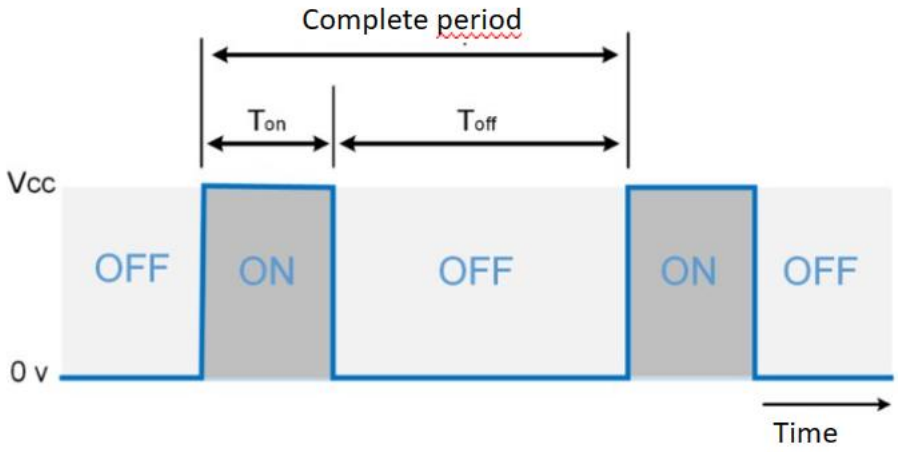
ServoMotor : Theoritical Background

The servomotor is a peripherial 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 recieve an order every 20 ms. This is the clock of the rotation execution. This correspond 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 receive information is the the time Ton. When this time is over, the servomotor turn off. The next time it will be on is after a complete periode of 20 ms.

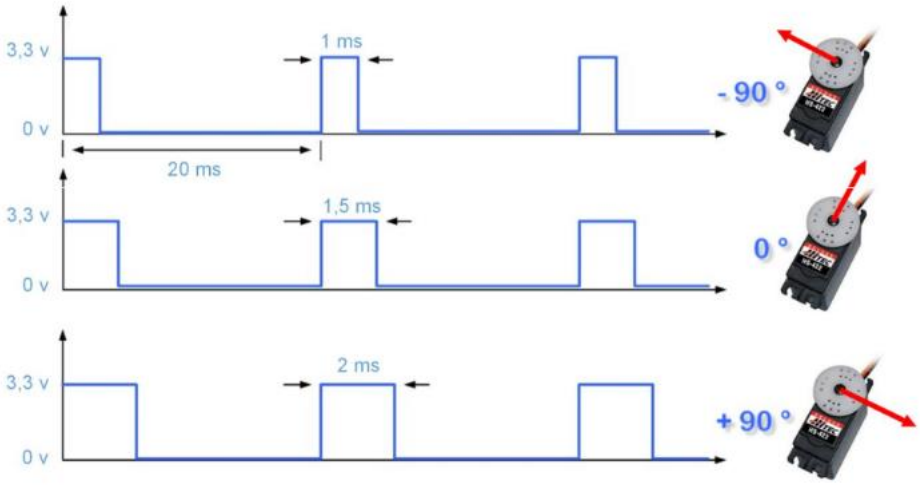
The information is carried by the length of the pulse. As the rotation of the servomotor can go from 0° to 180° ,the pulse linked to a rotation of 0° has a duration of 1ms, the pulse associated to a rotation of 180° corresponds to a duration of 2ms.

So, the first second of the pulse correspond to the fact that the servomotor is « awake » and the additionnal time of the pulse is the information of the rotation. Therefore, we have to divide 1 second in 180° different value 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 give the rotation in a binary value coded on 8 bits, for example a rotation on 0° will be 00000000. The software scales the rotation angle in 256 values.

This information is then sent to the Hardware part, its role 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 represent the transfer of information between the hardware, the software and the servomotor.