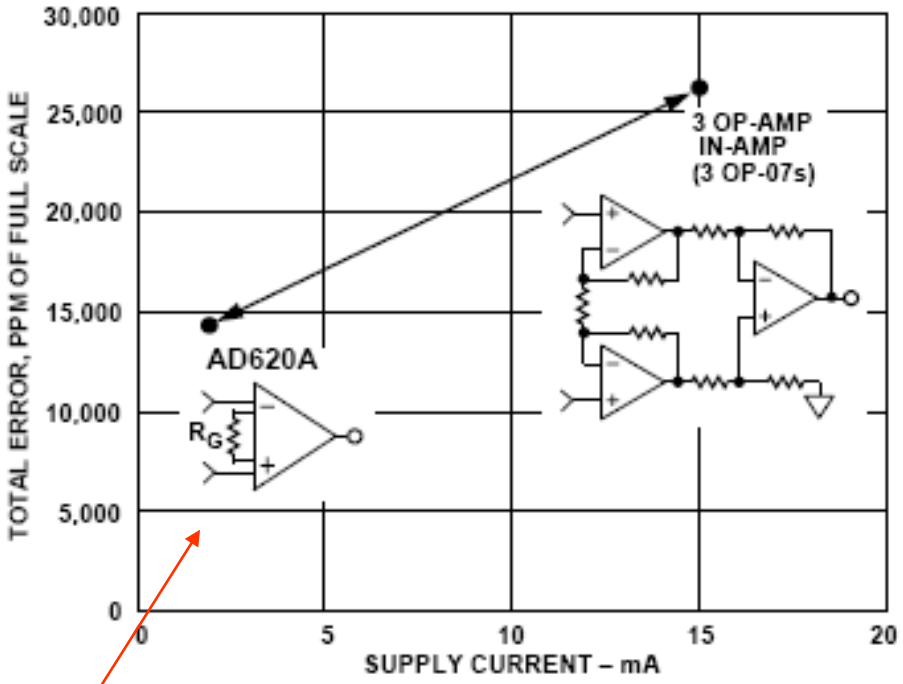
SUPPLY CURRENT = 1.3mA MAX



"HOMEBREW" IN-AMP, G = 100
*0.02% RESISTOR MATCH, 3PPM/°C TRACKING
**DISCRETE 1% RESISTOR, 100PPM/°C TRACKING
SUPPLY CURRENT = 15mA MAX

- The AD620 is a complete instrumentation amplifier in a single package.

