ELECTRIC VEHICLE DRIVES WITH TORQUE REGULATION

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In order to understand EVs more intricately, a functional diagram (fig. 1) demonstrating the internal working of an EV allows us to easily visualise its functionality when we use one. In this example, we will be using the 2019 car model Nissan Leaf SL plus with a 3-phase permanent magnet synchronous motor.

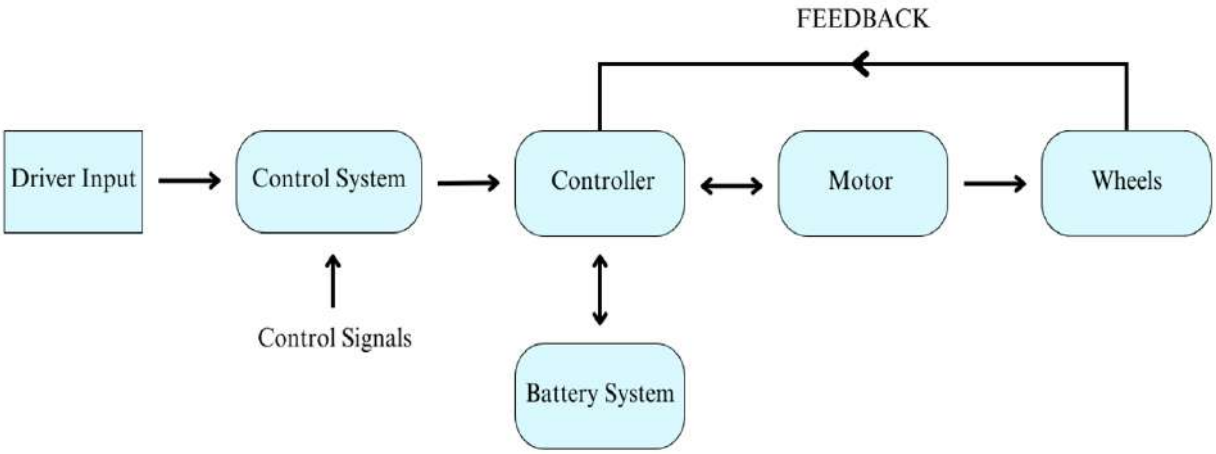

Fig. 1. Functional diagram of EVs

The simplified diagram illustrates how the driver's input block is the first step where the input, such as pressing the brakes or accelerating, gets signalled to the control system block of in order to perform many functions through a motor controller, which is a part of the control system, using control signals. The battery system provides the energy required in order to power the motor through the controller. The controller is the electronics package which controls the EV's speed and acceleration usually by using an electronic process called pulse-width modulation. Thus, the controller regulates the flow of electricity to the motor through a power converter depending on the purpose. The motor then will be able to turn the wheels of the vehicle through the transmission and gearbox according to the controller's signals.

The wheels allow for feedback such as the actual speed and the torque generated to the controller. The controller will in turn react to the feedback of the decelerating by regulating the flow of electricity to the motor applying braking pressure on the brake wheel and disc, and braking on the wheels; using the example of a braking system. This means that the vehicle body will slow down and eventually come to a stop as the driver's input of pressing the brakes intended. The same concept applies when accelerating as well, however, instead of applying friction it increases the speed of the turning of the wheels.