Clutchless Shifting of Manual Transmission
Technology #17743

Applications
This novel transmission concept has application for the high-performance vehicle industry.

Problem Addressed
Current hybrid transmission systems sacrifice high-performance operation (e.g. low weight, high speed, smooth acceleration) to increase fuel efficiency and to reduce greenhouse gas emissions of a vehicle. This hybrid transmission concept improves powertrain performance to maintain high-performance operation while facilitating more efficient driving in urban settings.

Technology
The proposed hybrid transmission design features a dual-shaft, clutchless transmission configuration to improve powertrain performance. Powertrain performance improvements result from a clutchless transmission design paired with a speed-matching concept in a hybrid system. A hybrid system uses an electric motor (EM) in unison with an internal combustion engine (ICE) to maintain high-performance operation and fuel efficiency in urban driving.

This transmission design achieves a significant reduction in transmission mass through removal of a clutch and several gears. Additionally, this hybrid design improves transmission efficiency while also reducing inertial, frictional, and mechanical losses. Speed-matching functionality assists the electric motor and allows for clutchless gear shifting.

Advantages
- Significant reductions in transmission mass due to clutchless design
- Improved fuel efficiency in urban driving
- Reduction of transmission losses

Categories For This Invention:
Energy
Electric Vehicles
Hydrocarbons
Other (Hydrocarbons)
Transportation
Engines/Motors

Intellectual Property:
Clutchless shifting of a manual transmission
Issued US Patent

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**Publications:**

- **Clutchless Hybrid Transmission Concept for High-Performance Cars**  
  SAE International  
  April 25, 2016
- **Feasibility of a Clutchless Dual-Shaft Hybrid Transmission System for Performance Applications**  
  18th International Conference on Advanced Vehicle Technologies, ASME IDETC/CIE  
  2016
- **Design of a Clutchless Hybrid Transmission for a High-Performance Vehicle**  
  Power Transmission and Gearing Conference, ASME IDETC/CIE  
  2015

**External Links:**

GEAR Lab  