PULL UP RESISTORS:

Pull-up resistors are resistors used in logic circuits to ensure a well-defined logical level at a pin under all conditions.

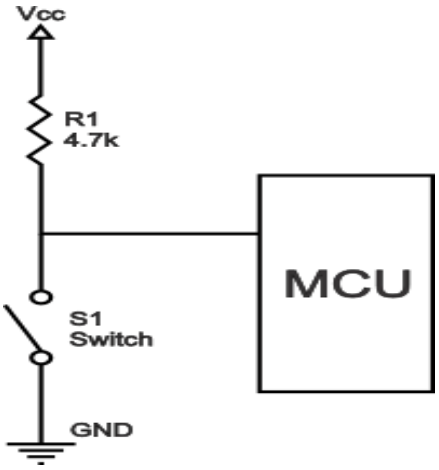

Fig: pull-up resistor

Without the pull-up resistor, the MCU's input would be floating when the switch is open and pulled down to a logical low only when the switch is closed. Pull-up resistors are not a special kind of resistors; they are simply fixed-value resistors connected between the voltage supply (typically +5 V, +3.3 V, or +2.5 V) and the appropriate pin, which results in defining the input or output voltage in the absence of a driving signal. A typical pull-up resistor value is 4.7 kΩ, but can vary depending on the application.

PULL-DOWN RESISITORS:

Pull-down resistors work in the same manner as pull-up resistors, except that they pull the pin to a logical low value. They are connected between ground and the appropriate pin on a device. An example of a pull-down resistor in a digital circuit can be seen in the following figure.

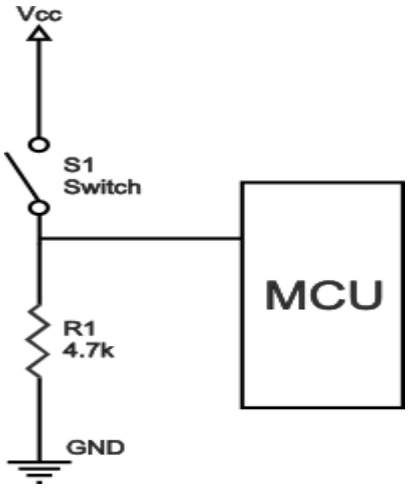

Fig: Pull-up transistor

In this figure, a pushbutton switch is connected between the supply voltage and a microcontroller pin. In such a circuit, when the switch is closed, the microcontroller input is at a logical high value, but when the switch is open, the pull-down resistor pulls the input voltage down to ground (logical zero value), preventing an undefined state at the input.

OPEN DRAIN:

An open-drain output pin is simply a transistor that is connected to the ground. Whenever we apply high input at the gate, drain, and source are shorted. Whenever we apply low input at the gate, drain, and source are disconnected. To make it simple, open-drain is like a switch that will get connected or disconnected basing on the input signal given.

ACTIVE LOW AND HIGH:

Active LOW is a term used in the field of digital electronics to describe the required logic state of an integrated circuit (IC) pin that will enable its internal function. Usually, the physical pin provides access to a function within the IC, and changing its state to **LOW** activates this function.

Active LOW always helps eliminate indeterminate states due to improper supply voltages. In digital circuits when: A signal is '**active low**' means that signal will be performing its function when its **logic** level is 0. If it's in active-**low** pin, you must “pull” that pin **LOW** by connecting it to ground. For an **active high** pin, you connect it to your **HIGH** voltage (usually 3.3V/5V).