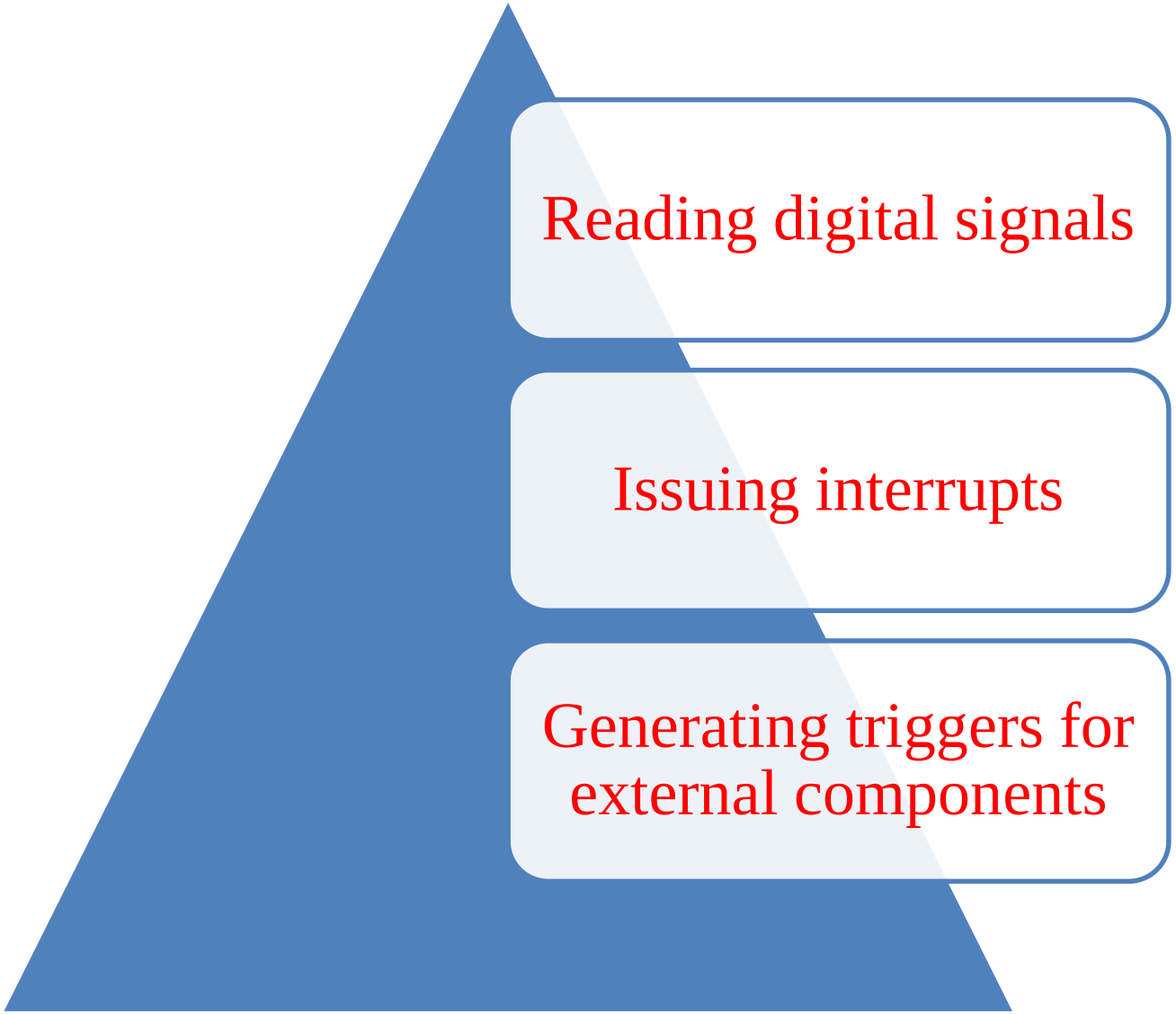
General Purpose Input Output (GPIO)