Setting the gain

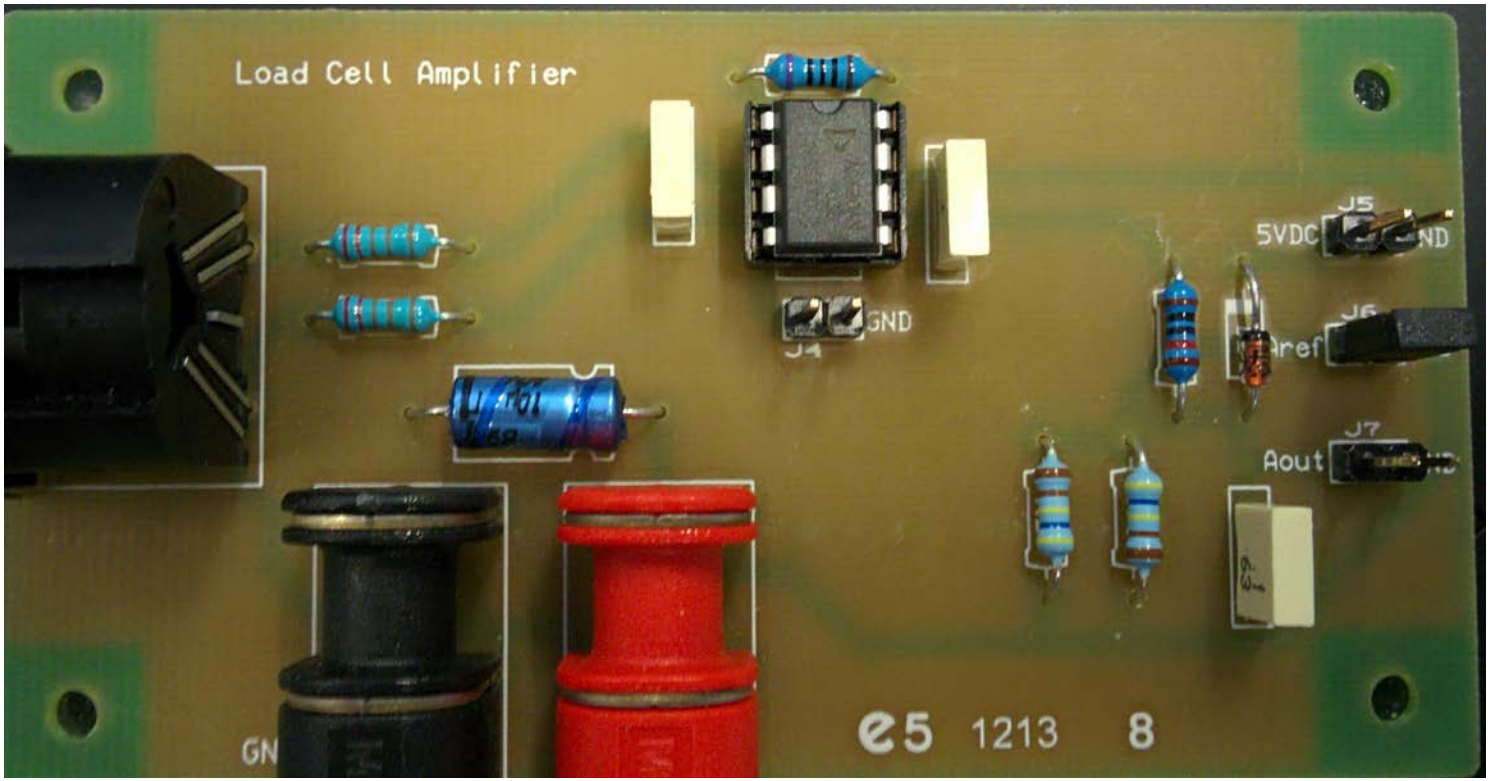


$$G = \frac{49.4\ k\Omega}{R_G} + 1$$

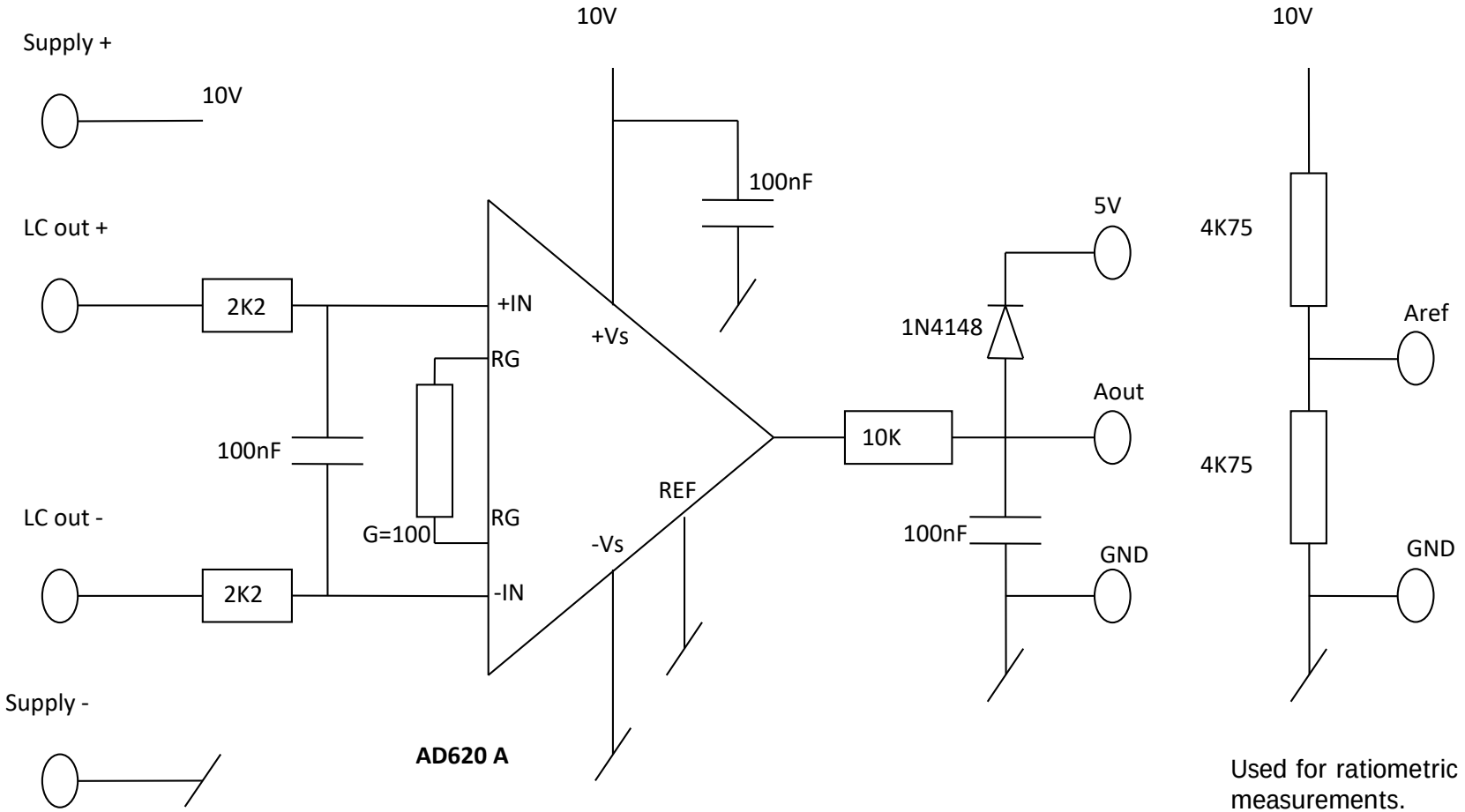
so that

$$R_G = \frac{49.4\ k\Omega}{G - 1}$$

Load cell AMP PCB

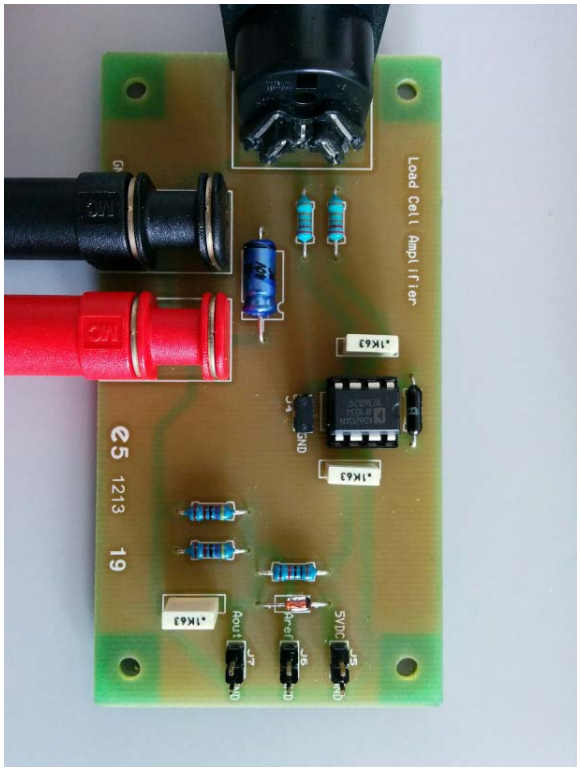


Load cell interface PCB



Used for ratiometric measurements.

- The load cell may need to be pre-loaded with a weight, to operate in its linear area.



- You can use the provided PSoC project on Blackboard as a starting point.
- It has a UART and a SAR ADC.

