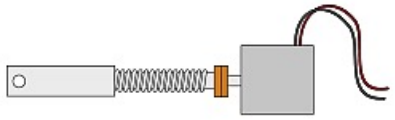
Ch. 7 - The Things: Actuators

COMPSCI 147

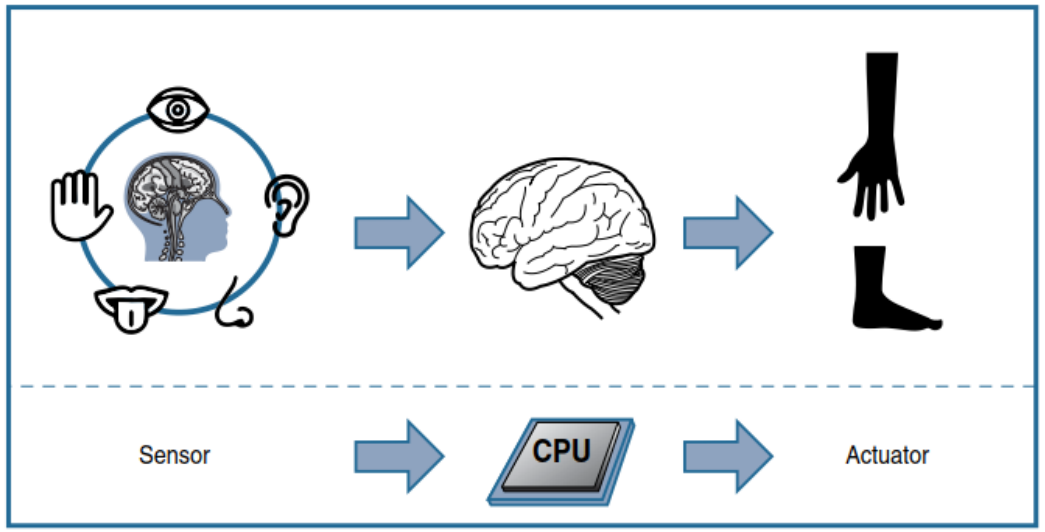
Internet-of-Things; Software and Systems

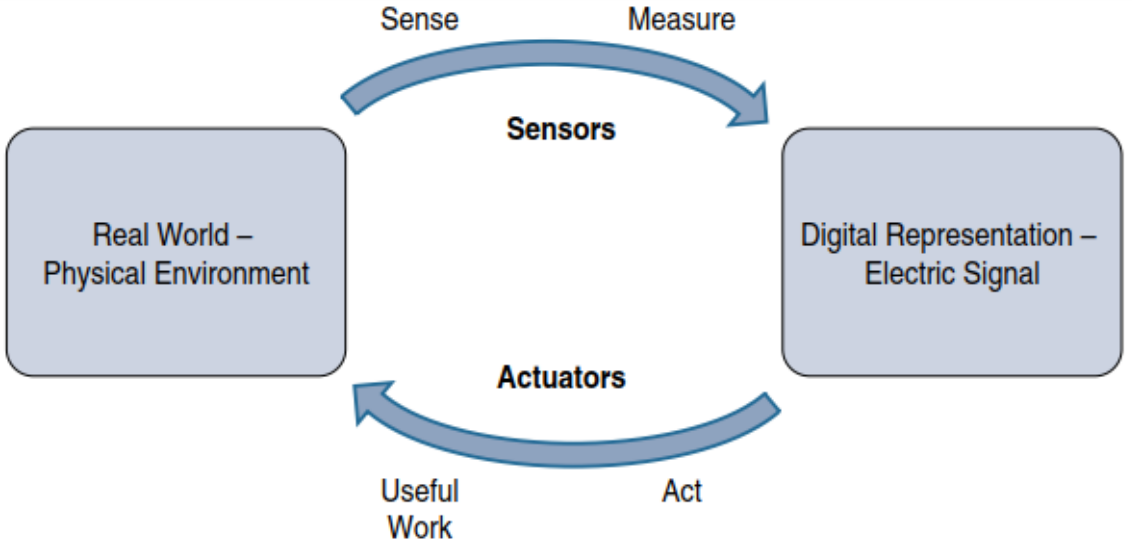


ACTUATORS

- Natural **complements** to sensors
- An actuator is a type of motor that is responsible for controlling or taking action in a system.
- It takes a source of data or energy (e.g., hydraulic fluid pressure, other sources of power) and converts the data/energy to motion to control a system.
- Receive some type of **control signal** (commonly an **electric signal or digital command**) that triggers a physical effect, usually some type of **motion, force**, etc.

IOT ACTUATORS FOLLOW ODA LOOP





Observe, Decide, Act : ODA loop

CLASSIFYING ACTUATORS BY CHARACTERISTICS

- **Type of Motion**
  - Examples: Linear, Rotary, One/Two/Three-Axes
- **Power**
  - Examples: High Power, Low Power, Micro Power
- **Output**
  - Binary or Continuous
  - Stable-State Outputs: Define or give an example
- **Application**
  - Industry Examples: Automotive, Healthcare, Manufacturing
- **Energy Type**
  - Examples: Thermal, Kinetic, Potential

ACTUATOR TYPES

- **Electrical Actuators** are devices driven by small motors that **convert energy to mechanical torque**.
- **Mechanical Linear Actuators** convert **rotary motion to linear motion**.
- **Hydraulic Actuators** are simple devices with mechanical parts that are used on linear or quarter-turn valves.
  - Pascal' s law: When there is an increase in pressure at any point in a **confined incompressible fluid**, then there is an equal increase at every point in the container.
- **Pneumatic Actuators** work on the **same concept as hydraulic** actuators except compressed **gas** is used instead of liquid.
- **Manual Actuators** employs levers, gears, or wheels to enable movement, while an automatic actuator has an external power source to provide motion to operate a valve automatically.