

Chapter 8

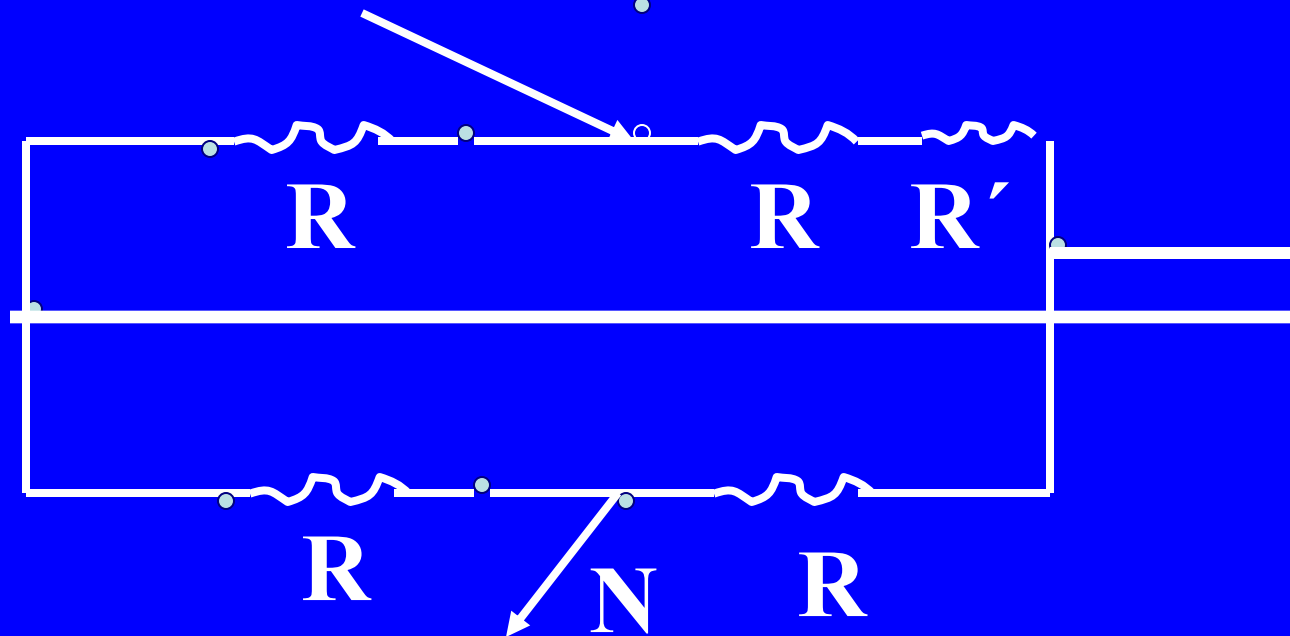
Digital and Analog Interfacing Methods

Lesson 11 Part c

Interface for Load Cell for Electronic Weighing

Vdc or a.c. from
an oscillator

Whetstone Bridge



Wheatstone Bridge

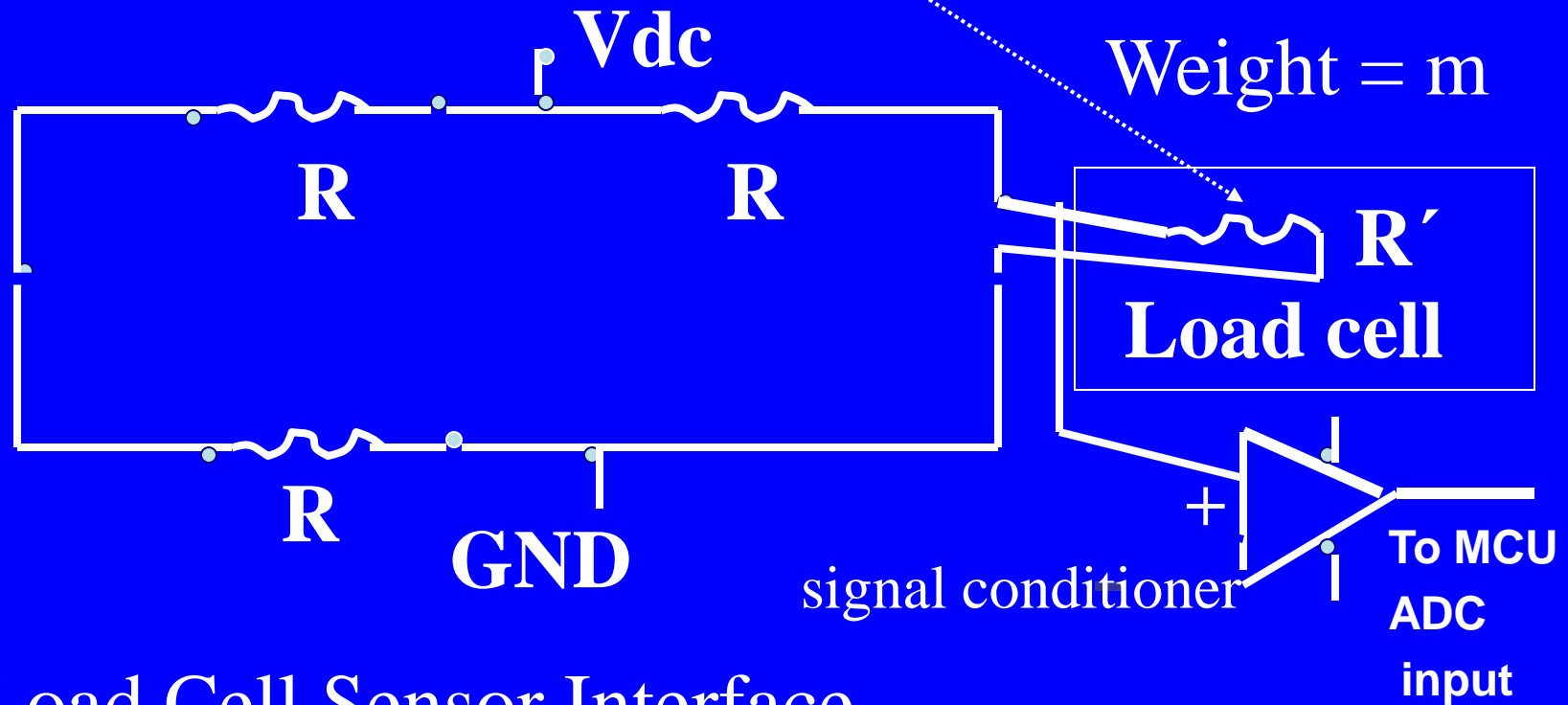
- All four arms Resistances equal when $R' = 0$, bridge is balanced
- Output = 0V for any analog input when bridge is balanced

Wheatstone Bridge

- Assume R' is resistance of the load cell for measuring weight.
- All but one Resistance is equal, the output depends on the ratio of $(R + R')/R$, bridge is not balanced
- Output not = 0V for a non-zero analog input when bridge is not balanced
- All Resistances are of the same order, bridge gives maximum sensitivity

Load Cell Resistance change on loading the cell by putting weight to the cell, Interface senses weight by resistance changes

$$R' = R_0 [1 + \alpha m + \beta m^2]$$
$$\text{or } R' = R_0 [1 - \alpha m - \beta m^2]$$



