## Project Details

| Project Title | Development of series hybrid test platform and associated control strategies |

As the world is moving from internal combustion engines (ICE) to electric vehicles (EVs) there is a key step in this transition which is often overlooked in the present scenario which is hybrids. Automotive hybridization ensures that we obtain the best of both worlds, namely the improved efficiency on an electric machine and extended range of an ICE. There are several benefit mechanisms of hybrids namely load leveling, kinetic energy recovery and reduced tail-pipe emissions. This project will focus on exploring different categories like micro, mild, full, plug-in and range extended hybrids. Next different vehicle architectures would be investigated to realize these categories like series, parallel, through-the-road, combined, powersplit, coupled Powersplit and compound coupled powersplit architecture. These different architectures will be mathematically modelled that will require the modeling of the engine, alternator, battery, power electronic converters and electric motors. Next a test-rig will be developed to evaluate the performance of the architecture chosen. Finally, this hybrid architecture will be installed in a test vehicle in order to enhance the vehicle fuel economy and performance.

To this end, some of the series hybrid rigs have been partially developed at the Center for Automotive Research, IITD which can be used for the initial benchmark studies (see Figure below). The potential candidate must have hands-on experience or willing to acquire the skillsets required in developing the rigs, testing them on the dynamometer, perform mathematical modeling and finally perform field tests.

More details about the faculty members are available on the following links:

https://web.iitd.ac.in/~husaink/
https://web.iitd.ac.in/~amitjain/
Ph.D. Supervisors

<table>
<thead>
<tr>
<th>Role</th>
<th>Faculty</th>
<th>Academic Unit in IITD/Institute/University</th>
<th>Email ID (Official)</th>
</tr>
</thead>
<tbody>
<tr>
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Project requirements (Student qualifications, experience required, etc)

- Bachelor’s in Mechanical or Electrical engineering (ME/EE) with CGPA 7.0 and above with a valid GATE Score of 700 and above.
- Masters degree in ME or EE with focus on vehicle or mechatronic systems with CGPA of 7.0 or more.
- Elementary understanding of electric machines and IC engines.

Source of fellowship/funding
( CSIR/UGC/DBT/ICMR/ICAR/NEET-PG/DST-INSPIRE/IRD/FITT Project details, if any)

Institute Fellowship

Role of Faculty Members involved:

HK will help in building the prototype vehicle and the rig. He will also assist in building the mathematical model of the system. AKJ will assist in developing the motor and controller, power electronics interface and the alternator for the wheel motors.