GPIOs generally used for



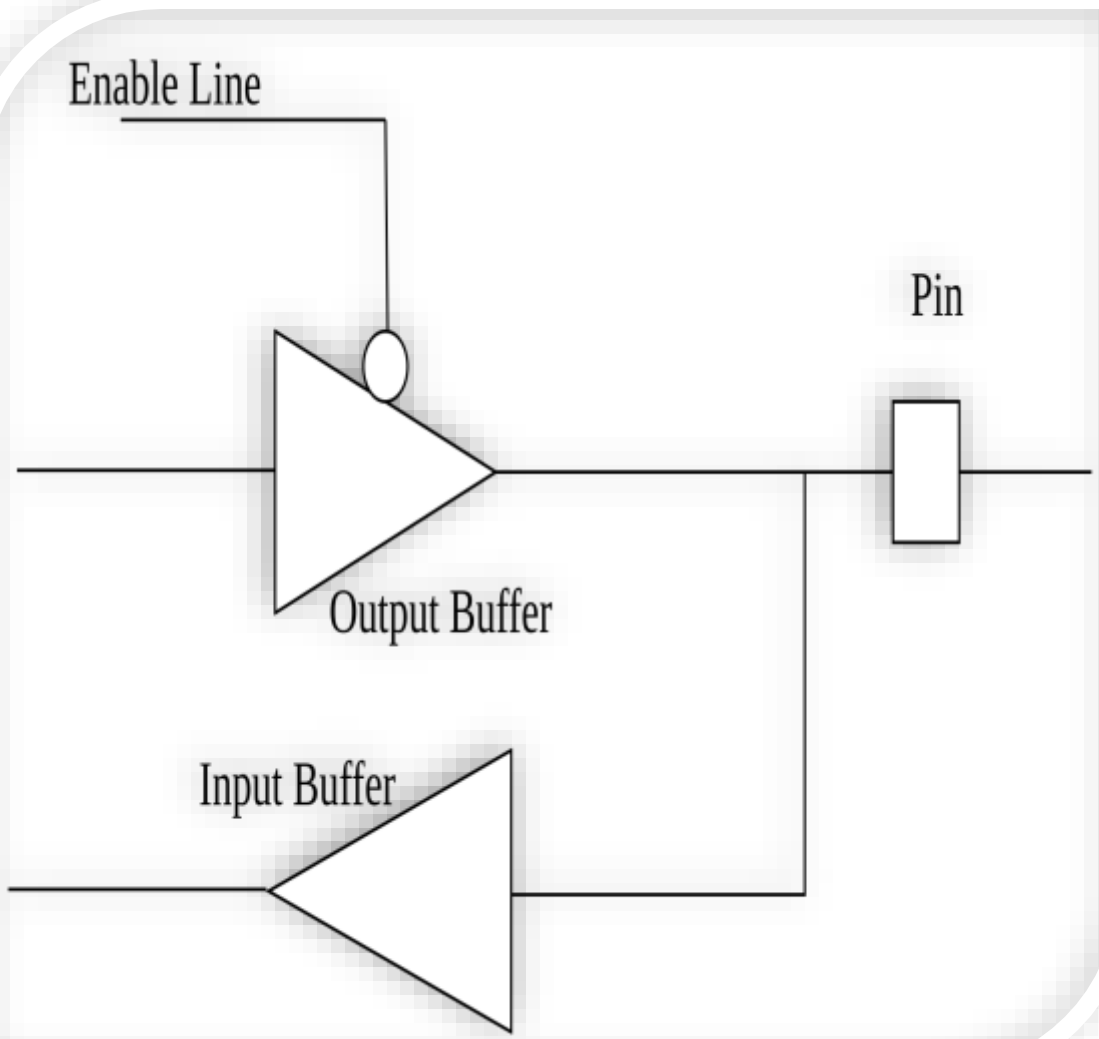
GPIO pin GPIO port

GPIO pin

- Generic pin whose value consists of one of two voltage settings (*high* or *low*)
- Behavior can be programmed through software

