Project Descriptions for ME463 Fall 2014

1. Project Title (Team Name): Truck Bed Cover (B.S.M.E)
   Project Description: The object of this project is to design an OEM Tonneau cover for Chrysler truck beds in order to improve aerodynamic flow over the truck bed, decreasing drag and improving fuel economy of the truck.

2. Project Title (Team Name): Ultra-Quiet Boat Thruster (Boiler Boat Drives)
   Project Description: Design and build a prototype of a new propulsion system for boats. The new system will use low-velocity, high-volume of water to propel a boat slowly and quietly. The drive is a box that is open on two ends to allow water to flow in and out. Inside the box is a flexible fin, driven by three slider crank mechanisms, to propel water from one end to the other. The new drive offers low-speed quiet operation that doesn’t harm fish or plants.

3. Project Title (Team Name): ATF Cracked Head Detection (Cold Heads)
   Project Description: ATF is a global leader in the design and manufacture of tight tolerance metal components, assemblies, and engineered fasteners. During the heading process for these fasteners cracks occasionally occur in the heads. The purpose of this project is to design a system to detect the cracks in the heads and sort the good parts from the bad parts while they are streaming off of the cold-heading machine.

4. Project Title (Team Name): Bicentennial Torch Design (Hadley’s Inferno)
   Project Description: In 2016 the state of Indiana will be celebrating its bicentennial (200 years). Many festivities will be scheduled, including a torch relay which will travel through all 90 counties of Indiana. In each county, the torch will be involved in activities that celebrate each county’s unique attributes such as possibly being attached to racecar at Indianapolis Motor Speedway or attached to combine in a county where the farming community is strong. The purpose of this project is to design the torch which will be visible in all weather conditions, and also offer tracking and video feeds to the internet.

5. Project Title (Team Name): Passive Ride-Height Controlling Racing Shocks (JCAPP Racing Dampers)
   Project Description: One issue with high-speed racing is sizeable levels of downforce cause large amounts of suspension displacement, causing the under trays of a racecar to drag on the ground. The under trays are part of the aerodynamic package on the racecar and keeping them damage free ensures optimal performance. The current solution to a low ride height requires stiff springs to maintain the ride height, but stiff springs can degrade handling performance. If the springs are too stiff the racecar has a tendency to bounce uncontrollably over track imperfections. Passive ride height controlling dampers with position dependent damping characteristics will be designed, analyzed and tested to solve this issue.

6. Project Title (Team Name): Prosthetic Interfaces for Comfort (Out on a Limb)
   Project Description: Poorly fitting prosthetic devices can result in pain, discomfort, and ulceration for those with amputated or prosthetically adapted limbs. Enhancing prosthetic fit by accommodating for volume fluctuation of the residual limb is conducive in improving prosthetic utility and patient comfort. A prosthetic interface is designed that allows the patient to self-adjust the fit with inflatable bladders between their limb and the prosthesis.
7. **Project Title (Team Name):** Morphing Airplane Wing (Flex Flight)  
   **Project Description:** Flex-flight is committed to designing and building a structurally sound airfoil with a variable-camber geometry to increase flight performance by changing lift and drag characteristics.

8. **Project Title (Team Name):** Indoor Lift Cart (Oriental Power)  
   **Project Description:** A 4 wheeled cart with a platform that is able to move up and down and is capable of propelling itself at a slow speed. The cart is to be able to easily fit though most household doors.

9. **Project Title (Team Name):** Overhead Bike Rack System (Skyrack)  
   **Project Description:** System for storing bicycles overhead.

10. **Project Title (Team Name):** Autonomous Stadium Sweeper (JaniTec)  
    **Project Description:** We will design an autonomous device to clear trash and debris away from the seating area and into the aisles in Purdue’s Mackey Arena, thus allowing for trash to be more easily swept up by janitors. This device will move along the benches and use plows and squeegees to clear debris. The device will need to be moved manually at times to get around the stadium and to switch between benches.

11. **Project Title (Team Name):** Aerodynamics Prototype for Purdue Electric Racing (AMPS Aerodynamics)  
    **Project Description:** The objective of this project is to create a physical prototype of aerodynamic devices for Purdue Electric Racing team who competes in FSAE Electric at Lincoln, NE. The aerodynamic devices will improve the performance of the car as they will create more downforce to assist with cornering in skidpad, autocross, and endurance events. As a second year car, this is going to be the first aerodynamic package for the team. This project will include front and rear wings and bodywork. It will cover the fundamental analysis, Computational Fluid Dynamics (CFD) and structural analysis. The aerodynamic package that is going to be manufactured in this semester is the front wing.

