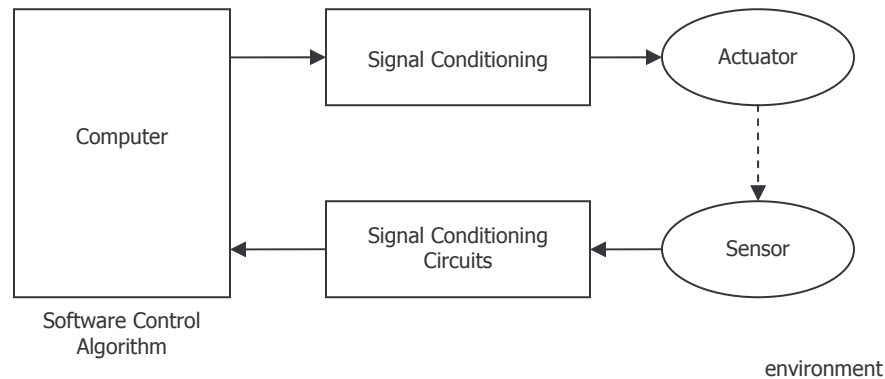## Basic Embedded Microsystem Model

This is an abstract, high level model that can be used to describe all embedded systems. Each embedded system expands on this.

The software control algorithm is generally not very complex, as there are multiple embedded systems that serve very specific purposes.

Transducer
A device that converts energy between forms

Ex: thermal energy, sound energy, light energy (including light), energy of motion

Sensor
Transducer that converts physical to electrical energy (P $\rightarrow$ E)

Examples: thermometer, flowmeter, button, switch, knob, photocell, photoreceiver, microphone, chemoreceptor, pressure (load cell)

Actuator
Transducer that converts electrical energy to physical energy (E $\rightarrow$ P)

Examples: LED, bulb, phototransmitter, motor, solenoid (linear actuator), speaker, piezobuzzer, sonicalert (high decibel that hurts), HVAC

Functions of Signal Conditioning Circuit

1. **Isolate** the computer system from the environment
   a. Ex: vibration noise, noise from lightening, etc.
2. **Filter** unwanted noise out of the sensor and actuator signals.
3. **Range** voltages or currents to appropriate levels
   a. What is appropriate is a system requirement. For the HC11, A/D conversions need to result in a value from 0 to 5V

5 Components of every computer
1. Input
2. Output
3. Memory
4. Arithmetic circuits
5. Controller

The arithmetic circuits and the controller collectively are the **processor**.

Aaron is a computer
The input is his ears, he calculated it using his brain, remembered it after calculating it, and returned output verbally.

Types of microbrains
1. **Microprocessors –** single-chip processor. Not a complete computer!
2. **Microcontrollers –** single-chip computer.
3. **Digital signal processors**
4. **Media processors**

Miniaturized integrated circuits packaged together on chips