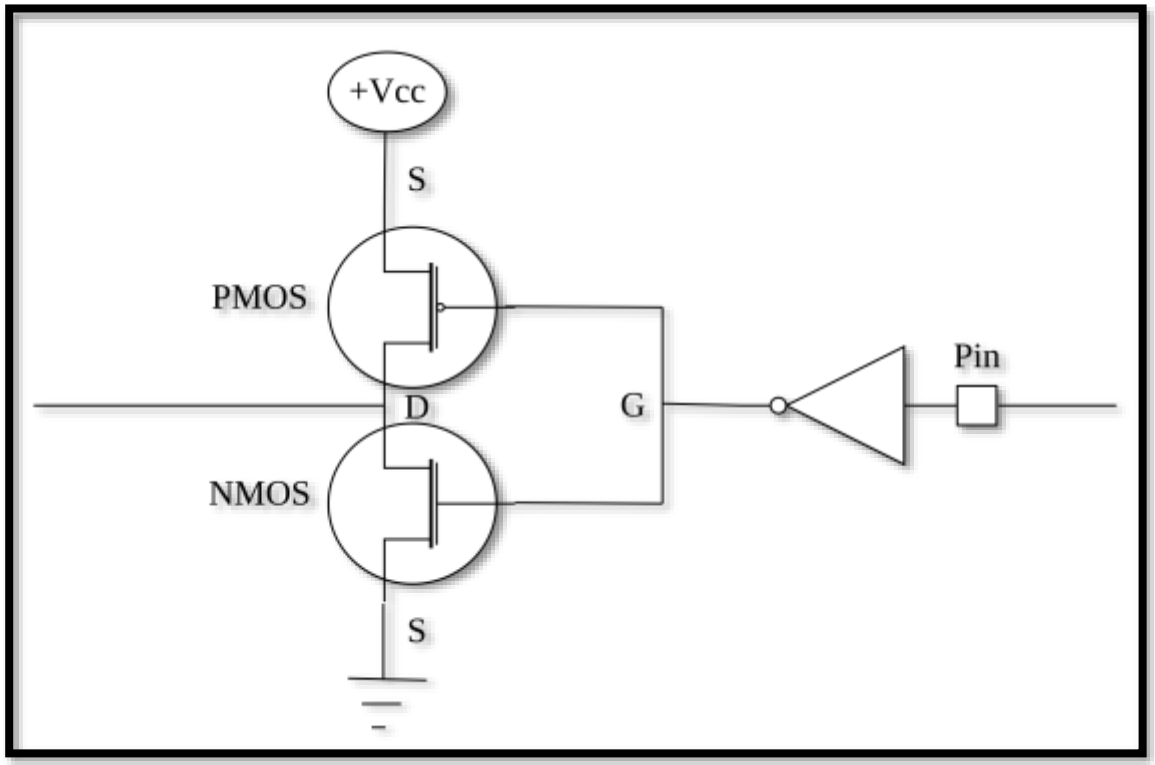
GPIO port

- Platform-defined grouping of GPIO pins (STM32 16 pins).