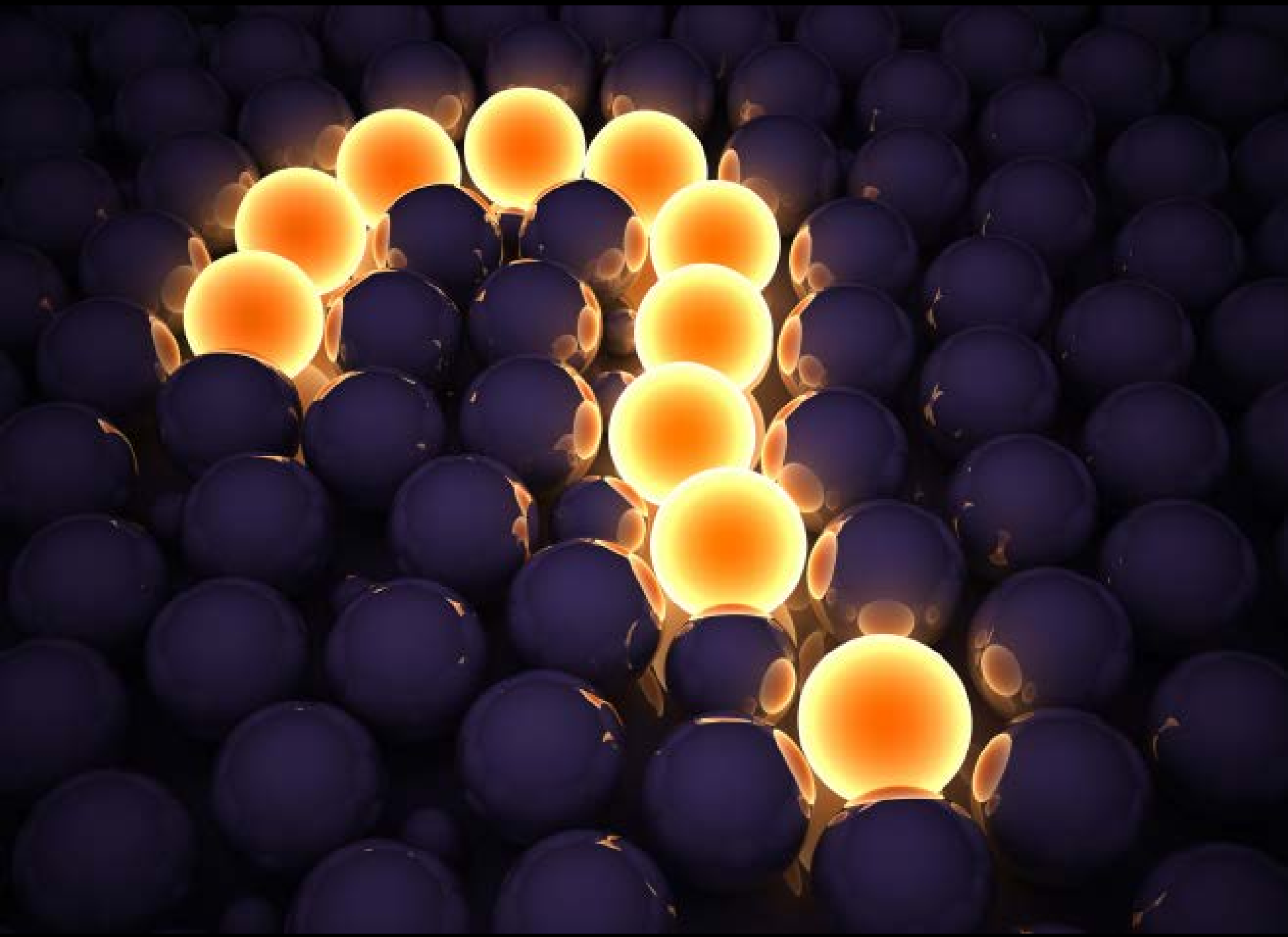


Image resources

- Question mark: https://wall.alphacoders.com/big.php?i=437563