

# PWM Output from Arduino

## EAS 199A Notes

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## Motivation

1. Arduino board cannot create an arbitrary voltage output
2. Pulse-width modulation (PWM) is a common technique for supplying variable power levels to “slow” electrical devices such as resistive loads, LEDs, and DC motors
3. PWM is versatile and is very easy to use on an Arduino board

## PWM is a variable-width pulse train from a digital source



The *effective* voltage is

$$V_{\text{eff}} = V_s \frac{\tau_o}{\tau_c} \quad (1)$$

where  $\tau_o/\tau_c$  is called the *duty cycle* of the square wave pulses.

## The analogWrite command produces PWM output from an Arduino

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```
int PWM_out_pin = 9; // Must be one of 3, 5, 6, 9, 10, or 11
                    // for Arduino Uno

void setup() {
  pinMode(PWM_out_pin, OUTPUT);
}

void loop() {
  byte PWM_out_level;

  PWM_out_level = ... // Code logic to set output level

  analogWrite( PWM_out_pin, PWM_out_level);
}
```

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