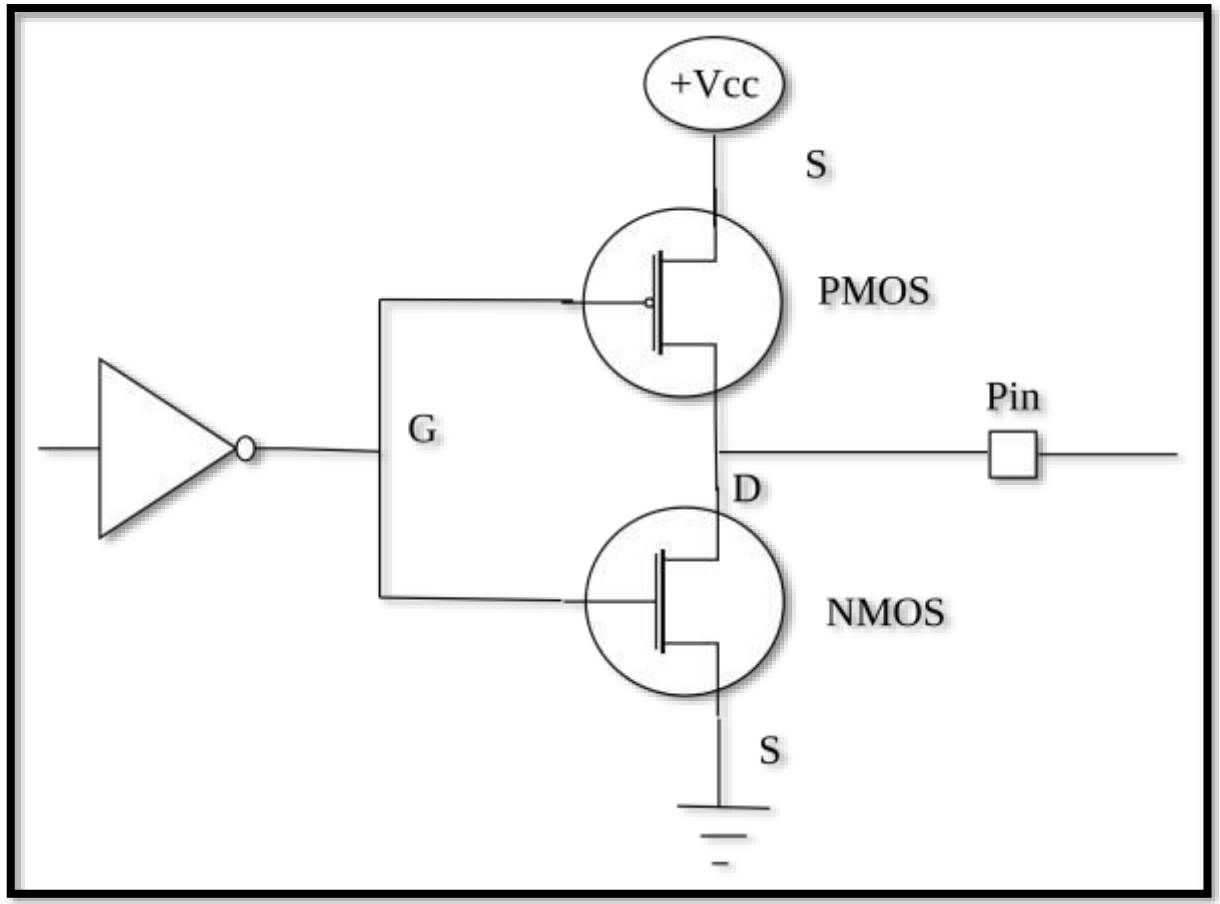


Enable Line	Output buffer	Input buffer
1	✓	✗
0	✗	✓

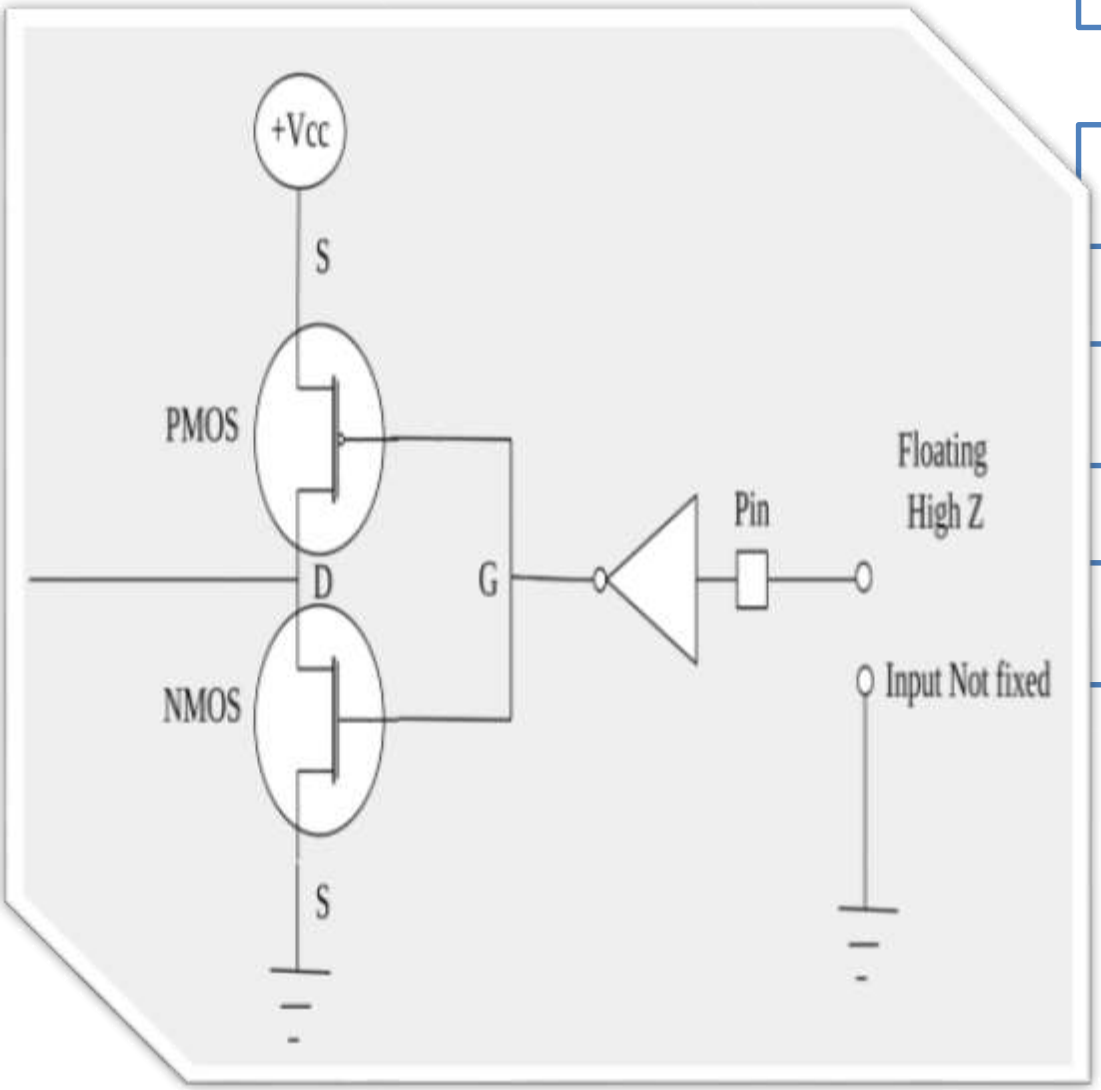
Input Buffer



Output Buffer

