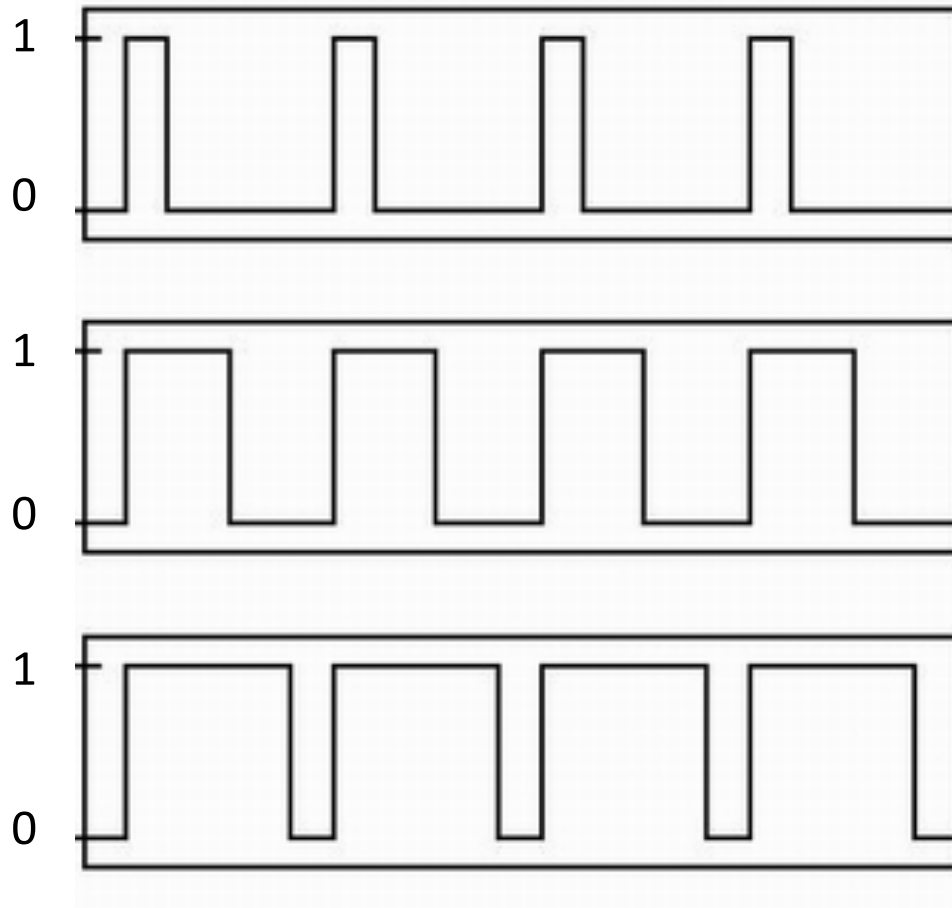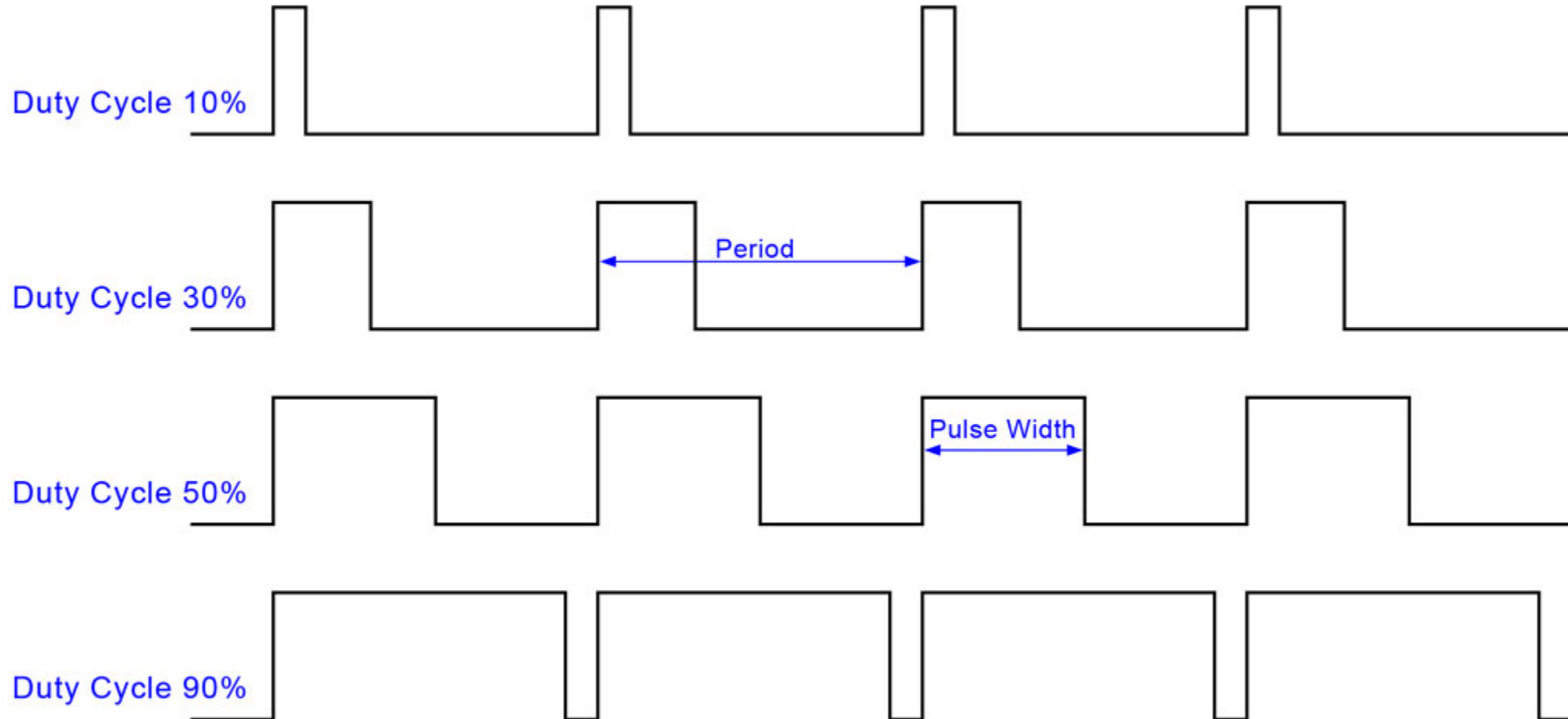# Pulse Width Modulation (PWM)

