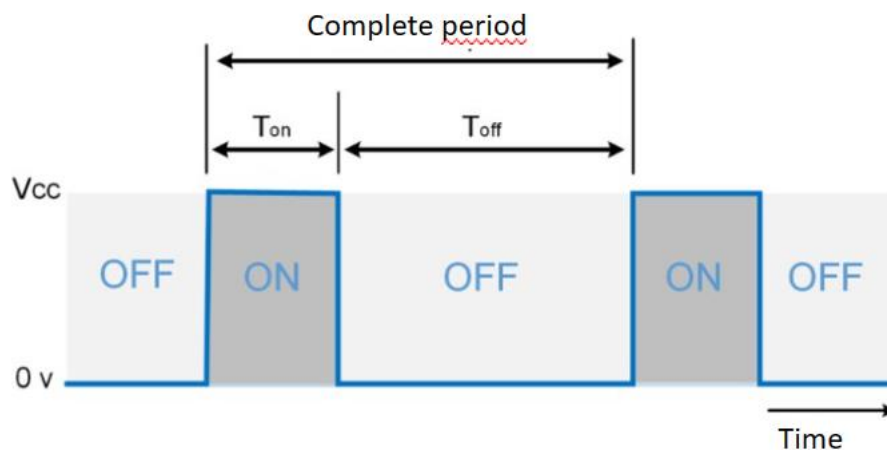


# ServoMotor : Theoretical Background

The servomotor is a peripheral which the rotation angle is ordered using a PWM (Pulse Width Modulation). This means that the information sent is carried by the length of the pulse received. Thus, transfer information with a PWM consists in varying the duty cycle of a fixed periodic signal.

To order a servomotor we have to deal with 2 clocks, the servomotor can receive an order every 20 ms. This is the clock of the rotation execution. This corresponds to a pulse that will appear every 20 ms if we send order every 20 ms. This is the servomotor frequency.



You can see on the picture above that the time during which the servo motor is on and receives information is the time  $T_{on}$ , the next time it will be on is after a complete period of 20 ms.

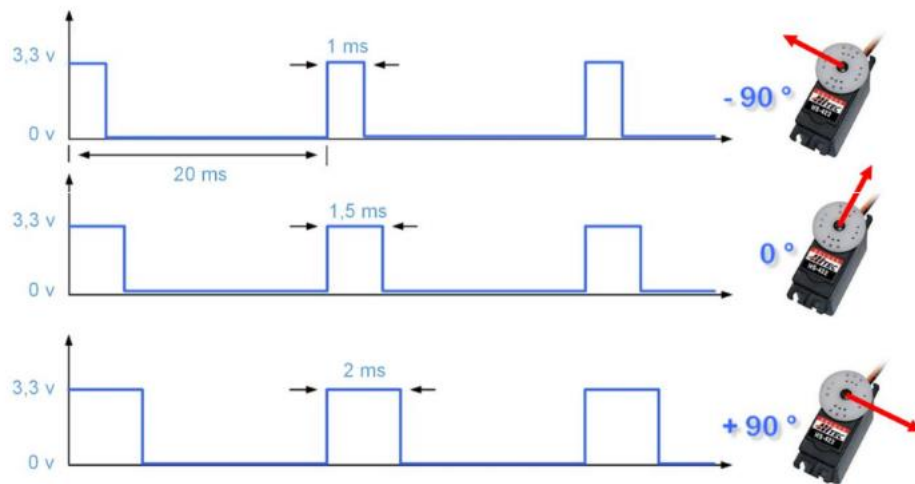
The information is carried by the length of the pulse. As the rotation of the servomotor can go from  $0^\circ$  to  $180^\circ$ , the pulse linked to a rotation of  $0^\circ$  has a duration of 1 ms, the pulse associated to a rotation of  $180^\circ$  corresponds to a duration of 2 ms.

So, the first second of the pulse corresponds to the fact that the servomotor is « awake » and the additional time of the pulse is the information of the rotation. Therefore, we have to divide 1 second in  $180^\circ$  different values to have a scale of rotation associated to a scale of time.

In the software part, the purpose is to generate the binary value of the rotation wanted. As we code the information on 8 bits, the rotation can take 256 different values. The software gives the rotation in a binary value coded on 8 bits, for example a rotation on  $0^\circ$  will be 00000000. The software scales the rotation angle in 256 values.

This information is then sent to the Hardware part, its rôle is to translate this binary information in time value. To have time values we can use frequency due to the fact that

$f=1/T$ . The 256 possible values have attributed time values between 1 and 2 ms. This range of time. You can see on the following picture an illustration of the translation of the time domain to a rotation domain.



The following scheme represents the transfer of information between the hardware, the software and the servomotor.

