

# A Study On The Performance Of Hybrid Electric Vehicle

Prepared by: Saleh Othman Juma Mohamed

## ABSTRACT

With people more aware of the concept of global warming and its effects on the planet, increased efforts are being made to tackle and eliminate this problem. As engineers, our work is to reduce the emissions of greenhouse gasses in an effort to work towards sustainable engineering. In transportation, the development of plug-in hybrid electric vehicle cuts down significantly on greenhouse gasses by replacing the internal combustion engine with a battery powered motor. Improving the performance of this vehicle is essential if people's minds are to be into investing for the future. Firstly, the working principle and mechanism of hybrid vehicle would be studied to investigate factors that contribute to the vehicle's performance. Simulations were then run in order to analyse the characteristics of various operating parameters on the performance. The varied parameters were the driving profile, the battery's state of charge, vehicle loading and the ambient temperature. Data analysis was done on the torque plot, losses plot, powertrain's global efficiency plot and the losses plot for each varied parameter. It was observed that increased speed and aggressiveness in the driving profile resulted to greater torque demands, increased battery losses, higher efficiency and greater energy losses over a shorter period of time. Having a lower state of charge yields no difference in the output torque, but increases battery losses, decreases efficiency, and increases the energy losses. With heavier vehicle loads, there is an observed increase in the torque demand, battery losses and energy losses, but an increase in the powertrains global efficiency. With an ambient temperature range between 20°C to 35°C, there is no effect what so ever on the performance of the plug-in hybrid electric vehicle.