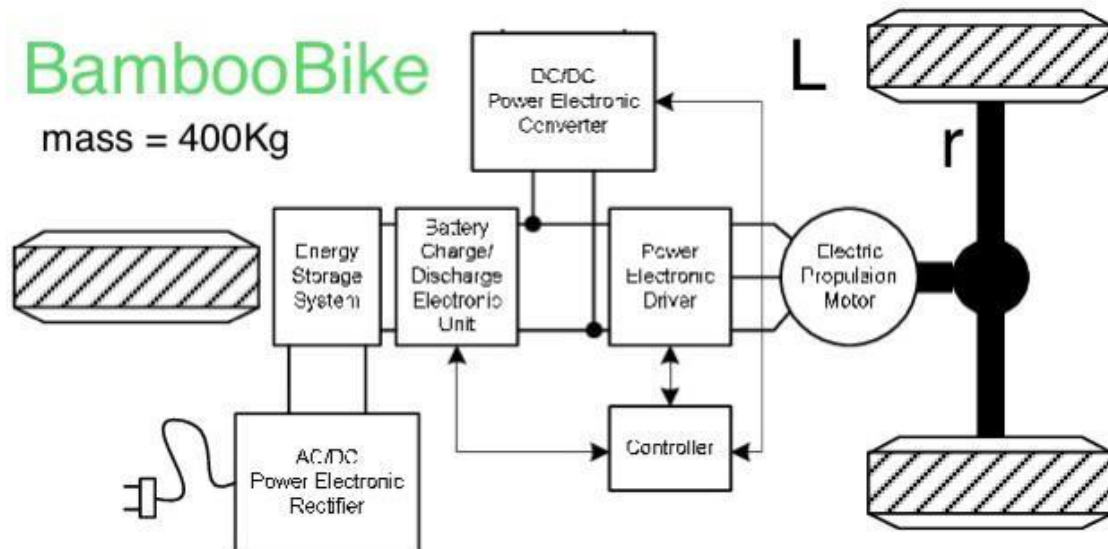


BambooBike

mass = 400Kg



Let's calculate theoretically how much power is required for the DC motor to move a 400 kg rickshaw at a speed of 40km/hr?

This is how the calculation is done:

Mass of vehicle= 400kg

(Assuming $g = 10\text{m/s}^2$)

Weight of vehicle= 4000N

(Assuming uniform distribution of weight)

Weight on each wheel= 1000N

Now this will act along the center of gravity of wheel and considering wheel as cylinder with

$r = 30\text{cm}$, $L = 15\text{cm}$

Moment of inertia along diameter $(1/4) * mr^2 + (1/12) * mL^2$

Using parallel axis theorem

Moment of inertia along diameter at wheel surface

$I = (1/4) * mr^2 + (1/12) * mL^2 + mr^2$

$I = 11.4375 \text{ Kg.m}^2$

Initial angular velocity (ω_1)=

0 rad/sec

Angular velocity (ω_2)=

$V/r = 40 * (5/18) / 0.3 = 37 \text{ rad/se}$

Suppose it takes 5sec to reach 40km/hr

Therefore, angular acceleration (α)= change

in angular velocity/ change in time

$\alpha = 37/5 = 7.4 \text{ rad/sec}^2$

Torque= $\tau = I * \alpha = 11.4375 * 7.4 = 85$

N.m(approx.)

Speed of revolution= $N = 60 * \omega / 2\pi = 60 * 11.4375 / 2\pi = 109 \text{ rpm}$

Power = $2\pi N * \tau / 60 = 2\pi * 109 * 85 / 60 = 972 \text{ Watt}$

Considering all 3 wheels $3 * 972.3888 \text{ watt} = 2.917 \text{ KW}$

So approximately u can use 3KW DC motor.