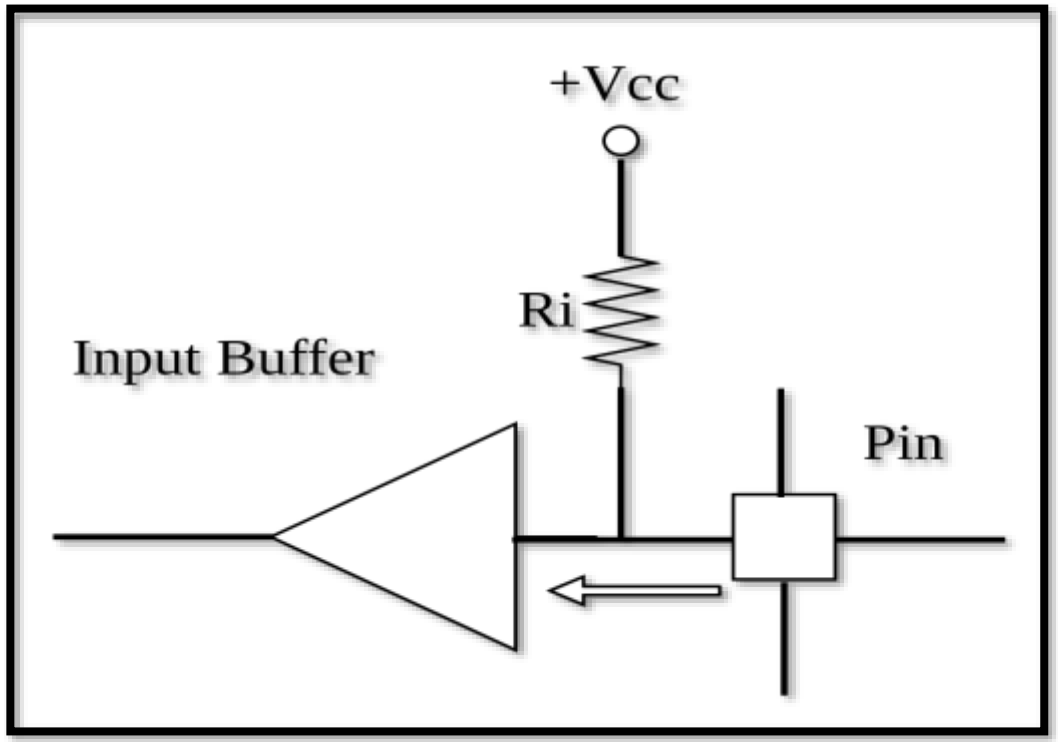


GPIO input mode with high impedance state



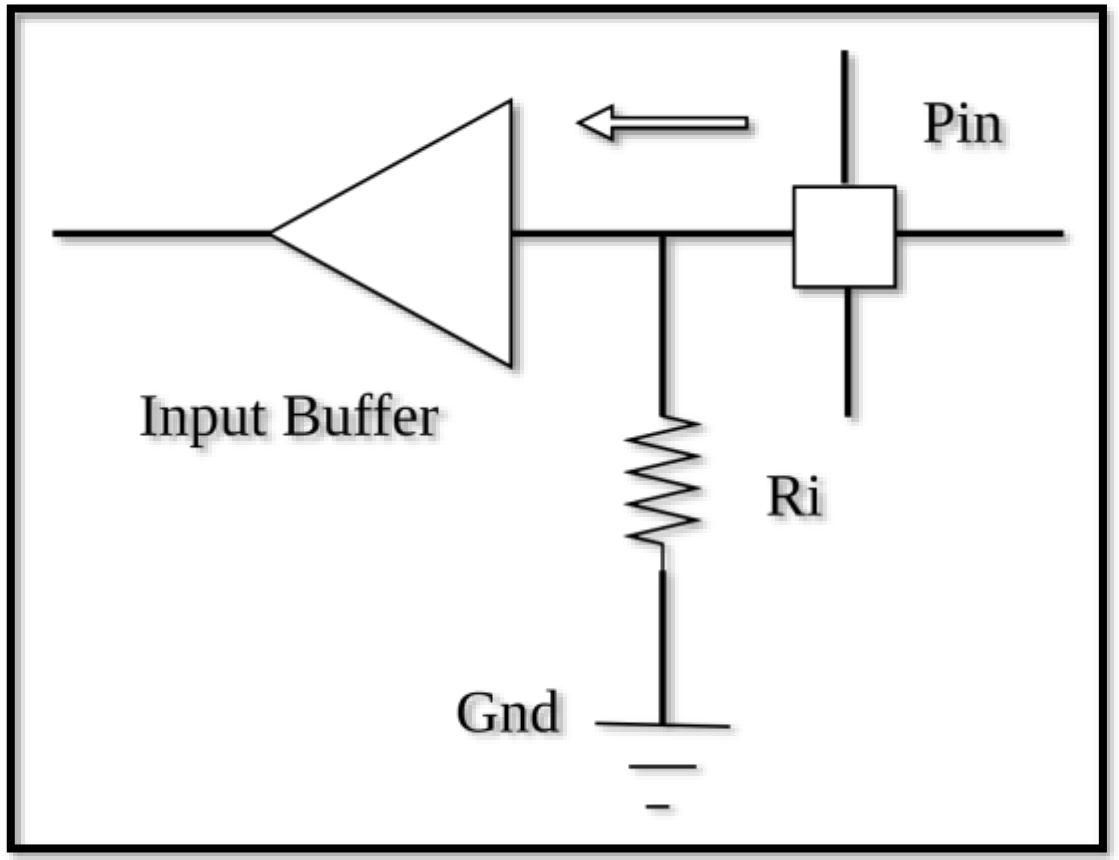
- After reset MCU default GPIO pins are Input Mode
- Default GPIO pins will be in High Z state or Floating state
- Neither high state or ground state
- Keeping the pin in floating state lead to leakage current, more power consumption