12. **Project Title (Team Name):** Object Sensing Dog Collar (Doggy Sixth Sense)  
    **Project Description:** There are several causes that can lead to blindness in dogs such as injury, illness, birth defects, age. Currently, blind dogs use the senses of touch, hearing, and smell to become oriented and navigate their way around. The purpose of Doggy 6th Sense is to design and build a dog collar which can assist blind dogs on sensing objects in their walking path. This collar will utilize a proximity sensor to alert the dog through sound when it is approaching an object in the walking path.

13. **Project Title (Team Name):** Gutter Cleaner (Gutter DeClutter)  
    **Project Description:** The goal of our project is to create an automatic mechanism capable of removing debris from gutters. This mechanism should move at a faster rate than what a human can clean the gutters at. The mechanism should also reduce the risk currently associated with cleaning gutters. Our current design is 10.26” long, 3.73” wide, and 3.28” high, which is dimensioned to fit in a 6K style gutter. To remove the debris we are using an angled spinning horizontal brush. We are using a set of treads to move the mechanism, and a remote control to control its movement forwards and backwards.

14. **Project Title (Team Name):** Mackey Arena Step Cleaning Robot (Keady Kleaners)  
    **Project Description:** Team Keady Kleaners plan to design and build a fully-functional robot whose
purpose is to move trash in Mackey Arena, and consolidate it to the aisles of the arena to facilitate easy trash retrieval. This project was taken up to help the cleaning staff following events in Mackey Arena. The device will be autonomously guided by sensors for navigating through the arena and traversing the steps.

15. Project Title (Team Name): Bicycle Regeneration Braking (Kinetic Energy Regeneration)
   Project Description: In the ASME human powered vehicle competition, frequent stops and restart of vehicle on track consume large amount of physical energy of the biker. The goal of this project is to design an assisting device that harvest kinetic energy of the vehicle when it brakes and then release the energy stored to help biker accelerate the vehicle when needed.

16. Project Title (Team Name): Aircraft Tow-Bar (Ground Control)
   Project Description: The project mission is to build a small electronic, remote controlled device that will easily transport a small tail-dragger aircraft from its storage location to its takeoff location. The proof-of-concept for this project will be if the device is able to maneuver across multiple terrains while effectively moving an aircraft from its storage location, to its takeoff location. The experiment will consist of attaching the device to the aircraft and moving it to the desired location.

17. Project Title (Team Name): Universal Poster Board Carrier and Presenter (Ascension)
   Project Description: Our product will solve the issue of inconvenience that arises when a person is carrying & presenting their poster board to their target audience. It could be used for protesting, public speaking, advertisement, marketing, good causes and many other desired uses. It will be positioned on the user’s back allowing the user to show their poster board to be positioned in multiple positions due to its adjustability feature. It will also be lightweight, inexpensive with minimal moving parts. Simplicity will be a key feature in our final, chosen design.

18. Project Title (Team Name): Swine Cooling System (Cool Pigs)
   Project Description: Heat stress in pigs (sows and boars) is a major problem facing the animal farming industry. Heat stress has a negative impact on pig’s reproductive performance and overall health. There is a strong need to develop a method and/or technology to remove excess heat from these individual pigs. A traditional method of cooling the entire space enclosure housing the pigs farrowing room has not been possible. It should be noted that environmental temperatures over a certain range tend to induce heat stress in grown-up pigs while cooler temperature impact the growth of piglets. Develop a method/system to remove excess heat from the pigs to mitigate heat stress.

19. Project Title (Team Name): Adaptable Pump and Filtration System for Bicycles (Integrated Water Systems)
   Project Description: Many developing nations continue to face problems with safe drinking water. The issue receives a lot of attention but a cost effective widespread implemented solution has still yet to occur. This team seeks to provide a solution for the majority of the market in need. A replaceable and adaptable system containing a pump, filter and storage system that can be fitted to any bicycle is the desired end result. The bicycle is a critical component of the system for two reasons: first it offers a mode of transportation, as many wells are located far from residential areas, and second it offers an efficient purely mechanical drive train. The user should be able to drive the pump and filter using the bikes drive train and gear system. A self priming pump and multi-stage filtration system (large particles and microbes) will be employed to provide the user with clean and safe drinking water.
20. Project Title (Team Name): Ped-Functional Prosthetic Foot (SmallStepGiantLeap)
   Project Description: Our goal is to design and prototype an innovative prosthetic foot that is both more functional and less costly than the average prosthetic foot currently on the market. As far as functionality goes, the prosthetic should be able to overcome common obstacles encountered daily such as ledges, uneven terrain, rocks, etc.

21. Project Title (Team Name): Modern Vinyl Record Player (Vinyl Revival)
   Project Description: The goal of this project is to create a reimagined record player that embraces the new and growing culture associated with vinyl records. The idea is to have a wall mounted and minimally visible record player that not only maintains the quality of the analog audio, but also displays the records themselves, while imposing minimum wear on the record grooves.