Applications
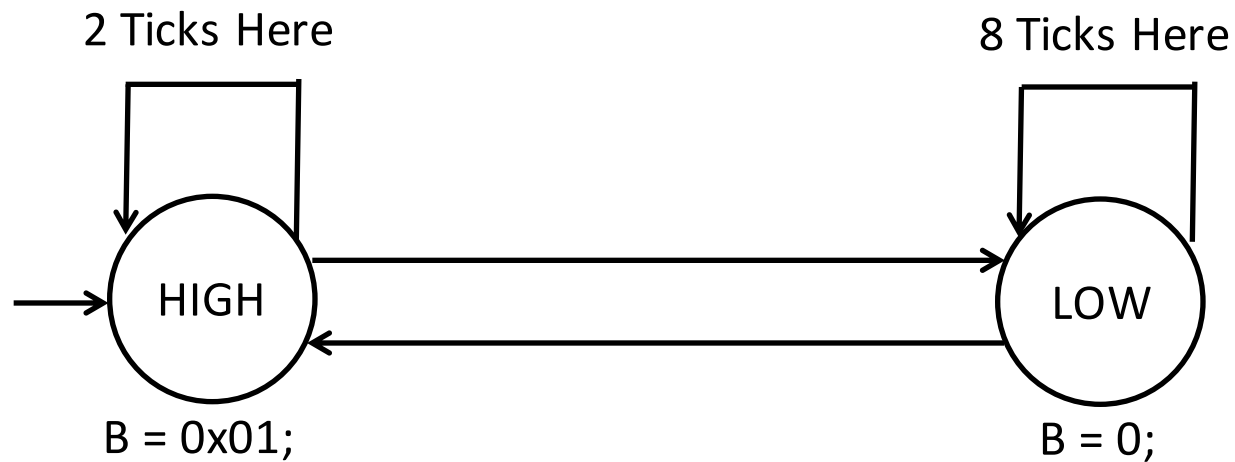- Motor control
- Servos
- Audio
- Telecommunications
- Power Delivery
- Voltage Regulation
- (+ Many Others)

