ENPM 809T – Autonomous Robotics

HW 5 – Ground Vehicle Assembly – Raspberry Pi

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Teleoperation Video

https://youtu.be/b917Zo27y54

In-Class Exercise

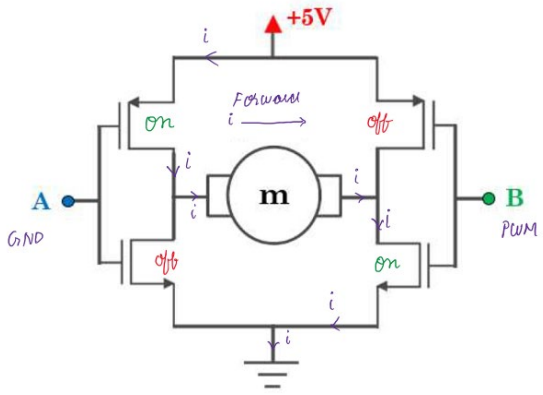
PWM Calculation

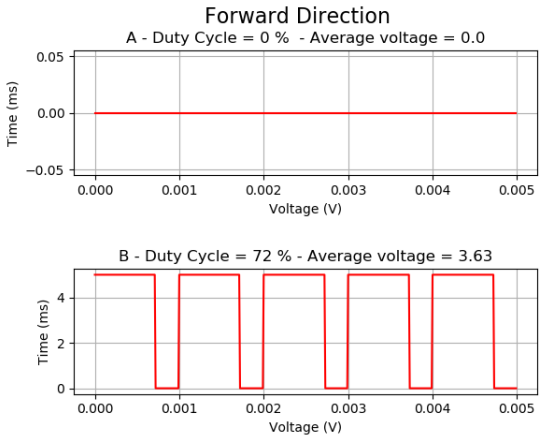
$$v_{th} = 3\ V$$
$$v_{max} = 5\ V$$

$$v_{operating} = v_{max} - v_{th}$$
$$v_{operating} = 2\ V$$

Forward Rotation

$$v_{forward} = 30\ \%\ of\ full\ speed$$
$$v_{forward} = 30\%\ of\ v_{operating} + v_{th}$$
$$v_{forward} = (0.3 \times 2) + v_{th}$$
$$= 0.6 + 3$$
$$= 3.6\ V$$
$$Duty\ cycle = \frac{3.6}{5} \times 100$$
$$= 72\ \%$$
$$t_{on} = 72\ \%\ of\ 1\ ms$$
$$= 0.72\ ms$$
$$t_{off} = 1 - 0.72$$
$$= 0.28\ ms$$





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Reverse Rotation

$$
\begin{aligned}
v_{reverse} &= 70\ \%\ of\ full\ speed \\
v_{reverse} &= 70\%\ of\ v_{operating} + v_{th} \\
v_{reverse} &= (0.7 \times 2) + v_{th} \\
&= 1.4 + 3 \\
&= 4.4\ V \\
Duty\ cycle &= \frac{4.4}{5} \times 100 \\
&= 88\ \% \\
t_{on} &= 88\ \%\ of\ 1\ ms \\
&= 0.88\ ms \\
t_{off} &= 1 - 0.88 \\
&= 0.12\ ms
\end{aligned}
$$