

A Novel Emission Tester for Diesel Vehicles

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Vehicle emissions remain the major source of human health issues. Several mechanisms have been developed to mitigate the emissions from the automotive industry, thus, emission testers are the prominent means to measure and control vehicle emissions. Though emission testing was started decades ago, Sri Lanka has begun to impose taxation policies based on vehicle emissions since 2003. The research aims to develop a portable emission tester that can update the emission status of diesel vehicles rather than obtaining the reports annually. The basic procedure of the experiment is to check the average K-factor value of the vehicle by doing 3 snap-acceleration procedures. The K-factor value must be less than 4 (as new rules and regulations are updated) and variation must be less than 1 from one to another procedure. The K-factor calculation is derived in SAE-J1667 which is a universal document that is used to identify rules and regulations of Automobile Diesel emission tests. The components namely, Arduino nano, Arduino Mega, wireless transmitter, magnetic pickup sensor, piezo sensor, optical dust sensor, buck converter, Battery Management system, and a display were used to build the system. The results were compared with the test results obtained from the localized emission test centers. This developed module provided a more detailed description of vehicles with in-depth analysis. Moreover, the system suggested the improvements required for diesel vehicles with higher emissions. A feedback model analysis has been performed to understand the market expectations with this novel solution. 75% of the 253 targeted population were positive on the developed solution. On average, the developed device indicated values around 0.79 whereas the emission report provided 0.675. It can be concluded that both results were comparable and beneficial for remote usage in terms of diesel vehicles.

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