PWM Basics

Duty Cycle 10%

Duty Cycle 30%

Period

Duty Cycle 50%

Pulse Width

Duty Cycle 90%

SynchSM Design

Example: 20% Duty Cycle
1000 ms period
100 ms synchSM period

2 Ticks Here   8 Ticks Here

HIGH ───────────────→ LOW

LOW ───────────────→ HIGH

B = 0x01;   B = 0;

SynchSM Design

Example: 60% Duty Cycle
1000 ms period
100 ms synchSM period

6 Ticks Here

4 Ticks Here

HIGH

LOW

B = 0x01;

B = 0;
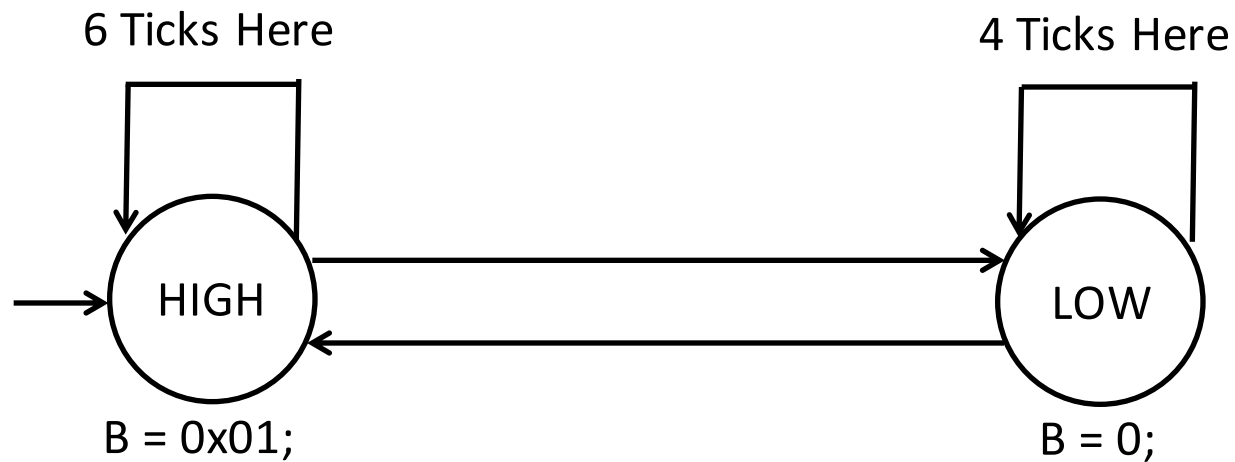
SynchSM Design

Example: 20% Duty Cycle
1000 ms period
10 ms synchSM period

20 Ticks Here

80 Ticks Here

HIGH

LOW

B = 0x01;

