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**Research Area**

- Vibration energy harvesting where Dr. Nitin had reported energy harvesting devices with excellent power to weight ratio.
- The main highlights of the work includes motion modification using gears/linkage/fluid links, detailed Matlab/FEA analysis, customized design of the necessary electric generators, smart materials, smart manufacturing and detailed experimentation in time and frequency domain with sensors including accelerometer, LVTD and other types of sensors.
- Recently work has been started in process for use of Nano-Technology for hydrophobic surface, high loss factor composites, high strength epoxy based composites, heat storage and improvement in heat transfer with non-fluids, FE-N magnets and magnetic composite materials.

Few funded research projects are presently in progress and few have been completed in the domains of vibrations, complaint/flexible mechanism, Nano particles and magnetic material development.

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**Publications**

- Design and analysis of motion and energy regulating vibration harvester
- Study on Manufacturing of High Purity thin Iron Foil
- Design and Analysis of Eddy Current Damper
- Energy Harvesting Shock Absorber with Linear Generator and Mechanical Motion amplification
- Design and analysis of switchable magnetic polarity bistable energy harvester
- Implementation of Mechanical Motion Amplifier in Hybrid Shock Absorber with Linear Generator and Fluid Damper
- Investigation of mechanical motion amplification for vibration energy harvesting
- Characterization of Magneto-Rheological Damper
- Design & Development of Regenerative Braking System at Rear Axle
- Mathematical modeling and experimental investigation of regenerative shock absorber
- Fluid flow modelling of a fluid damper with shim loaded relief valve
- Performance and Emission Characteristics of Thermal Barrier Coating on Diesel Engine Fueled with Cottonseed Biodiesel
- Design and Fabrication of Electromagnetic Shock Absorber

- Design and Analysis of Ball Screw-Based Inertial Harvester
  - Design and analysis of energy-harvesting shock absorber with electromagnetic and fluid damping
  - Energy Harvesting Shock Absorber with Electromagnetic and Fluid Damping
  - Hybrid electromagnetic shock absorber for energy harvesting in a vehicle suspension
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### **Projects**

- Design and analysis of air water harvester
- Development of high energy magnets with Iron Nitride
- Development of super-hydrophobic surface with nano material
- Design and development of a passive vibration isolator for machine tool application
- Investigation of pure iron application in magnetic shielding
- Wearable vibration energy harvester for utilization of human walking and running motion
- Design of a controllable torsional damper with MR fluid
- Design of Automated Tube Coning Machine
- Design of spot cooling device for heat transfer augmentation
- Design optimization of a heated vessel in collaboration with a leading healthcare machine manufacturer