- **Transducer:** A device that converts physical signals into electrical signals (or vice versa).
- **Actuator:** A device that converts electrical signals into physical action.
- **DC motor:** Converts electrical energy into mechanical energy.
- **Servo motor:** Provides precise control of position, velocity, and acceleration.
- **Stepper motor:** A motor that moves in discrete steps for precise position control.
- **Arduino speed function:** `analogWrite()` is used to control motor speed.
- **Motor ON/OFF pins:** Digital pins are used to turn a motor on and off.
- **Motor speed pins:** PWM pins are used to control motor speed.
- **Servo control steps:** Include library, create object, attach pin, write position.
- **Stepper control steps:** Define pins, set pin modes, apply stepping sequence, control speed/steps.
- **Relay:** An electrically operated switch used to control high voltage devices.
- **Heat actuator:** Heater is an example of a heat actuator.
- **Light actuator:** LED is an example of a light actuator.
- **Sound actuator:** Buzzer is an example of a sound actuator.
- **Watchdog timer:** A timer that resets the system if it fails to operate correctly.
- **SOC:** A system that integrates all components of a computer into a single chip.
- **JTAG:** An interface used for debugging and testing integrated circuits.
- **GPIO:** General Purpose Input/Output pins used for interfacing devices.
- **RTOS:** An operating system designed for real-time, predictable task execution.

Question:

What would the savings be for 100 instructions?

Answer:
Non-pipelined cycles = 3 × 100 = 300 cycles
Pipelined cycles = 2 + 100 = 102 cycles
Saving = 300 − 102 = 198 cycles

✅ Final Answer: Saving = 198 cycles (≈66% faster)

Capacitor & Inductor

SI unit of capacitance: Farad (F)

- **Capacitors store energy:** In an electric field
- **SI unit of inductance:** Henry (H)
- **Inductors store energy:** In a magnetic field

Diode & Transistors

- **Diode conduction conditions:** Forward biased and sufficient threshold voltage
- **BJT terminals:** Emitter, Base, Collector
- **NPN fill in blanks:**In an NPN BJT, a small base current controls a much larger collector current.
- **BJT type:** Current-controlled device
- **JFET terminals:** Gate, Source, Drain
- **JFET type:** Voltage-controlled device