B = 0;
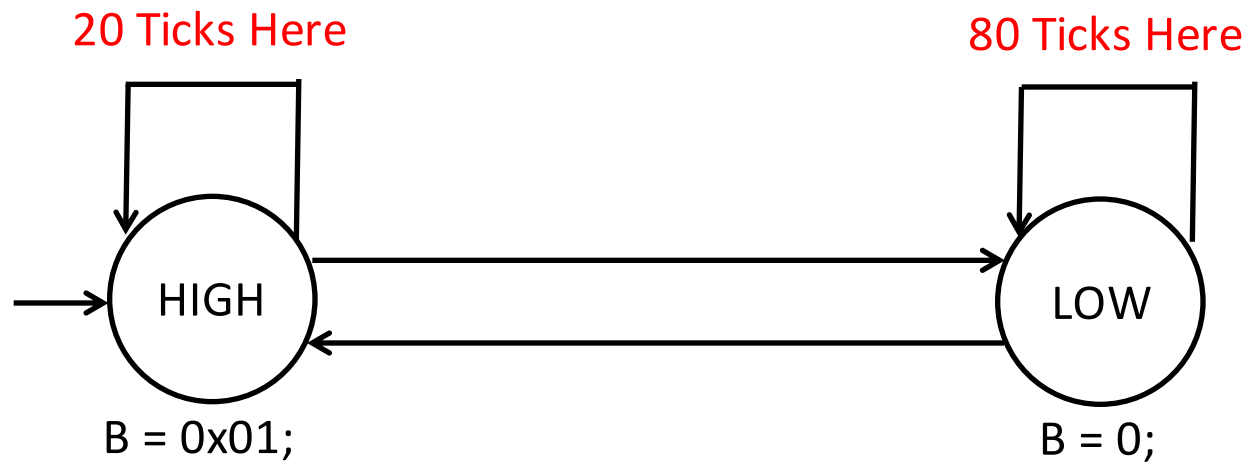
SynchSM Design

Example: 43% Duty Cycle
1000 ms period
100 ms synchSM period

??? Ticks Here   ??? Ticks Here

PULSE   OFF

B = 0x01;   B = 0;
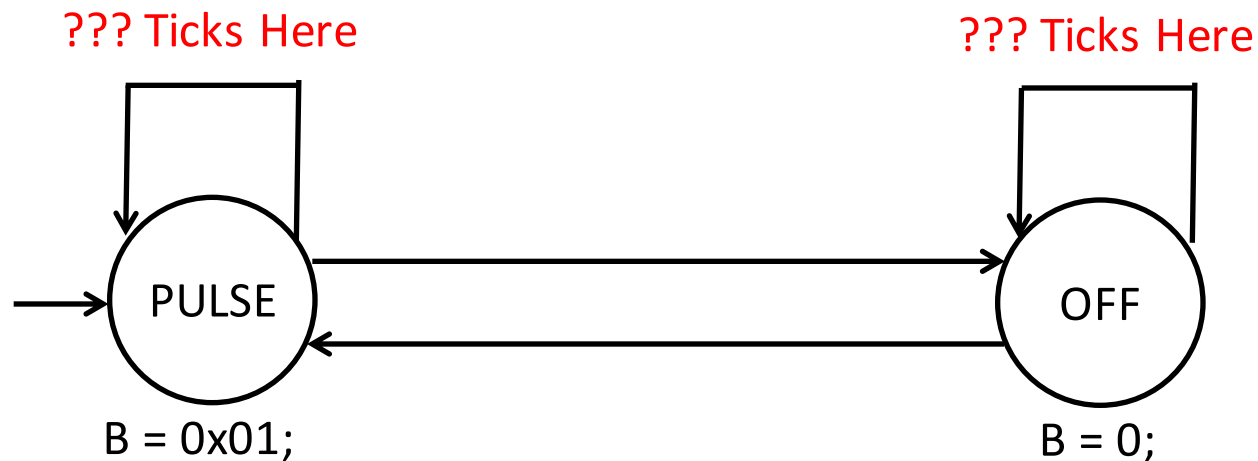
Not feasible given the two periods!
- Pulse needs to be 430ms

PWM SynchSM Template

System Period: L + H
Duty Cycle: (H / (L + H)) x 100%

PWM
unsigned char i;
unsigned char L, H;
Period = _____

B = i = 0;
L = ___
H = ___

i <= H

i > H
/
i = 0;

i <= L

HIGH

LOW

B = 0x01;
i++;

i > L
/
i = 0;

B = 0;
i++;