



# Precise, Reliable and Robust Free Piston Engine with Virtual Crankshaft (20120205, Dr. Zongxuan Sun)

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## Category

Engineering & Physical Sciences/Design Specifications  
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## Free Piston Engine Provides Precise Piston Motion Control

A real-time active piston motion control acts as the virtual crankshaft in a free piston engine to coordinate the combustion and the load. The control system forces the piston to follow a pre-determined trajectory by sensing the combustion event and the load in real-time. This allows the piston motion to be precisely controlled in real-time, which is difficult with the current free piston engine technologies.

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## Efficient Free Piston Engine and Fluid Power Package

The design offers increased fuel efficiency by adjusting the engine compression ratio in real time. Potential applications of the free piston engine and high pressure fluid power package include off road machinery, agricultural equipment, on-highway vehicles and smaller mobile applications (5-10 kW). The proposed method is also applicable to free piston engine linear alternator.

### BENEFITS OF FREE PISTON ENGINE WITH IMPROVED OPERATION:

- Higher fuel efficiency by adjusting the engine in real time.
- The invention offers precise control of piston motion and robust engine operation.
- Increased power density.

## Researchers

Zongxuan Sun, PhD

Department of Mechanical Engineering, School of Science and Engineering

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