GPIO input mode with pull-up /pull-down state

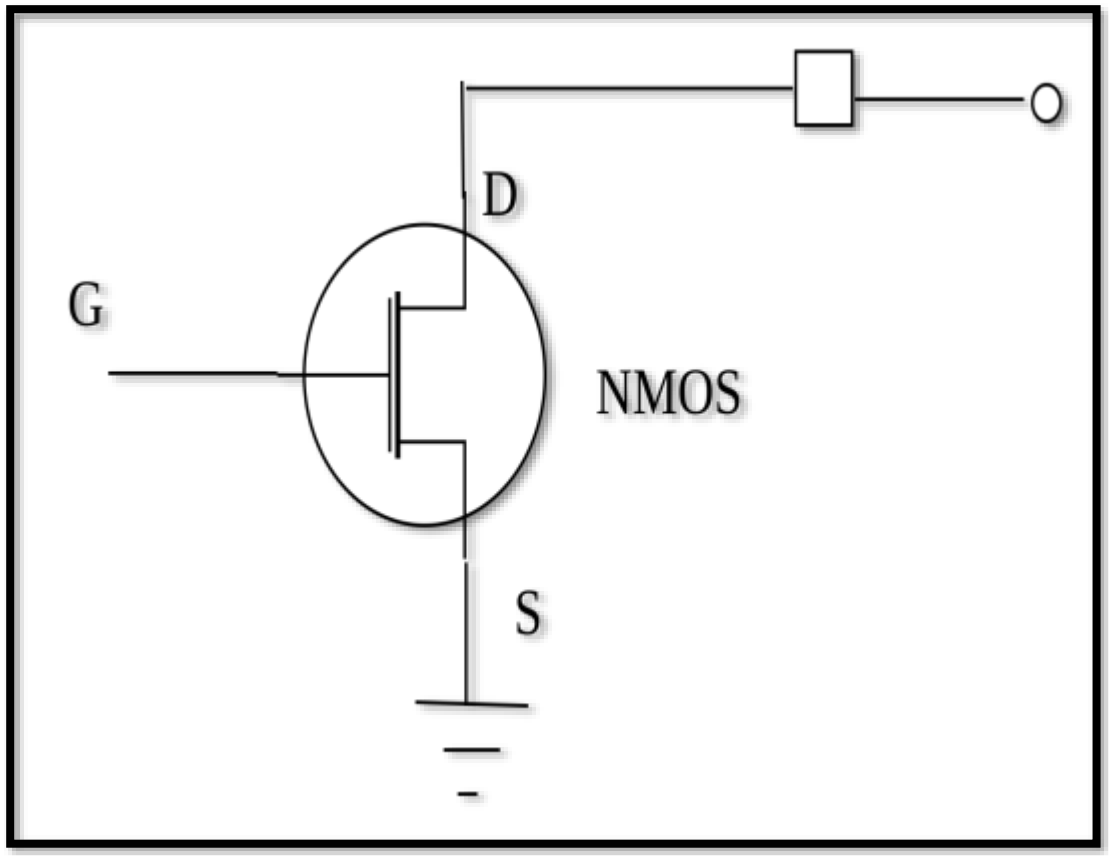


Internal Pull Up

Internal Pull Down



GPIO output mode with open drain state

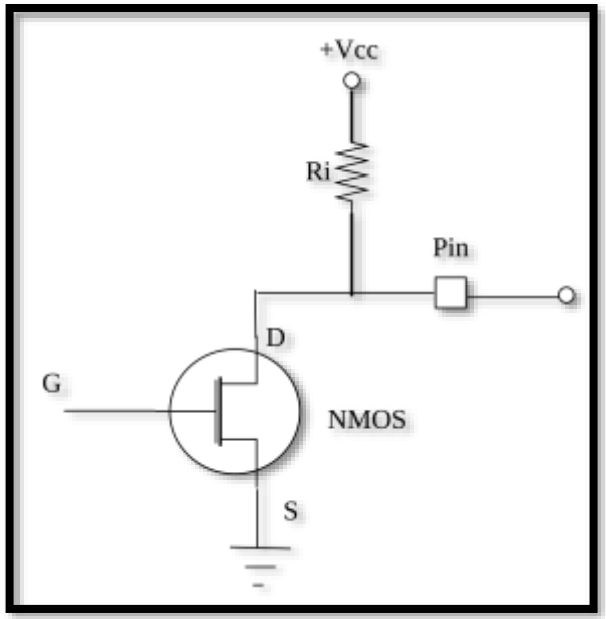


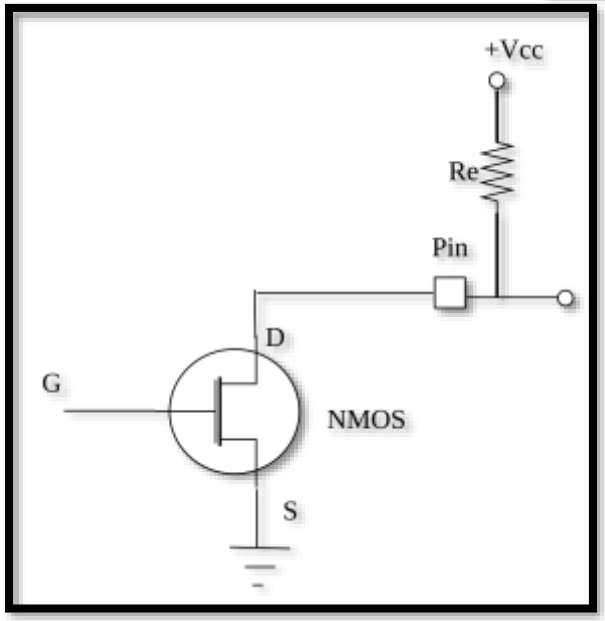
Open-drain output configuration is nothing but the top PMOS transistor is deactivated

When the transistor is ON, the pin pulled to the ground.

When the transistor is OFF, the drain of the transistor will be floating or open.

That's the reason it is called an open drain.





