



## SENIOR DESIGN ORGANIZATION SYNOPSIS – SPRING 2013

### EXHAUST POWERED TURBINE

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**Team 7: Brian Gleason, Angel Fernandez, Efrain Rivero**

**Faculty Advisor: Dr Andrés Tremante**

Waste is always a major concern when designing an energy producing system. When designing an internal combustion engine, only so much can be done to reduce the amount of waste generated. Introducing a mechanism into the exhaust pipe of an automotive will utilize the wasted exhaust energy. The kinetic energy in exhaust gas can be used to drive a turbine, which will be used to gather and store energy.

The purpose of this project is to design a turbine to capture the wasted exhaust energy similar to the method used by a turbocharger, but instead use the harvested energy to charge a battery and provide assistance to existing gasoline-electric hybrid engine systems. This design will help reduce emissions by being able to reduce manufacturer's engine size while providing an alternate innovation in recharging the batteries. The reduction of the CO<sub>2</sub> emissions is an important part of our considerations as well in order to help preserve the planet.

For this project, our team will be designing a turbine that will be adapted to an automobile exhaust pipe to utilize the high speed of exhaust gas. The kinetic energy will be converted to electrical energy while maintaining the engine's efficiency. The major challenge is to design the turbine such that it introduces a negligible amount of back pressure in the exhaust pipe. This will allow the turbine to capture as much energy as possible without affecting the performance of the engine.