Load Cell Sensor Interface

Signal Conditioner

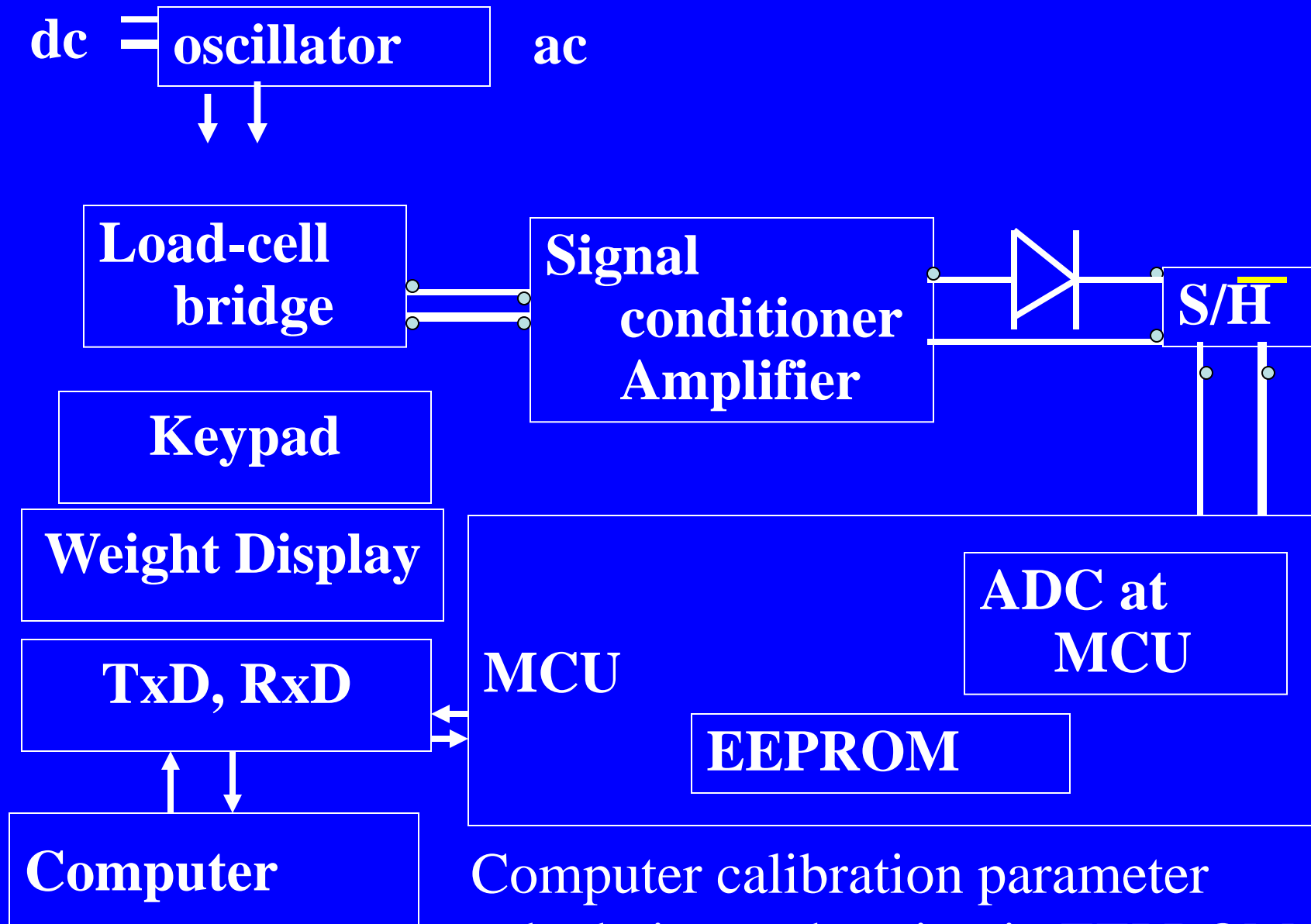
- Design such that output obtained = 0 V for input to ADC when weight = 0 and ADC output is 00000000.
- For obtaining reference Voltage input V_{ref} to ADC when weight is at certain maximum limiting value and ADC output is 11111111.

Signal Conditioner for Baby Weighing machine

- Design such that output obtained = 0 V for input to ADC when baby not at the weighing PAN = 0 and ADC output is 00000000.
- For obtaining reference Voltage input V_{ref} to ADC when sample weight at the weighing PAN is at certain maximum limiting value (for example, 5.11 kg) and ADC output is 11111111.

Baby weighing Machine





Computer calibration parameter calculation and saving in EEPROM

TxD and RxD Interface to Computer

- Keypad for entering the sample name, time and date of measurement and other features
- Computer calibration parameters calculation and saving in EEPROM
- Periodic calculation and revision of calibration parameters and saving in EEPROM

TxD and RxD Interface to Computer

- Environmental effects and spring strength changes require Periodic calculation and revision of calibration parameters and saving in EEPROM
- Computer records permanently the readings at different instances and gives graphical presentations for baby growth with months and comparison with standard weights according to child's height

Summary

We learnt

Analog Inputs from load cell sensor

- Whetstone bridge for load cell
- Signal conditioning amplifier and S/H circuit
- MCU ADC input
- Calibration parameter calculation and downloading in EEPROM

End of Lesson 11 Part c

Interface for Load Cell for Electronic Weighing