**Assignment – 1**

**1. What is a Prototype?**

A **prototype** is an early model or version of a product that is used to test concepts and design features before full-scale production. Prototypes allow designers and engineers to explore ideas and refine them through feedback and testing. They can range from simple, low-fidelity models to fully functional versions of the product.

**Open Source vs. Closed Source Prototype Platforms**

* **Open Source Prototype Platforms**: These platforms provide the design, code, and documentation openly, allowing anyone to modify, distribute, and use the prototype as they see fit. Open-source platforms encourage collaboration and community contributions. Examples include Arduino and Raspberry Pi.
* **Closed Source Prototype Platforms**: These platforms restrict access to the design, code, and documentation. The source code is proprietary, and users typically have limited freedom to modify or distribute the software or hardware. Examples include many commercial development kits and platforms where the company controls the intellectual property and usage rights.

**2. What is Arduino?**

**Arduino** is an open-source electronics platform based on easy-to-use hardware and software. It is used for building digital devices and interactive objects that can sense and control physical devices. The Arduino board is programmable via the Arduino Integrated Development Environment (IDE), which supports the C++ programming language. Arduino boards are popular in the maker community for prototyping electronic projects due to their simplicity and versatility.

**3. Arduino Uno R3 Key Specifications**

* **Main Processor**: ATmega328P microcontroller
* **Memory**:
  + **SRAM**: 2 KB
  + **Flash Memory**: 32 KB (0.5 KB used by the bootloader)
  + **EEPROM**: 1 KB
* **I/O Pins**:
  + **Digital I/O Pins**: 14 (of which 6 provide PWM output)
  + **Analog Input Pins**: 6
  + **PWM Pins**: 6
  + **Operating Voltage**: 5V
  + **Input Voltage (recommended)**: 7-12V
  + **DC Current per I/O Pin**: 20 mA
  + **DC Current for 3.3V Pin**: 50 mA