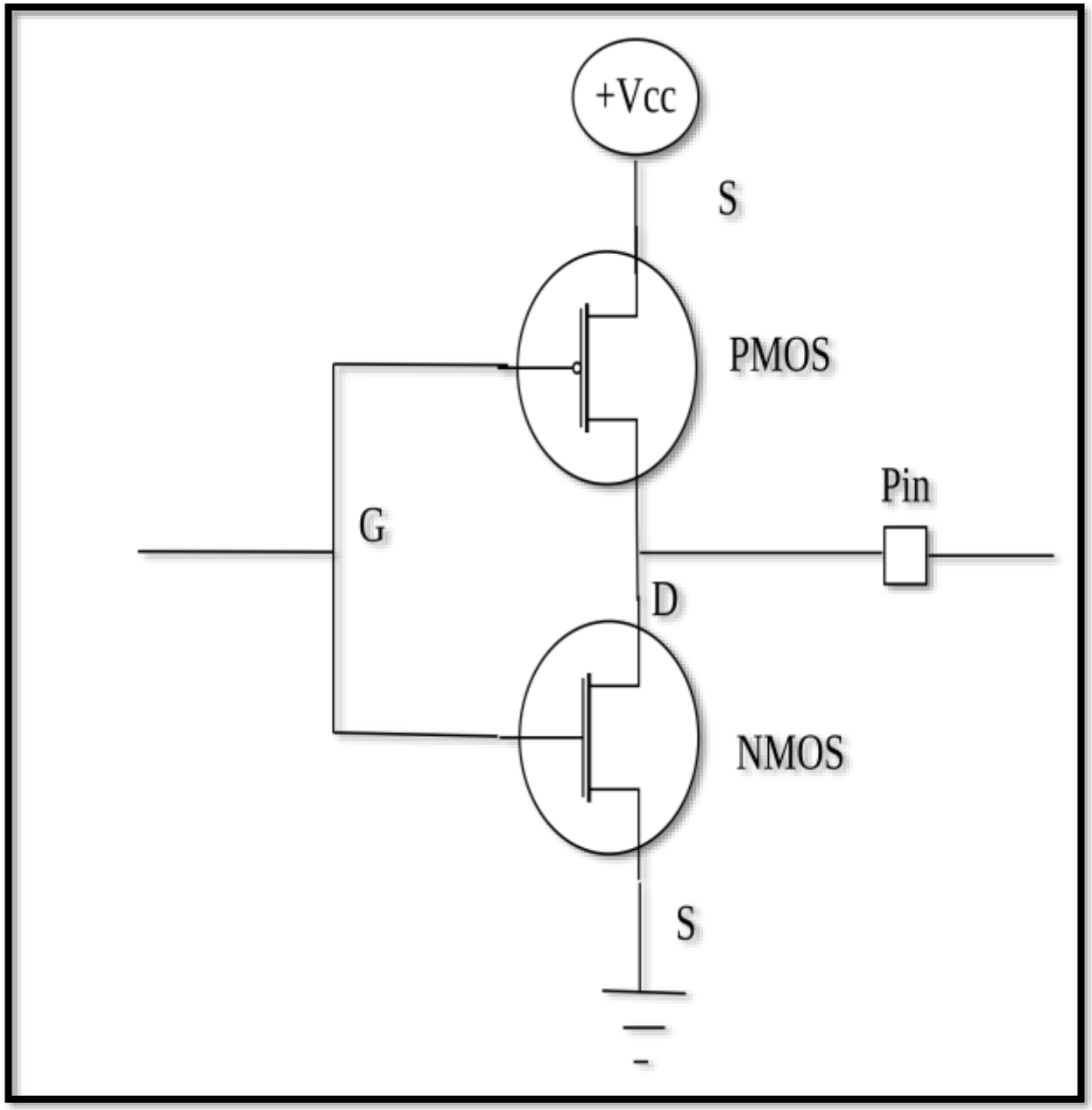
So, an open-drain configuration can only pull-down the pin, but it lacks pulling up capability.

Open-drain configuration has two states, either ground or floats.

Both are useless until you introducing pull-up resistor.

Activating internal pull-up or external pull-down resistor.

GPIO output mode with push pull state



The push-pull state is the default configuration of any GPIO pin in output mode.

When you enable GPIO port by default, its pin will be in input mode.

But if you set any pin as the output mode, then by default it will be in push-pull configuration.

The name Push-pull output configuration because output will be pulled actively between low and high by using two transistors.

Push-pull configuration doesn’t need any pull-up/pull-down resistor.

Push-pull output uses two transistors. Each will be on to drive the output to the appropriate level.

Open Discussions

Connect-us

Developer Wiki