

PWM, ICU Lab

Example 1:

Write Embedded C code using ATmega328P μ C to control LED brightness using Fast PWM.

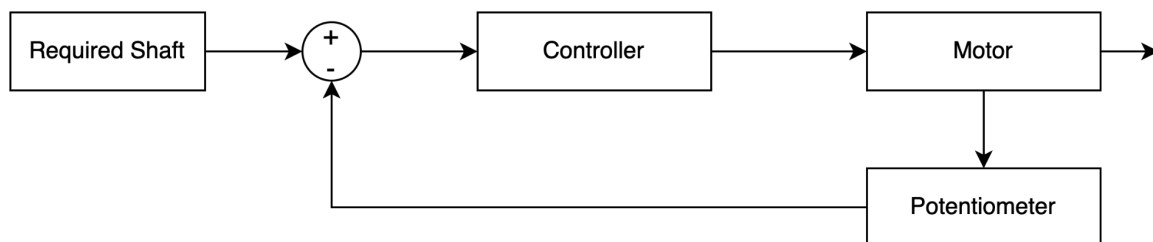
i.e. The intensity of the led should increase slightly from low to high then decrease slightly to low again.

Example 2:

Write Embedded C code using ATmega328P μ C to control Servo motor using Fast PWM.

i.e. The motor angle should increase slightly from 0 to 180 then decrease slightly to 0 again. The servo motor is used to determine the shaft position precisely.

The servo motor consists of a DC motor, potentiometer and a controller.



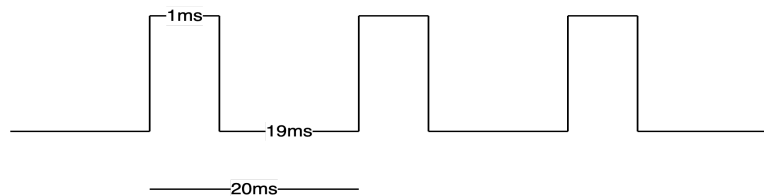
The motor rotation enters the potentiometer which calculates the amount of rotation achieved, and this calculation is used as a feedback that enters the controller to achieve precise shaft position.

Here our problem is to give the Servo motor the required angle using PWM. By selecting the proper duty cycle we can obtain the required angle.

The servo motor takes an input signal of a time period equal to 20ms.

To achieve the required angle between (0-180), adjust the Turn on period between (1-2)ms.

Ex: The signal in the figure will adjust the shaft position at 0 degree.



Hints: use Timer1, and use wave generation mode where WC1(0-3) = (1111), use prescaler 64.

Example 3:

Assuming that the clock pulses are fed into the pin ICP1 (PB0), following program will read TCNT1 value at every rising edge and place the result on serial monitor using Serial.println() function.

Steps Main:

- 1- Clear the timer counter TCNT1.
- 2- Clear input capture flag.
- 3- Configure capture on rising edge.
- 4- Wait for capture (ICF1)
- 5- Capture current time in ICR1 on a variable.
- 6- Clear capture flag.
- 7- Wait for next rising edge capture
- 8- Capture recent time in ICR1 and calculate period= recent capture- previous capture.
- 9- Put period count on serial monitor